IZDEVNIECĪBA
BALTIJA
PUBLISHING

SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF GLOBAL TRANSFORMATIONS

Scientific monograph

Part 1

Riga, Latvia
2026

UDK 001(082)
SU830

Title: Sustainable Development in the Context of Global Transformations

Subtitle: Scientific monograph

Scientific editor and project director: Anita Jankovska

Authors: Ilona Babukh, Viktoriia Bozhenko, Halyna Haman, Mykhailo Hantsiak, Igor Guzhva, Mariana Dobrivska, Maria Yaroshko, Iryna Kohut, Tetyana Lebid, Maryana Kohut, Iryna Kupriianchyk, Viacheslav Makedon, Viktoriya Onyshchenko, Nadiia Paranytsia, Tetiana Perehudova, Olha Serikova, Olena Petrushka, Mykhaylo Pityulych, Kudak Krystyna, Nataliia Sokrovolska, Alina Korbutiak, Oksana Stepanenko, Oleksiy Stupnytskyy, Volodymyr Vergun, Serhiy Borysov, Oleh Ustymenko, Nataliia Kholiavko, Ihor Potseluiko, Sergiy Tsviliy, Pavlo Bobrykin

Publisher: Publishing House "Baltija Publishing", Riga, Latvia

Available from: http://www.baltijapublishing.lv/omp/index.php/bp/catalog/book/772

Year of issue: 2026

All rights reserved. No part of this book may be reprinted or reproduced or utilized in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publisher and author.

Sustainable Development in the Context of Global Transformations : Scientific monograph. Part 1. Riga, Latvia : Baltija Publishing, 2026. 584 p.

ISBN: 978-9934-26-715-4

DOI: https://doi.org/10.30525/978-9934-26-715-4

The scientific monograph presents theoretical and practical aspects of the development of science, technology, and innovation. It covers general issues of world economy and international economic relations, management of national economy, finance and tax policy, Innovations and investment activity, etc. The publication is intended for scientists, educators, postgraduate students and undergraduates, as well as the general readership.

© Izdevniecība "Baltija Publishing", 2026
© Authors of the articles, 2026

Table of Contents

SECTION «ECONOMIC SCIENCES»

CHAPTER
CREATIVE ECONOMY IN THE SYSTEM
OF REGIONAL INNOVATION DEVELOPMENT:
THEORETICAL AND STRATEGIC FOUNDATIONS
(Ilona Babukh) 1

CHAPTER
COMPLEMENTARY MODEL OF CYBERSECURITY,
ANTI-CORRUPTION AND ECONOMIC DE-SHADOWING REFORMS:
A ROADMAP FOR WARTIME AND POST-WAR DEVELOPMENT
(Viktoriia Bozhenko) 28

CHAPTER
ENTREPRENEURIAL CAPITAL MIGRATION:
TRANSFORMATION AND CHALLENGES UNDER WAR
(Halyna Haman) 49

CHAPTER
STRUCTURAL ASYMMETRIES IN THE DISTRIBUTION
OF LOAN CAPITAL IN THE ECONOMY
(Mykhailo Hantsiak, Igor Guzhva) 69

CHAPTER
THE LEADER/CLLD APPROACH
AS A MECHANISM FOR SUPPORTING
THE SUSTAINABLE DEVELOPMENT OF RURAL AREAS
(Mariana Dobrivska, Maria Yaroshko) 97

CHAPTER
PROJECT MANAGEMENT
UNDER CONDITIONS OF DIGITAL TRANSFORMATION
AND THE BANI ENVIRONMENT
(Iryna Kohut, Tetyana Lebid) 129

CHAPTER
FOREIGN DIRECT INVESTMENT
AS A DRIVER OF ECONOMIC GROWTH:
TRENDS, CHALLENGES, AND STRATEGIC PROSPECTS FOR UKRAINE
(Maryana Kohut) 157

CHAPTER
RATIONAL USE AND PROTECTION OF LAND
AS COMPONENTS OF STATE ENVIRONMENTAL POLICY
(Iryna Kupriianchyk) 176

CHAPTER
ENTERPRISE POTENTIAL FOR SUSTAINABLE GROWTH:
INNOVATION CAPACITY, INVESTMENT RESOURCES,
AND STRATEGIC RESILIENCE
(Viacheslav Makedon) 201

CHAPTER
COGNITIVE RISK-ORIENTED CONTROL OF TRADE RECEIVABLES
UNDER THE DIGITAL TRANSFORMATION OF ACCOUNTING
(Viktoriya Onyshchenko) 229

CHAPTER
BILLIONS THROUGH "DORMANT" COMPANIES:
A STUDY BASED ON THE ANALYTICAL TOOLS YOUCONTROL
AND YC.MARKET
(Nadiia Paranytsia) 259

CHAPTER
GLOBAL AND NATIONAL FEATURES OF SOCIAL INEQUALITY:
A MULTIDIMENSIONAL APPROACH
(Tetiana Perehudova, Olha Serikova) 291

CHAPTER
FINANCIAL RISKS OF FRAUD
IN THE SYSTEM OF INSURANCE RELATIONS:
ECONOMIC CONSEQUENCES AND COUNTERMEASURES
(Olena Petrushka) 323

CHAPTER
SOCIAL CAPITAL DEVELOPMENT
IN MOUNTAIN TERRITORIAL COMMUNITIES:
A STRATEGIC APPROACH IN A MULTI-ETHNIC REGION
(Mykhaylo Pityulych, Krystyna Kudak) 350

CHAPTER
PROBLEMS AND DIRECTIONS
FOR IMPROVING THE EFFICIENCY OF BUDGET FINANCING
FOR UKRAINE'S POST-WAR RECOVERY
(Nataliia Sokrovolska, Alina Korbutiak) 373

CHAPTER
INTANGIBLE ASSETS IN THE DIGITAL ECONOMY:
CORPORATE VALUE, ARTIFICIAL INTELLIGENCE AND RESILIENCE
(Oksana Stepanenko) 422

CHAPTER
QUANTUM-SINGULAR ORIENTATION
OF THE NEOTECHNOLOGY PARADIGM
OF WORLD ECONOMIC DEVELOPMENT
(Oleksiy Stupnytskyy, Volodymyr Vergun, Serhiy Borysov) 463

CHAPTER
STRATEGIC MANAGEMENT TRANSFORMATION
AND SUSTAINABLE DEVELOPMENT IN IT OUTSOURCING
(Oleh Ustymenko) 500

CHAPTER
GLOBAL EXPERIENCE OF STATE INSTITUTIONS
USING ARTIFICIAL INTELLIGENCE TECHNOLOGIES
FOR PRUDENTIAL SUPERVISION
OF CREDIT INSTITUTIONS' ACTIVITIES
(Nataliia Kholiavko, Ihor Potseluiko) 532

CHAPTER
CURRENT STATE AND PROBLEMS
OF FORMING AN ACCESSIBLE ENVIRONMENT
FOR THE IMPLEMENTATION OF PROMISING DIRECTIONS
OF INCLUSIVE TOURISM IN UKRAINE
(Sergiy Tsviliy, Pavlo Bobrykin) 551

SECTION «ECONOMIC SCIENCES»

CREATIVE ECONOMY IN THE SYSTEM OF REGIONAL INNOVATION DEVELOPMENT: THEORETICAL AND STRATEGIC FOUNDATIONS

Ilona Babukh[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-1

Abstract. The chapter examines the theoretical, methodological, and strategic foundations of creative economy development within the regional context. The relevance of the study is determined by the transformation of contemporary models of regional development under the influence of the knowledge economy, digitalization, innovation, and the growing importance of human capital. Under these conditions, the competitiveness and resilience of regions increasingly depend on their ability to mobilize available resources, generate and implement new ideas, develop entrepreneurship, and transform intangible assets into economic and social value. The purpose of the chapter is to substantiate the theoretical and methodological foundations and strategic directions for the development of the creative economy as a factor of regional innovation and socio-economic development.

The study systematizes theoretical approaches to understanding the creative economy and its regional dimension, clarifies the relationship between creative potential, creative industries, and the creative economy, identifies the role of human, intellectual, cultural, entrepreneurial, and institutional resources, and examines the mechanisms through which their interaction affects regional development. Particular attention is paid to the distinction between the creative potential of a territory and the effectiveness of its utilization. The methodology is based on systemic, institutional,

[1] Candidate of Economic Sciences, Associate Professor,
Associate Professor at the Department of Marketing,
Innovation and Regional Development,
Yuriy Fedkovych Chernivtsi National University, Ukraine

© Ilona Babukh

spatial, structural-functional, and strategic approaches, as well as on the methods of analysis and synthesis, comparison, theoretical generalization, systematization, and conceptual modelling.

The scientific contribution of the chapter consists in substantiating a systemic approach to the creative economy as the capacity of a territory to transform its human, intellectual, and cultural potential into economic and social value through entrepreneurship, innovation, digitalization, creative industries, cultural resources, and institutional interaction. The chapter demonstrates that the availability of creative resources does not automatically generate corresponding development outcomes. Their realization depends on the quality of the regional institutional environment, infrastructure, entrepreneurial ecosystem, professional networks, access to finance, digital opportunities, and external markets. On this basis, a conceptual model of the transformation of regional creative potential into development outcomes is proposed, and strategic directions for strengthening the creative economy are systematized with due consideration of territorial differentiation. For Ukraine, the proposed approach is particularly relevant under conditions of war, structural transformation, and regional recovery, as it emphasizes the restoration and productive utilization of human capital, support for entrepreneurship and innovation, digital transformation, preservation and economic activation of cultural resources, and integration of regions into national and international networks.

INTRODUCTION

Contemporary regional economic systems are undergoing substantial structural transformations associated with the increasing importance of knowledge, creativity, innovation, digital technologies, and intangible assets. Traditional sources of territorial competitiveness based primarily on material resources, physical infrastructure, and economies of scale are increasingly complemented by human and intellectual capital, the ability to generate and implement new ideas, and the capacity to create products and services with a high knowledge and creativity component. These changes determine the growing importance of the creative economy within contemporary approaches to regional development.

The concept of the creative economy has attracted considerable scholarly and policy attention; however, its interpretation remains multidimensional.

It is frequently associated with creative industries, while its actual scope is broader and encompasses processes of generating, transforming, commercializing, disseminating, and using creative and intellectual resources. The creative economy therefore intersects with entrepreneurship, innovation, education, culture, digitalization, employment, intellectual property, and regional policy.

The regional dimension of the creative economy is particularly important because creative resources are unevenly distributed across territories, while the institutional and infrastructural conditions for their utilization differ substantially. The presence of universities, cultural institutions, creative enterprises, skilled professionals, or digital infrastructure does not automatically ensure corresponding economic outcomes. The effectiveness of these resources depends on the quality of interaction among regional actors, access to finance and markets, entrepreneurial opportunities, institutional support, and the capacity of a territory to retain and attract human capital.

For this reason, the analysis of the creative economy requires a distinction between the creative potential of a territory and the effectiveness of its utilization. Creative potential reflects the resources and capacities that can be mobilized for creative and innovative activity, whereas effectiveness reflects the extent to which these resources are transformed into economic, social, and cultural outcomes. This distinction makes it possible to move beyond a purely sectoral understanding of the creative economy and to consider it as a systemic characteristic of territorial development.

The issue is particularly relevant for Ukraine. War, demographic changes, internal displacement, destruction of infrastructure, changes in employment patterns, and regional economic disparities have significantly altered the conditions of territorial development. In the recovery period, regional policy must address not only the physical reconstruction of infrastructure but also the restoration of human capital, entrepreneurial activity, professional networks, innovation capacity, and cultural environments. Under these circumstances, the creative economy can become one of the mechanisms of structural modernization and economic diversification, provided that appropriate conditions are created for the realization of regional creative potential.

The author's approach is based on understanding the creative economy not merely as a set of creative industries but as a systemic capacity of a territory to transform human, intellectual, and cultural potential into new economic and social value. Creative industries constitute an important structural component of this system, but the broader creative economy also includes the institutional, entrepreneurial, technological, educational, cultural, and network conditions under which creative resources are realized.

The purpose of the chapter is to substantiate the theoretical foundations and strategic directions of creative economy development within the regional context, identify the mechanisms through which the creative economy influences innovation and socio-economic development, and determine the key priorities for its development under contemporary conditions in Ukraine. The object of the study is the process of creative economy development within the regional context. The subject comprises theoretical provisions, mechanisms, and strategic approaches to the development of the creative economy as a component of regional innovation and socio-economic development. The methodological basis of the study consists of systemic, institutional, spatial, structural-functional, and strategic approaches, supplemented by the methods of analysis and synthesis, comparison, theoretical generalization, systematization, and conceptual modelling.

The chapter is structured according to the logic of the research. The first section examines the conceptual foundations of the creative economy and clarifies its regional dimension. The second section focuses on the mechanisms through which the creative economy influences innovation and socio-economic development. The third section substantiates strategic directions for the development of the creative economy with consideration of territorial differentiation and the contemporary challenges facing Ukraine.

1. Conceptual Foundations of the Creative Economy

Structural transformations of contemporary economies are accompanied by a gradual change in the sources of economic growth and territorial competitiveness. Whereas the industrial model was predominantly based on physical capital, natural resources, economies of scale, and standardized production, contemporary development increasingly depends on knowledge, information, human capital, intellectual assets, innovation, and

creativity. Under these conditions, creativity acquires the characteristics of an economic resource capable of influencing entrepreneurial activity, innovation processes, employment structures, and the competitiveness of territories.

The emergence of the creative economy concept can be regarded as a logical continuation of the development of theoretical approaches to the knowledge economy, post-industrial society, innovation, human capital, and intangible assets. The essential transformation consists not simply in increasing the amount of knowledge available to economic actors but in their ability to combine knowledge, technology, cultural resources, experience, and creative competencies in order to generate new value.

The concept of the creative economy has no single universally accepted definition. This is explained by its interdisciplinary character, the rapid development of digital technologies, changes in the structure of creative activity, and the increasing integration of creativity into traditional economic sectors. UNCTAD considers the creative economy as an evolving concept based on the interaction of human creativity and ideas, intellectual property, knowledge, and technology. Its scope includes a broad range of creative goods and services and reflects the increasing role of creative industries in economic activity and international trade [1].

At the same time, the creative economy cannot be reduced to creative industries. Creative industries represent economic activities in which creativity, cultural content, knowledge, and intellectual property play a particularly significant role in value creation. The creative economy has a broader meaning because it encompasses the environment and processes through which creative resources are generated, accumulated, transformed, commercialized, and reproduced.

This distinction is important for regional analysis. Identifying the creative economy exclusively with the number of creative enterprises may underestimate its actual contribution to territorial development. Creative practices and competencies can influence manufacturing, tourism, education, healthcare, trade, services, public administration, and other activities. Design, digital technologies, marketing, cultural content, new organizational solutions, and creative approaches to problem-solving can increase the competitiveness of sectors that are not formally classified as creative industries.

Ukrainian research also emphasizes the transformation of economic relations associated with the growing role of knowledge, information, innovation, and creativity. H. M. Samiilenko examines the theoretical foundations and specific features of the functioning of the creative economy under conditions of the emergence of a new economy, thereby emphasizing the systemic transformation of economic activity associated with the growing importance of creative resources [2]. From a methodological perspective, it is therefore necessary to distinguish among the concepts of creativity, creative activity, creative industries, creative potential, and creative economy.

Creativity refers to the ability to generate original and potentially useful ideas. Creative activity represents the practical application of this ability. Creative industries are types of economic activity in which creativity, cultural content, knowledge, and intellectual property constitute important factors of value creation. Creative potential reflects the aggregate resources and capacities available to a territory for generating and implementing creative solutions. The creative economy, in turn, encompasses the broader economic, social, cultural, technological, and institutional system within which this potential is formed, realized, and reproduced.

This distinction is particularly relevant at the regional level. A region possesses creative potential when it has a combination of human, intellectual, cultural, technological, entrepreneurial, institutional, and infrastructural resources that can be mobilized for the creation of economic and social value. However, the existence of such resources does not necessarily mean that the region has a highly developed creative economy. Between potential and actual outcomes lies a set of transformation mechanisms, including entrepreneurship, innovation, digitalization, access to finance, institutional support, professional networks, and market integration.

The regional dimension of the creative economy is therefore determined by the capacity of a territorial system to create conditions for the productive utilization of creative resources. Regions are not passive spatial environments. They provide the institutional and infrastructural context in which human capital is accumulated, knowledge is disseminated, entrepreneurial networks are formed, innovation is implemented, and cultural resources are transformed into products, services, and social value.

Spatial differentiation is particularly significant because human capital, educational and research institutions, cultural resources, infrastructure, and entrepreneurial networks are unevenly distributed. Territories also differ in institutional capacity, access to finance, digital connectivity, market opportunities, and their ability to retain or attract skilled people. Consequently, similar levels of creative potential may result in significantly different development outcomes. T. V. Posnova and M. M. Telishchuk emphasize the regional dimension of creative economy development in Ukraine and identify the importance of territorial differences and contemporary challenges to its recovery [3]. This supports the need for a spatially differentiated approach to regional creative economy policy.

Human capital is one of the fundamental prerequisites for creative development. Knowledge, professional competencies, creative abilities, critical thinking, communication skills, adaptability, and the ability to work with new technologies determine the capacity of a territory to generate and implement new ideas. T. V. Posnova emphasizes the role of creative human capital as a factor in innovative economic development, highlighting the importance of knowledge and knowledge-intensive technologies [4].

However, human capital cannot be treated as an automatically productive resource. Its economic contribution depends on the opportunities available for professional, entrepreneurial, and innovative realization. A region may have a substantial educational and intellectual potential but fail to convert it into economic value because of limited employment opportunities, insufficient entrepreneurial infrastructure, weak interaction between education and business, inadequate access to finance, or underdeveloped innovation networks. Education therefore performs a function that extends beyond conventional workforce training. Within the creative economy, educational institutions should contribute to the development of creative thinking, interdisciplinary competencies, digital skills, entrepreneurial abilities, and continuous learning. Research institutions and universities should also participate in knowledge generation, technology transfer, start-up development, and the formation of professional networks.

Investment in human capital is particularly important because human capital constitutes both a resource and a mechanism for the development of the creative economy. Research by S. Londar, A. Lytvynchuk, N. Versal, T. Posnova, and H. Tereshchenko demonstrates the relationship between

investment in human capital, education, innovation, and the formation of the creative economy [6].

Creative industries represent an important structural component of the creative economy. Their distinguishing feature is the combination of economic and symbolic value. Design, architecture, fashion, music, publishing, audiovisual production, advertising, programming, digital content, computer games, and other activities use creativity and intellectual property as important sources of value creation.

However, creative industries should not be considered synonymous with the creative economy. V. P. Ilchuk and I. V. Sadchykova emphasize the role of creative industries in the development and modernization of the real sector of the economy [8]. This supports the broader interpretation proposed in this chapter: creative industries form the structural core of the creative economy, while creative practices and resources can diffuse throughout the regional economic system.

Digitalization significantly expands the possibilities for creative activity. Digital platforms reduce some spatial barriers, facilitate access to external markets, enable remote and project-based employment, and create new forms of production and consumption. Programming, digital design, online media, digital art, video production, computer games, and other activities have become important components of the contemporary creative economy.

At the same time, digitalization does not eliminate regional disparities. Its economic effects depend on digital infrastructure, competencies, access to finance, entrepreneurial capabilities, and institutional support. Digital transformation should therefore be understood not merely as a technological process but as a component of regional modernization.

Entrepreneurship provides another essential mechanism for transforming creative potential into economic outcomes. A creative idea becomes economically significant when mechanisms exist for its implementation, commercialization, and market entry. Creative entrepreneurship often relies on intangible assets, including knowledge, intellectual property, design, brands, professional reputation, and digital content. It can therefore contribute to diversification, self-employment, small-business development, and the emergence of new business models.

The entrepreneurial function is closely linked to innovation. Creativity and innovation are related but not identical. Creativity is associated

primarily with the generation of new ideas, whereas innovation involves the practical implementation of new solutions and the achievement of economic or social effects. Creative potential therefore creates prerequisites for innovation, while entrepreneurial and institutional mechanisms determine whether these opportunities are realized. Culture and local identity represent another specific component of regional creative potential. Cultural heritage, traditions, crafts, architecture, artistic practices, and territorial symbols can provide the basis for new products and services, tourism development, territorial branding, and entrepreneurial initiatives. At the same time, cultural resources possess intrinsic social value and should not be reduced solely to their commercial potential.

An ecosystem approach makes it possible to integrate these components. A regional creative ecosystem includes enterprises, universities, research institutions, cultural organizations, public authorities, local communities, financial institutions, innovation centers, creative spaces, and individual creative professionals. Its effectiveness depends not simply on the number of actors but on the quality of relationships among them.

Institutional conditions determine the rules and mechanisms through which these actors interact. Intellectual property protection, entrepreneurial regulation, access to finance, public support programmes, innovation policy, education policy, and mechanisms of public-private cooperation all influence the ability of a region to transform creative potential into actual outcomes.

The principal components of the regional creative economy and their contribution to territorial development are summarized in Table 1.

The systematization presented in Table 1 demonstrates that the creative economy should be understood as an interconnected system rather than a collection of isolated sectors. Individual resources acquire economic significance through their interaction within an appropriate institutional and organizational environment. On this basis, the creative potential of a region can be defined as the aggregate of human, intellectual, cultural, entrepreneurial, technological, institutional, and infrastructural capacities that can be mobilized to create economic and social value.

Table 1

Main Components of the Creative Economy within the Regional Context

Component	Main content	Contribution to regional development	Key transformation mechanism
Human capital	Knowledge, competencies, creative abilities, professional and digital skills	Formation of the human-resource and creative capacity of a territory	Education, professional development, talent retention
Creative industries	Economic activities based on creativity, cultural content, and intellectual property	Creation of products, services, employment, and income	Commercialization of creative outputs
Entrepre-neurship	Commercialization of ideas and development of new business models	Economic diversification and increased business activity	Start-ups, SMEs, self-employment
Innovation	Generation and implementation of new products, services, technologies, and organizational solutions	Increased productivity and competitiveness	Interaction between knowledge and business
Digitalization	Digital technologies, platforms, and communication tools	Expanded markets and new forms of employment and cooperation	Digital transformation and market access
Cultural resources	Heritage, traditions, crafts, local identity, artistic practices	Territorial attractiveness, identity, and cultural-economic development	Cultural production and creative entrepreneurship
Institutional environment	Rules, organizations, public support, coordination mechanisms	Creation of conditions for the realization of creative potential	Governance and institutional coordination
Infrastructure	Educational, innovation, cultural, digital, and entrepreneurial facilities	Support for the functioning of the creative ecosystem	Access to resources and networks
Network interaction	Cooperation among business, education, research, culture, government, and communities	Knowledge circulation and joint project development	Partnerships and collaborative innovation

The creative economy of a region, in contrast, represents a system of economic, social, cultural, technological, and institutional relations through which this potential is transformed into products, services, innovations, employment, entrepreneurial activity, cultural value, and other development outcomes. This distinction leads to another important proposition: creative potential and creative economy performance are not equivalent. Potential reflects available opportunities, while performance reflects the extent to which those opportunities are realized. A region may possess considerable creative potential while demonstrating relatively modest creative economy outcomes if institutional, entrepreneurial, financial, infrastructural, or market conditions are unfavorable.

Accordingly, the assessment of the creative economy should combine three dimensions:

– resource dimension – the creative, human, intellectual, cultural, and infrastructural resources available to the region;

– enabling-environment dimension – the institutional, entrepreneurial, financial, digital, and network conditions for their utilization;

– performance dimension – the economic, innovation, employment, cultural, and social outcomes generated through the utilization of these resources.

This approach also has implications for measurement. Traditional indicators such as the number of creative enterprises, employment, turnover, or exports provide important information but do not fully capture the quality of institutional interaction, the strength of professional networks, innovation capacity, or the ability of a region to convert creative potential into sustainable development outcomes. UNCTAD's recent work also emphasizes the importance of developing appropriate statistical approaches to measuring the creative economy and its components [1].

Within the framework of this study, the creative economy is therefore defined as a system of economic, social, cultural, technological, and institutional relations through which the human, intellectual, and cultural potential of a territory is realized through creative industries, entrepreneurship, innovation, digital technologies, cultural resources, and network interaction and transformed into economic and social value.

This definition constitutes the central conceptual proposition of the chapter. It extends a narrow sectoral interpretation of the creative

economy and places the process of transforming territorial potential into actual outcomes at the center of analysis. For Ukraine, this approach is particularly important under conditions of war and recovery. Regional recovery requires not only physical reconstruction but also restoration of human capital, entrepreneurial activity, professional networks, cultural environments, and institutional capacity. Since the initial conditions of Ukrainian regions differ substantially, the development of their creative economies should be based on territorial characteristics rather than a uniform policy model.

Thus, the creative economy can be regarded as a systemic characteristic of a region's capacity to transform human, intellectual, and cultural resources into economic and social value. Its effectiveness depends on the interaction of resources, institutions, entrepreneurship, innovation, digitalization, culture, infrastructure, and networks. This conceptual framework provides the basis for analyzing the role of the creative economy in regional innovation and socio-economic development.

2. The Creative Economy as a Factor in the Innovation and Socio-Economic Development of Regions

The increasing role of knowledge, creativity, and intangible assets changes the mechanisms through which regional economies develop. The creative economy contributes to this transformation by creating conditions for the generation of new ideas, the emergence of entrepreneurial initiatives, the development of new products and services, and the formation of new employment opportunities. Its regional effect should not, however, be measured solely by the size of creative industries. The broader issue concerns the ability of a territory to transform creative potential into actual economic and social outcomes. This transformation occurs through several interconnected mechanisms: human capital development, entrepreneurship, innovation, digitalization, cultural production, employment creation, and network interaction.

The first mechanism is the development and utilization of human capital. Creative economic activity requires not only specialized knowledge but also critical thinking, adaptability, communication skills, digital competencies, and the ability to work across disciplinary boundaries. These characteristics increase the capacity of a region to generate and implement new solutions.

However, the existence of human capital does not automatically lead to regional development. Its contribution depends on the availability of employment opportunities, entrepreneurial opportunities, innovation projects, professional networks, and institutional mechanisms that allow people to apply their competencies locally. Consequently, the retention and attraction of skilled people becomes a strategic regional policy issue.

The second mechanism is the interaction between education, research, and business. Universities and research institutions generate and disseminate knowledge, while businesses provide opportunities for its commercialization and application. Public institutions can facilitate this interaction by supporting partnerships, innovation infrastructure, technology transfer, entrepreneurial education, and collaborative projects.

The effectiveness of such interaction depends on trust, professional networks, institutional incentives, and the capacity of regional actors to engage in long-term cooperation. Where these mechanisms are weak, knowledge and creative potential may remain underutilized. Entrepreneurship represents the third mechanism. Creative entrepreneurship transforms ideas, knowledge, design, intellectual property, and cultural resources into marketable products and services. It can contribute to economic diversification, self-employment, the development of small and medium-sized enterprises, and the emergence of new business models.

Research by S. Y. Lee, R. Florida, and Z. Acs demonstrates the relevance of creativity to regional entrepreneurial dynamics and new firm formation [7]. The regional entrepreneurial environment therefore constitutes an important intermediary between creative potential and economic outcomes.

The fourth mechanism is innovation. Creativity provides new ideas, while innovation involves their implementation. The creative economy can therefore contribute to regional innovation by generating new products, services, organizational solutions, technologies, business models, and forms of interaction. This relationship is particularly important in regions seeking to modernize traditional economic sectors. Creative capabilities can complement manufacturing, agriculture, tourism, trade, education, and services by introducing design, digital solutions, new marketing approaches, branding, and organizational innovations.

Digitalization represents the fifth mechanism. Digital technologies expand opportunities for production, communication, marketing, remote

work, and international cooperation. For small firms and individual creative professionals, digital platforms can reduce dependence on local demand and provide access to external markets. However, digitalization may also reproduce regional inequalities if territories differ substantially in digital infrastructure, competencies, financial resources, and institutional capacity. Digital development should therefore be integrated into broader regional policy rather than treated as an isolated technological objective.

The sixth mechanism concerns employment. The development of design, programming, media, digital services, architecture, advertising, cultural production, and other creative activities creates new forms of employment and professional self-realization. Freelancing, remote work, self-employment, and project-based employment can be particularly important for territories with limited traditional employment opportunities.

The seventh mechanism involves cultural resources. Cultural heritage, traditions, crafts, local architecture, artistic practices, and territorial identity can generate new economic activities while simultaneously strengthening social cohesion and territorial attractiveness. Their contribution is therefore both economic and socio-cultural.

These mechanisms are mutually reinforcing. Human capital provides the resource base, education and research generate knowledge, entrepreneurship creates opportunities for commercialization, innovation transforms ideas into practical solutions, digitalization expands the scale of interaction, cultural resources provide distinctive content, and institutions coordinate the process.

This interaction can be represented through the following conceptual model.

The model emphasizes that creative potential is not a direct development outcome. Its contribution is mediated by the enabling environment and the mechanisms through which resources are transformed into practical results. This distinction is central to understanding differences among regions. Two territories may have comparable educational resources or cultural assets but achieve different outcomes because of differences in entrepreneurship, infrastructure, access to finance, institutional capacity, or network interaction.

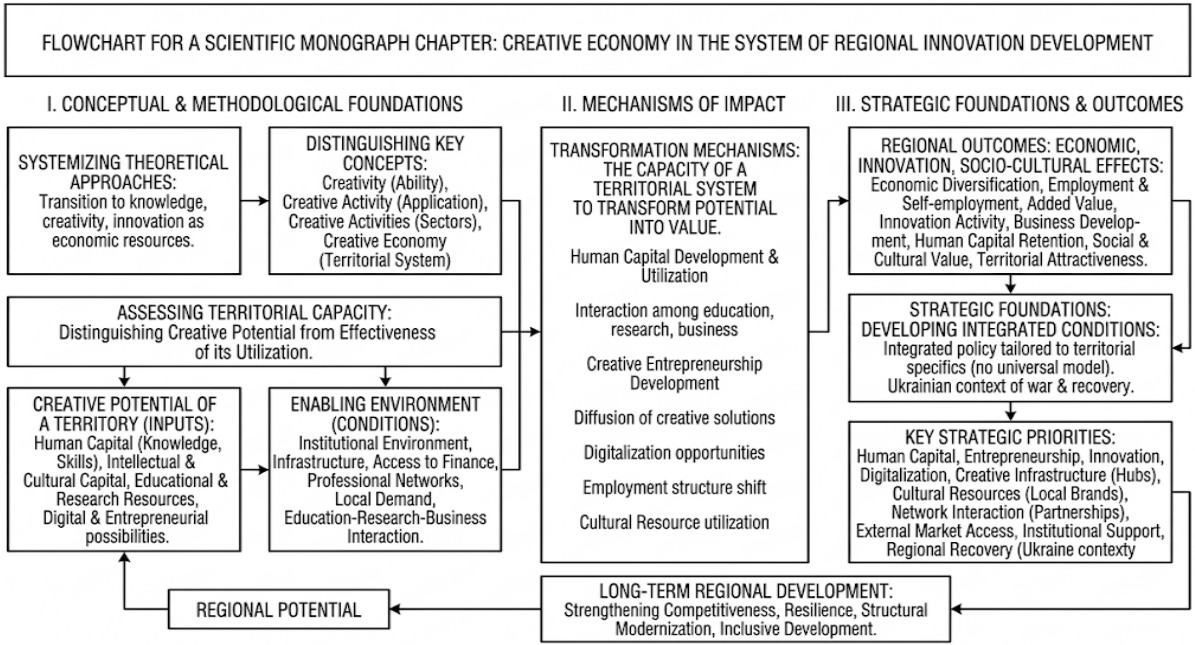


Figure 1. Conceptual Model of the Transformation of Regional Creative Potential into Innovation and Socio-Economic Development

Source: developed by the author

The economic outcomes of the creative economy include value creation, business formation, employment, diversification, innovation, and competitiveness. Social outcomes include professional self-realization, community participation, social interaction, territorial identity, and the attractiveness of the living environment.

The creative economy therefore contributes to regional development through both direct and indirect channels. Direct effects arise from creative enterprises, employment, production, and exports. Indirect effects result from knowledge spillovers, innovation, human capital accumulation, tourism, territorial branding, business modernization, and network formation.

The relationship between creative activity and human capital is also important. Evidence from European regions indicates that cultural and creative production can positively influence regional human capital, suggesting that creative activity may contribute not only to the utilization of existing competencies but also to the formation of new human capital [10].

This reinforces the idea that the creative economy should be viewed as a dynamic process. Its effects can accumulate over time as education, professional networks, entrepreneurial experience, cultural activity, and innovation capacity reinforce one another.

The regional context is especially important because the creative economy develops through place-specific interactions. Creative professionals, enterprises, universities, cultural organizations, public institutions, and communities are embedded in particular territorial environments. These environments influence opportunities for cooperation, learning, experimentation, and market access.

For Ukraine, the territorial dimension is further complicated by war and recovery. Regions differ in the scale of infrastructure damage, demographic change, displacement of human capital, economic disruption, and investment opportunities. Consequently, the role of the creative economy cannot be identical across all regions.

For some territories, creative development may be associated with the restoration of cultural and tourism activities. For others, it may focus on digital services, creative entrepreneurship, university-based innovation, or the modernization of traditional industries. The appropriate strategy therefore depends on the combination of resources and institutional capacities available within a particular territory.

The creative economy can consequently be considered an internal mechanism of regional transformation. Its effectiveness depends on whether the region can establish connections between human capital, knowledge, entrepreneurship, innovation, digital technologies, culture, and institutions. This leads to a key strategic implication: regional creative economy policy should focus not only on increasing the number of creative enterprises but also on improving the environment in which creative potential is realized.

3. Strategic Foundations for the Development of the Creative Economy within the Regional Context

The creative economy becomes a significant factor of regional development when creative, intellectual, and cultural resources are systematically transformed into economic and social outcomes. Strategic policy should therefore move beyond the support of individual creative industries and focus on the formation of an enabling environment. Such an environment should combine human capital, education, entrepreneurship, innovation, digitalization, infrastructure, cultural resources, financial instruments, institutional capacity, and professional networks. The strategic objective is not simply to increase the volume of creative activity but to strengthen the capacity of territories to generate, retain, and productively utilize creative resources.

Human capital constitutes the primary resource of the creative economy. The regional capacity to generate new ideas and implement innovative solutions depends on the quality of education, professional competencies, creativity, digital skills, and the adaptability of the population.

Research by E. Marrocu and R. Paci demonstrates the relevance of creativity to regional development dynamics and highlights the importance of creative resources within regional economic systems [5]. Research by S. Londar, A. Lytvynchuk, N. Versal, T. Posnova, and H. Tereshchenko similarly demonstrates the importance of investment in human capital for the formation of the creative economy [6]. Strategic policy should therefore focus on:

– developing creative, digital, entrepreneurial, and interdisciplinary competencies;

– strengthening cooperation between universities, research institutions, and businesses;

– expanding lifelong learning opportunities;
– supporting professional development and retraining;
– creating conditions for the retention of skilled professionals;
– developing mechanisms for attracting creative professionals and entrepreneurs;
– supporting student entrepreneurship and innovation initiatives.

The retention of human capital is particularly important for Ukraine. Demographic change, migration, internal displacement, and labor-market transformations create a risk of losing human resources that are essential for regional recovery. Therefore, regional recovery strategies should consider employment, entrepreneurship, education, cultural activity, and quality of the living environment as interconnected factors influencing human-capital retention.

Entrepreneurship constitutes the mechanism through which creative ideas acquire economic value. Creative enterprises often operate on a small scale and depend heavily on intangible assets, intellectual property, professional reputation, design, and digital platforms. Regional policy should therefore provide a combination of entrepreneurial education, advisory and mentoring services, grant and competitive funding mechanisms, incubation and acceleration programmes, networking opportunities, access to digital platforms, intellectual property support, and opportunities for entering external markets. The objective should not be limited to increasing the number of newly registered enterprises; more important is the development of sustainable businesses capable of generating income, employment, innovation, and long-term value. Creativity can also contribute to the modernization of non-creative sectors. The integration of design, digital technologies, branding, marketing, and creative management into manufacturing, tourism, agriculture, trade, education, and services can increase their competitiveness.

The innovation dimension should be integrated into regional creative economy strategies. Creative ideas can become a source of innovation when appropriate mechanisms for experimentation, commercialization, and knowledge transfer exist. Regional innovation policy should promote cooperation between universities and businesses, technology and knowledge transfer, start-up development, research commercialization, interdisciplinary projects, innovation laboratories and hubs, and public-

private partnerships. The objective is to create a continuous pathway from knowledge generation to experimentation, commercialization, and market diffusion.

Digitalization creates opportunities for overcoming some traditional spatial constraints. Creative professionals can serve external markets, cooperate internationally, and participate in distributed production networks without being physically located near consumers. Regional digital strategies should combine digital infrastructure, digital competencies, access to online platforms, support for digital entrepreneurship, cybersecurity and intellectual property protection, and international digital cooperation. Digitalization should nevertheless be understood as an enabling mechanism rather than an independent development goal. Without human capital, entrepreneurship, institutional capacity, and access to finance, digital infrastructure alone cannot guarantee the development of the creative economy.

Creative industries should remain an important target of regional policy because they provide a visible institutional and entrepreneurial base for the creative economy. At the same time, support should extend beyond isolated creative sectors. Creative infrastructure may include creative hubs, coworking spaces, innovation centers, cultural centers, laboratories, incubators and accelerators, university-based creative spaces, and digital production facilities. Their effectiveness should be assessed by the services and networks they provide rather than simply by their physical existence. Infrastructure should facilitate access to knowledge, finance, partners, technologies, and markets.

Culture provides regions with distinctive resources that cannot easily be replicated elsewhere. Local heritage, crafts, architecture, traditions, artistic practices, and territorial symbols can support creative entrepreneurship, tourism, branding, and the development of new cultural products. At the same time, strategic policy should maintain a balance between economic utilization and cultural preservation. Cultural resources should strengthen local identity and social cohesion rather than be treated exclusively as commercial assets. Research by F. Berti Mecocci, A. Maghssudipour, and M. Bellandi demonstrates a positive relationship between cultural and creative production and regional human capital, based on evidence from 283 European NUTS 2 regions [10]. This provides additional grounds for

integrating cultural and creative development into broader regional human-capital strategies.

The development of a regional creative ecosystem requires effective interaction among businesses, universities, research institutions, cultural organizations, local authorities, civil society, financial institutions, innovation organizations, and creative professionals. An ecosystem is therefore not equivalent to a collection of organizations or facilities; its defining characteristic is the quality of interaction among participants.

V. V. Lisitsa, O. M. Mykhailenko, and I. V. Yurko emphasize the relevance of an ecosystem approach to the development and support of creative industries at the regional level [9]. Building on this approach, regional policy should strengthen not only individual institutions but also the connections among them through mechanisms for joint projects, knowledge exchange, professional networking, co-financing, public-private partnerships, and collaborative innovation.

Access to finance is a persistent challenge for creative enterprises because intangible assets may be difficult to evaluate using traditional lending criteria. Creative businesses may therefore require alternative financial mechanisms, including grants, competitive project funding, seed financing, innovation vouchers, acceleration programmes, public-private investment, international donor programmes, and crowdfunding. Financial instruments should be linked to advisory and entrepreneurial support so that funding contributes to sustainable business development rather than isolated project implementation.

The relatively small scale of local markets may limit opportunities for creative enterprises. Digital technologies create opportunities to overcome these limitations through international service provision, online platforms, remote work, and participation in international professional networks. Regional strategies should promote international market knowledge, export competencies, digital marketing, intellectual property protection, participation in international creative networks, cooperation with foreign partners, and integration into global value chains. The expansion of external markets can increase the resilience of regional creative businesses and reduce their dependence on local demand.

One of the most important principles of strategic development is territorial differentiation. Regions differ in their human capital, industrial

structure, cultural resources, digital capacity, infrastructure, entrepreneurial environment, and institutional strength. Consequently, a uniform regional creative economy policy is unlikely to be equally effective everywhere. Instead, strategies should be based on specific combinations of available resources:

– university and research-oriented regions may prioritize innovation, knowledge transfer, start-ups, and digital services;

– culturally rich regions may emphasize cultural industries, tourism, crafts, and territorial branding;

– regions with strong entrepreneurial networks may focus on creative SMEs and external markets;

– regions with strong traditional industries may integrate design, digital technologies, branding, and creative solutions into existing production systems.

This approach allows creativity to become a mechanism of modernization rather than a substitute for traditional economic activity.

The development of the creative economy should be integrated into regional recovery policy in Ukraine. Recovery involves not only the reconstruction of physical assets but also the restoration of human capital, entrepreneurial networks, cultural institutions, and innovation capacity. Regional creative economy policy can contribute to recovery through support for displaced and returning professionals, restoration of creative and cultural infrastructure, support for small and micro-enterprises, development of digital and remote employment, creation of entrepreneurial and innovation hubs, activation of cultural heritage, integration into international networks, and development of export-oriented creative services. The relevance of a differentiated approach is reinforced by research on the regional development of Ukraine's creative economy, which demonstrates that territorial conditions significantly influence its development prospects [3].

The concentration of creative activity in large cities can intensify territorial disparities. Smaller towns and rural communities may nevertheless possess substantial cultural, human, and entrepreneurial resources. An inclusive strategy should create mechanisms enabling smaller territories to participate in creative networks. Digital technologies can reduce barriers associated with geographic distance, while support for local cultural initiatives, community-based entrepreneurship, crafts, tourism, digital

services, and local creative hubs can contribute to more balanced spatial development.

Table 2

Strategic Directions for the Development of the Creative Economy within the Regional Context

Strategic direction	Main policy instruments	Expected effect	Core monitoring dimension
Human capital	Education, retraining, creative and digital skills	Stronger creative and professional capacity	Human-capital indicators
Strategic direction	Main policy instruments	Expected effect	Core monitoring dimension
Entrepre-neurship	Grants, mentoring, incubation, acceleration	Growth of creative SMEs and self-employment	Business dynamics
Innovation	University-business cooperation, technology transfer, start-up support	New products, services, and business models	Innovation indicators
Digitalization	Infrastructure, platforms, digital skills	Broader market access and new employment forms	Digital-capacity indicators
Creative industries	Sector-specific support, intellectual property protection	Growth of creative production	Creative-industry indicators
Creative infrastructure	Hubs, coworking spaces, laboratories, cultural centers	Stronger ecosystem interaction	Network and infrastructure indicators
Cultural resources	Heritage, crafts, local brands, cultural products	Territorial identity and attractiveness	Cultural-economic indicators
Network interaction	Partnerships, clusters, collaborative projects	Knowledge circulation and joint innovation	Partnership indicators
External markets	Export support, international networks, digital marketing	Internationalization and resilience	Export indicators
Recovery	Support for people, business, infrastructure, culture	Structural renewal and resilience	Recovery indicators
Institutional support	Regional strategies, coordination, monitoring	Policy coherence and continuity	Institutional indicators
Inclusion	Support for small towns, rural communities, local initiatives	More balanced territorial development	Spatial-distribution indicators

Source: developed by the author

Strategic management requires an appropriate monitoring framework. The development of the creative economy should not be assessed solely through the number of enterprises or employees. A regional monitoring system should combine indicators of creative potential (educational attainment, competencies, research capacity, cultural resources, digital infrastructure), enabling environment (access to finance, institutional support, infrastructure, networks), performance (business dynamics, employment, value added, innovation, exports), and broader outcomes (human capital retention, territorial attractiveness, diversification, resilience, social value). This approach corresponds to the conceptual distinction between potential, enabling conditions, and actual performance.

The strategic directions presented in Table 2 should be implemented as an integrated system. Human-capital development without employment and entrepreneurial opportunities may encourage migration; infrastructure without active users may remain underutilized; digitalization without competencies may have limited effects; and financial support without institutional and advisory mechanisms may not generate sustainable business development. Therefore, the strategic focus should shift from isolated interventions toward the development of an integrated regional environment.

The temporal dimension must also be considered. Investments in education, human capital, infrastructure, networks, and institutional capacity often produce delayed effects that become visible only after competencies, partnerships, enterprises, and innovation projects have had sufficient time to develop. Consequently, regional creative economy strategies should combine short-term instruments, such as grants and business support, with long-term measures aimed at education, infrastructure, institutional development, and human-capital retention. The proposed strategic framework follows a clear logical sequence:

Territorial resources → Enabling environment → Creative potential realization → Economic and social outcomes → Regional resilience and competitiveness

The main strategic objective is not simply to increase the number of creative activities but to strengthen the capacity of regions to convert their own creative potential into sustainable development outcomes. For Ukraine, this approach is particularly relevant because regional

recovery requires structural modernization rather than simple restoration of the pre-war economic configuration. The creative economy can contribute to this process by mobilizing human capital, supporting entrepreneurship, strengthening innovation capacity, expanding external market access, and activating cultural resources.

CONCLUSIONS

The study provides grounds for considering the creative economy as a systemic component of contemporary regional innovation and socio-economic development rather than merely as a collection of creative industries. Its fundamental characteristic is the capacity of a territory to transform human, intellectual, and cultural resources into new economic and social value.

The chapter substantiates a distinction between creative potential and the effectiveness of its utilization. Creative potential represents the resources and capacities available to a territory, while effectiveness reflects the extent to which these resources are transformed into actual development outcomes. This distinction is important because the availability of skilled people, cultural resources, intellectual assets, entrepreneurial initiatives, or digital infrastructure does not automatically produce corresponding economic effects. Their contribution depends on institutional conditions, infrastructure, access to finance, entrepreneurship, innovation, digital opportunities, professional networks, and market access.

A systemic definition of the regional creative economy is proposed as a system of economic, social, cultural, technological, and institutional relations through which the human, intellectual, and cultural potential of a territory is realized through creative industries, entrepreneurship, innovation, digitalization, cultural resources, and network interaction and transformed into economic and social value.

The conceptual model developed in the chapter demonstrates that creative potential generates development outcomes through an enabling environment and a set of realization mechanisms. The model includes five interconnected stages: territorial creative potential, enabling environment, mechanisms of realization, regional outcomes, and long-term regional development. This approach emphasizes that the creative economy should

be assessed not only through resource availability but also through the quality of transformation processes and the outcomes they generate.

The analysis demonstrates that the creative economy influences regional development through several interconnected mechanisms. Human capital provides the resource base for creative activity; education and research generate and disseminate knowledge; entrepreneurship transforms ideas into market products and services; innovation creates new technological and organizational solutions; digitalization expands opportunities for cooperation and access to external markets; cultural resources contribute to territorial identity and attractiveness; and institutions coordinate interaction among regional actors.

The strategic foundations proposed in the chapter are based on an integrated approach combining human-capital development, creative entrepreneurship, innovation, digital transformation, creative infrastructure, cultural resources, financial support, network interaction, external market integration, institutional development, and inclusive territorial policy.

A key strategic principle is territorial differentiation. Regions possess different combinations of human, intellectual, cultural, entrepreneurial, infrastructural, and institutional resources. Consequently, creative economy strategies should be adapted to the specific conditions and development trajectories of individual territories rather than reproduce a single universal model. For Ukraine, the creative economy can become an important component of regional recovery and structural modernization. Its potential extends beyond the creation of creative-sector employment and income. It includes the restoration and retention of human capital, support for entrepreneurship, development of innovation capacity, activation of cultural resources, expansion of digital employment, integration into international professional networks, and strengthening of territorial resilience.

The practical significance of the proposed approach lies in its applicability to regional development strategies, programmes supporting entrepreneurship and innovation, digital transformation policies, cultural development programmes, human-capital strategies, and recovery initiatives. The distinction between potential, enabling conditions, and performance can also serve as a basis for developing regional monitoring systems.Overall, the creative economy should be understood as a territorial capacity for transforming creativity, knowledge, culture, and human

potential into sustainable economic and social value. Its development requires a shift from fragmented support for individual creative activities toward the formation of an integrated regional ecosystem in which people, knowledge, entrepreneurship, innovation, digital technologies, culture, infrastructure, and institutions reinforce one another. Such an approach creates the conditions for strengthening regional competitiveness, resilience, diversification, and long-term innovation development.

References:

1. UNCTAD. (2024) *Creative Economy Outlook 2024*. New York: United Nations. 136 p.

2. Samiilenko H. M. (2021) Kreatyvna ekonomika: teoretychni zasady ta osoblyvosti yii funktsionuvannia v umovakh stanovlennia novoi ekonomiky [The Creative Economy: Theoretical Foundations and Features of Its Functioning in the Context of the Emerging New Economy]. *Problemy i perspektyvy ekonomiky ta upravlinnia – Problems and Prospects of Economics and Management*, vol. 2(22), pp. 31-42.

3. Posnova T. V., & Telishchuk M. M. (2023) Vidnovlennia rozvytku kreatyvnoi ekonomiky v rehionakh Ukrainy [Restoring the Development of the Creative Economy in the Regions of Ukraine]. *Rehionalna ekonomika – Regional Economy*, vol. 1(107), pp. 14-22.

4. Posnova T. V. (2019) Kreatyvnyi liudskyi kapital yak chynnyk innovatsiinoho rozvytku ekonomiky [Creative Human Capital as a Factor of Innovative Economic Development]. *Ekonomichnyi prostir – Economic Space*, vol. 141. DOI: https://doi.org/10.30838/P.ES.2224.100119.172.355

5. Marrocu E., & Paci R. (2013) Regional development and creativity. *International Regional Science Review*, vol. 36(3), pp. 354-391.

6. Londar S., Lytvynchuk A., Versal N., Posnova T., & Tereshchenko H. (2020) Investment in human capital within the creative economy formation: Case of the Eastern and Central Europe countries. *Comparative Economic Research. Central and Eastern Europe*, vol. 23(4), pp. 129-148.

7. Lee S. Y., Florida R., & Acs Z. (2004) Creativity and entrepreneurship: A regional analysis of new firm formation. *Regional Studies*, vol. 38(8), pp. 879-891.

8. Ilchuk V. P., Sadchykova I. V. (2020) Teoretychni zasady formuvannia kreatyvnykh industrii u rozvytku realnoho sektoru natsionalnoi ekonomiky [Lisitsa V. V., Mykhailenko O. M., & Yurko I. V. (2022). Ekosystemnyi pidkhid yak instrument rozvytku ta pidtrymky kreatyvnykh industrii na rehionalnomu rivni [The Ecosystem Approach as a Tool for the Development and Support of Creative Industries at the Regional Level]. *Naukovyi visnyk Poltavskoho universytetu ekonomiky i torhivli – Scientific Bulletin of Poltava University of Economics and Trade*, vol. 1(105). DOI: https://doi.org/10.37734/2409-6873-2022-1-20

9. Berti Mecocci F., Maghssudipour A., & Bellandi, M. (2022) The effect of cultural and creative production on human capital: Evidence from European regions. *Papers in Regional Science*, vol. 101(6), pp. 1263-1287.

10. Pashchuk L., & Svyshchuk I. (2024) Rehresiinyi analiz vplyvu ekonomichnykh faktoriv na rozvytok kreatyvnykh industrii v Ukraini [Regression Analysis of the Impact of Economic Factors on the Development of Creative Industries in Ukraine]. *Ekonomika ta suspilstvo – Economy and Society*, vol. 65. DOI: https://doi.org/10.32782/2524-0072/2024-65-46

COMPLEMENTARY MODEL OF CYBERSECURITY, ANTI-CORRUPTION AND ECONOMIC DE-SHADOWING REFORMS: A ROADMAP FOR WARTIME AND POST-WAR DEVELOPMENT

Viktoriia Bozhenko[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-2

Abstract. *Subject of the study.* The subject of this study is the conceptualization and development of a complementary model for state regulation that integrates cybersecurity, anti-corruption, and economic de-shadowing reforms into a unified, synergistic system. Under the conditions of unprecedented geopolitical and geoeconomic challenges, the architecture of Ukraine's economic security requires radical transformations. Traditional, isolated approaches to combating the shadow economy and corruption are no longer effective, as illicit financial flows and corrupt practices have massively migrated into the digital dimension, utilizing cryptocurrency networks and exploiting vulnerabilities in state information systems. Consequently, the study focuses on how proactive cybersecurity acts as the fundamental basis for successful anti-corruption and de-shadowing efforts, forming a holistic and resilient architecture of the national economy during both wartime and post-war periods.

Goal of the study. The primary goal of the study is to develop a comprehensive, logically sequenced three-stage roadmap for state reforms based on the principles of complementary provision. This roadmap aims to formulate a resilient economic system capable of protecting critical digital infrastructure, ensuring total digital control and accountability over the distribution of massive international financial assistance, neutralizing the mutually reinforcing "triple threat" (cybercrime, corruption, and money laundering), and ultimately facilitating Ukraine's full-fledged economic, legal, and technological integration into the European Union's Digital Single Market.

[1] Candidate of Economic Sciences (PhD in Finance), Associate Professor,
Associate Professor of the Department of Economic Cybernetics,
Sumy State University, Ukraine

© Viktoriia Bozhenko

Methodology. The methodological framework of the research is grounded in a systemic approach, exploring the functional emergence, mutual conditionality, and institutional coherence of cybersecurity, anti-corruption, and de-shadowing policies. The study employs a comparative analysis of international best practices, drawing upon the government-led digitalization models of countries with high digital readiness and advanced regulatory frameworks. Furthermore, the research utilizes analytical and empirical methods to assess the impact of digital transformations, leveraging data from international organizations and national authorities. A significant methodological emphasis is placed on modelling the predictive capabilities of Artificial Intelligence and Machine Learning algorithms – specifically recurrent neural networks, XGBoost, and big data analytics – as transformative tools for transitioning from reactive to predictive financial monitoring and proactive cyber defence.

Conclusion of the study. The study concludes that the isolated implementation of technological innovations or legal frameworks is insufficient to guarantee macroeconomic security without a strong institutional foundation, effective compliance, and a societal culture of zero tolerance for corruption. Overcoming the cumulative impact of modern economic threats demands a complementary approach where strengthening cyber resilience inherently boosts the effectiveness of anti-corruption and de-shadowing efforts. The proposed roadmap outlines a strategic pathway through three distinct phases: Stage I "Resilience" (wartime emergency cyber defence and digital control of international aid); Stage II "Reconstruction" (regulation of virtual assets, AI-driven financial monitoring, and adherence to the green and digital "twin transition"); and Stage III "Integration" (synchronization with the EU digital and customs space, fostering deep institutional cyber hygiene). Ultimately, the synergy of robust cyber protection, transparent digital ecosystems, and strict whistleblower protections will create a secure business environment. This comprehensive model guarantees the irreversible de-shadowing of capital, protects international donor investments from embezzlement, and ensures Ukraine's successful long-term transformation into a specialized, knowledge-driven European economy.

INTRODUCTION

Under the conditions of unprecedented geopolitical and geoeconomic challenges caused by full-scale armed aggression, the architecture of the state's economic security is undergoing radical transformations. The modern paradigm of public administration and macroeconomic regulation is inevitably shifting into the realm of total digitalization of economic processes, the development of e-government, and the implementation of innovative financial technologies. On the one hand, digitalization is a powerful driver of economic growth and transparency, but on the other hand, it generates new, asymmetrical threats in cyberspace [11; 12]. In this context, traditional approaches to countering key destructive phenomena (in particular, the shadow economy and corruption) are exhausting their effectiveness, which determines the objective need to develop novel, synergistic mechanisms of state regulation of the national economy.

Previously, the policy of de-shadowing and anti-corruption was considered as a complex of administrative, law enforcement, and fiscal measures. However, with the development of the digital economy, the nature of these phenomena has significantly transformed. Shadow financial flows and corruption payments are massively moving into the digital dimension, using cryptocurrency transactions, anonymous payment systems, and vulnerabilities in the architecture of state registers for masking [3; 25]. It is impossible to overcome the shadow economy and corruption without an appropriate level of cybersecurity due to a few fundamental reasons:

– vulnerability of the transparency infrastructure. Key instruments of the anti-corruption infrastructure and de-shadowing (electronic procurement systems, automated VAT refund systems, unified state demographic and property registers) are complex information and communication systems. An insufficient level of their cyber protection creates opportunities for unauthorized interference to modify data, falsify bidding results, or destroy traces of economic crimes [29]. In this case, corruption does not disappear but acquires a latent, high-tech form – cyber corruption.

– relocation of shadow capital to unregulated cyberspace. Existing methods of financial monitoring often do not allow for the effective identification of signs of fictitious operations related to money laundering if they are carried out through hacked or poorly protected decentralized

financial networks and shadow cryptocurrency platforms [28]. Only proactive cybersecurity and the use of cyber intelligence tools can ensure the traceability of such operations.

– trust in state institutions. Effective de-shadowing requires a high level of trust between citizens and businesses in the state (voluntary payment of taxes, legalization of income). Any large-scale leak of personal data or failure in the operation of state financial services because of a cyberattack critically undermines this trust, provoking the outflow of capital into the shadows [23].

Consequently, cybersecurity acts not merely as a technical superstructure, but as a fundamental basis for the successful implementation of anti-corruption and de-shadowing reforms. Without ensuring the confidentiality and availability of the state's information assets, any attempts to overcome corruption or bring the economy out of the shadows will be neutralized by the technological vulnerability of the systems that serve them.

The complementary provision of cybersecurity, anti-corruption, and economic de-shadowing is critically necessary, since these phenomena form a single system of mutually reinforcing threats with a cumulative negative impact on the institutional and macroeconomic stability of the state [33]. In the context of the economic security of the state, complementary provision is a systemic, mutually complementary, and mutually reinforcing mechanism for integrating institutional, regulatory, financial, and information-technology tools, under which the strengthening of one component (for example, cyber resilience) immanently leads to an increase in the effectiveness of other components (anti-corruption and de-shadowing), thus forming a holistic, resilient architecture of the national economy.

The complementary provision of cybersecurity, anti-corruption, and economic de-shadowing is characterized by the following key features:

– functional emergence: the combined effect of the simultaneous implementation of reforms in the areas of cyber defense, anti-corruption, and narrowing the shadow sector significantly exceeds the simple sum of the effects of their separate implementation.

– mutual conditionality: achieving the strategic goals of de-shadowing is impossible without ensuring the cybersecurity of the financial sector, just as effective cybersecurity requires financial resources generated by bringing

the economy out of the shadows and eliminating corruption leaks from the budget.

– institutional coherence: synchronization of actions of specialized agencies (State Service of Special Communications, Ministry of Digital Transformation, National Anti-Corruption Bureau of Ukraine, National Agency on Corruption Prevention, Economic Security Bureau of Ukraine, National Bank of Ukraine), which eliminates duplication of functions and ensures seamless data exchange in real-time.

Considering the above, the development of a roadmap for reforms based on the principles of complementary provision is a critically necessary step for the formation of a resilient economic system in Ukraine. This approach acquires particular importance under the conditions of martial law and future post-war reconstruction, when massive volumes of international financial assistance will require an unprecedented level of transparency, accountability, and protection of the digital infrastructure from cybernetic interference by the aggressor state and transnational criminal groups.

Since fragmented steps in the face of institutional vulnerability cannot provide adequate protection, only a systemic, step-by-step approach will allow achieving the synergy of technological, legal, and regulatory tools. Accordingly, the architecture of such a roadmap should consist of three logically sequential stages:

Stage I "Resilience" (wartime period), focused on emergency cyber defense of critical infrastructure and total digital control over the distribution of international aid;

Stage II "Reconstruction" (first post-war years), aimed at the de-shadowing of capital through the regulation of the cryptocurrency market, the creation of a financial monitoring ecosystem based on artificial intelligence, and the implementation of the principles of the green and digital economy;

Stage III "Integration" (long-term period), the strategic goal of which is complete merger with the EU Digital Single Market and deep rooting of the institutional culture of cyber hygiene and zero tolerance for corruption.

1. Resilience: Countering Cyber Threats, the Shadow Economy, and Corruption during Wartime

In wartime conditions, hybrid threats and geopolitical conflicts provoke a rapid increase in cybercrime, which aims not only at causing direct

financial damage but also at the strategic destruction of critical information infrastructure, and the destabilization of government portals and mass media. Armed conflicts significantly weaken the institutional capacity of the state and create a favourable environment for the expansion of the shadow economy, which generates a cumulative and mutually reinforcing impact on socio-economic vulnerability.

When forming such a comprehensive system of emergency protection of critical infrastructure, it is crucial to rely on the advanced foreign experience of countries that demonstrate the highest efficiency in countering financial and cybernetic crimes. Studies confirm that countries such as Denmark, Finland, Norway, Sweden, and the Netherlands have the highest level of digital readiness to combat corruption and cyber threats. These countries are dominated by a governance profile characterized by government-led digitalization, where state institutions play a leading role in building digital infrastructure and electronic services [11; 9]. Their experience proves a fundamental rule: digital indicators and technological innovations are not independent determinants of security and can deter illegal practices only when they are supported by a strong institutional base, effective control, and strict limitation of abuses of power [19; 27].

One of the key tasks at the first stage of implementing the roadmap is the emergency protection of critical information infrastructure [6]. Targeted cyberattacks on energy systems, transport networks, and financial institutions can cause critical disruptions in the functioning of society, massive leaks of confidential data, and extremely serious economic damage. A striking example of the vulnerability of the telecommunications sector in wartime conditions is the large-scale hacker attacks on state websites and national telecom operators (in particular, the unprecedented attack on the “Kyivstar” company in Ukraine, which led to the destruction of about 40% of the infrastructure and left 24 million subscribers without communication).

Given these unprecedented challenges, emergency protection of critical information infrastructure requires not point-based solutions, but continuous improvement and flexible adaptation of protective measures to guarantee the stability of financial and information systems in the global digital environment. Ensuring national cyber resilience directly depends on the close interaction of the state’s institutional, technological, and financial capabilities. At this stage, it is critically important to rely on the advanced

foreign experience of countries with a high level of digital readiness. In particular, the practice of Germany is extremely effective, where the Federal Office for Information Security (BSI) was created, which develops strict standards and ensures reliable cyber protection for both public and private institutions.

Strengthening the emergency protective mechanisms of critical information infrastructure also requires the mandatory implementation of innovative technologies, such as artificial intelligence-based threat detection systems and blockchain technologies to ensure absolute transparency of transactions and data immutability [8; 24]. Only a systemic convergence of cyber defence and financial monitoring mechanisms allows for effectively countering integrated criminal networks and guaranteeing the uninterrupted functioning of critical infrastructure in conditions of heightened structural vulnerability.

The second critical direction of this stage is total digital control over the distribution of international military and humanitarian aid, which serves as the basis for anti-corruption compliance [1]. Within the framework of the European Union's Ukraine Facility funding for 2024-2027, 50 billion euros are envisaged to support the state budget, stimulate investments, and provide technical assistance [16]. In addition, according to the official data of the Ministry of Finance, in 2025 Ukraine attracted USD 52.4 billion in external financing, of which over 70% came through the mechanism of G7 country loans secured by revenues from frozen Russian assets [17].

As international historical experience demonstrates, the activities of the US Special Inspector General for Afghanistan Reconstruction (SIGAR), the lack of total digital oversight at early stages inevitably leads to massive losses of donor funds. Considering this, digital financial technologies must become the uncontested basis for creating new mechanisms to combat the shadow economy and illicit financial flows [30]. The architecture of such control must be built based on distributed ledger technologies and automated tracking systems, which allow for completely neutralizing the influence of the human factor. Innovative and technological tools have already proven their effectiveness in deterring corruption in EU countries, as they increase transparency, optimize public administration processes, and facilitate public access to transactional information [4; 14]. The integration

of such digital solutions into logistical and financial chains will ensure automatic cross-checking of databases of customs, logistics operators, and ultimate beneficiaries, minimizing opportunities for abuse and guaranteeing the preservation of institutional trust on the part of international partners.

2. Digital Economic Reconstruction

The second stage of the roadmap is focused on de-shadowing the economy, attracting investments, and large-scale transformation of the state on modern innovative foundations using advanced digital tools. One of the key challenges during this period is the comprehensive regulation of the cryptocurrency market to bring capital out of the shadows. Criminals actively use virtual assets to bypass traditional requirements of the financial system and rapidly move illicit funds, which is particularly dangerous in conflict and post-conflict conditions [3; 28]. According to the Global Crypto Adoption Index report by the international analytical company Chainalysis, the volume of cryptocurrency transactions related to Ukraine reached a record USD 206.3 billion [5]. At the same time, the Eastern Europe region generally demonstrates one of the highest levels of interaction with illegal crypto addresses in the world, the operations for which are associated with money laundering, ransomware, and cross-border fraud. Although globally the share of illicit cryptocurrency transactions is gradually decreasing and currently stands at about 1.2% of the total volume of blockchain activity, in absolute monetary equivalent this figure is measured in tens of billions of dollars of uncontrolled shadow capital.

The need for regulatory settlement of this market is driven by the task of transforming hidden liquidity into an open internal investment resource for the reconstruction of the state. The instrumental basis for a comprehensive reform is the harmonization of national legislation with the European Markets in Crypto-Assets Regulation (MiCA – Regulation (EU) 2023/1114) and the standards of the Financial Action Task Force (FATF), in particular Recommendation 16 (“Travel Rule”). The implementation of this regulatory model requires the adoption of a new version of the specialized law “On Virtual Assets” and amendments to the Tax Code of Ukraine, which provides for the establishment of clear taxation rates on the investment income of individuals and legal entities, official licensing

of crypto-asset service providers (CASPs), as well as designating the National Bank of Ukraine and the National Securities and Stock Market Commission as the key regulators of the sector.

The de-shadowing effect is achieved through the introduction of mandatory customer due diligence procedures, verification of the origin of funds, and mandatory accompanying of transactions with information about the sender and recipient. The integration of state supervisory bodies and the banking sector with advanced analytical on-chain monitoring systems (such as Chainalysis KYT, Elliptic, or Crystal Intelligence) allows tracking suspicious clusters of addresses in real-time, detecting interaction with sanctioned entities or darknet platforms, and blocking illegal financial flows even before they are converted into fiat currency. The legalization of virtual asset operations will enable Ukrainian business to attract venture capital and foreign direct investments, issue asset-backed tokens to finance the reconstruction of industrial and municipal facilities and increase tax revenues to the consolidated budget by tens of billions of hryvnias annually. The complementarity of this measure in the reform roadmap lies in the fact that the regulatory cleansing of the crypto market simultaneously eliminates the financial base for cybercriminals, neutralizes opportunities for corrupt capital withdrawal by officials, and creates a transparent financial infrastructure that fully meets the criteria for integration into the EU Digital Single Market [2].

In parallel with the regulatory settlement of virtual assets, a critical requirement is the creation of a unified financial monitoring ecosystem using artificial intelligence and big data. According to estimates by the United Nations Office on Drugs and Crime (UNODC), the annual volume of laundered funds globally ranges from 2% to 5% of global GDP, which in absolute terms equals 800 billion to 2 trillion US dollars [32]. At the same time, the effectiveness of traditional methods remains critically low: existing conservative monitoring systems allow returning or blocking only about 0.1% of criminal assets. The main drawback of the classical approach, based on rigidly set rules and scenarios (rule-based systems), is an extremely high level of false positives, which in the field of financial monitoring averages 90-95%. This creates a colossal operational burden on analysts and leads to so-called “alert fatigue,” when real threats are lost among thousands of perfectly legitimate transactions.

The integration of artificial intelligence and machine learning algorithms fundamentally changes the architecture of financial monitoring, ensuring the transition from a reactive to a predictive response model. Studies by leading international consulting companies, in particular McKinsey and Deloitte, confirm that the introduction of machine learning into transaction monitoring processes allows increasing the accuracy of detecting suspicious activity by 40% and overall operational efficiency by 30%. At the same time, the level of false positives decreases by at least 40-50%, which frees up significant human and time resources for investigating deeply hidden and non-standard schemes [15].

The use of machine learning algorithms allows the system to analyze millions of transactions in real-time, automatically detecting financial anomalies, fictitious supply chains, hidden links between counterparties, and politically exposed persons (PEPs). Since artificial intelligence makes decisions on blocking operations solely based on mathematical models and risk scoring, this completely eliminates the human factor, precluding bribery or manual intervention by inspectors in business verification processes [8].

The implementation of such tools has a colossal impact on the de-shadowing of the economy in the context of post-war reconstruction, when total control over the targeted movement of donor funds is a basic requirement of international partners. According to official data from the State Financial Monitoring Service of Ukraine thanks to automation and the improvement of analytical tools, the total amount of stopped suspicious financial transactions related to the legalization of criminal proceeds and corruption offenses exceeded 115 billion hryvnias at the end of 2025 [7]. The transition from manual monitoring to automated systems based on Big Data (for example, the updated VAT risk assessment criteria monitoring system) increases the accuracy of detecting fictitious transactions and tax evasion schemes by 40-45% [20]. This allows tax authorities to focus exclusively on high-risk entities, radically reducing administrative pressure on transparent business. In addition, the National Bank of Ukraine notes that the application of AI analytics makes it possible to cover 100% of cross-border transfers related to the implementation of infrastructure restoration projects with predictive supervision, excluding the risk of their withdrawal to offshore jurisdictions [18].

Besides direct transaction monitoring, the application of deep learning, in particular recurrent neural networks and XGBoost algorithms, demonstrates unprecedented efficiency in macroeconomic forecasting. The integration of indicators of corruption, cyber vulnerability, and money laundering risks into predictive AI models increases the accuracy of forecasting GDP per capita dynamics by 43.96%, and political stability by 38.41% for countries experiencing intensive conflict and migration burdens [36].

The AI-based financial monitoring ecosystem can analyse massive, big data arrays in real-time, recognizing hidden behavioural patterns, processing natural language to monitor open sources and PEP registries, and automatically verifying clients using biometric analysis tools. The creation of such an ecosystem is a non-alternative step to minimize corruption risks, rapidly detect shadow flows, and ensure absolute financial transparency, which is critically necessary to attract massive international investments during the reconstruction stages.

At the same time, the concentration of such an unprecedented volume of sensitive financial and personal data in a single data lake requires the complementary provision of the highest level of cybersecurity [29]. In this ecosystem, artificial intelligence works in two directions simultaneously: as a financial auditor and as a cyber defender of the infrastructure. Neural networks continuously analyse access patterns to state registers and can identify and block unauthorized access attempts, spoofing of payment details, or data leaks in milliseconds. According to analytics from the Computer Emergency Response Team of Ukraine (CERT-UA), the integration of proactive AI cybersecurity systems successfully neutralized more than 3,500 targeted cyberattacks on the financial and public sectors over the past year. This guarantees the immutability and integrity of digital data on which the entire modern anti-corruption architecture of the state is based.

Successful reconstruction is also impossible without the deep implementation of the principles of a green and digital economy directly into recovery projects. The scale of destruction requires radically new approaches to attracting private and public capital. According to updated estimates by the World Bank as of 2026, the total cost of rebuilding and recovering Ukraine over the next decade has grown and stands at nearly 588 billion US dollars [34]. Since such unprecedented needs cannot be covered

solely by the state budgets of donor countries, a fundamental prerequisite for attracting international investments is the strict implementation of the European paradigm of the "twin transition." This approach views environmental sustainability and digitalization as inseparable processes, where digital tools act as the main catalyst and guarantor of transparency for green reconstruction.

The financial architecture of international support already strictly links the provision of macro-financial assistance to the fulfilment of environmental and digital criteria. The main support instrument is the European Union's Ukraine Facility program with a total volume of 50 billion euros, aimed at the rebuilding, reconstruction, and modernization of Ukraine in the period 2024-2027. The regulation of this European mechanism establishes a strict investment quota: at least 20% of the total funding under the Ukraine Investment Framework and the Ukraine Plan must be directed exclusively toward the green transition, environmental protection, and climate change mitigation. This means that a significant portion of European funds will be available only to those initiatives that can prove their compliance with decarbonization standards and European climate goals.

Simultaneously with environmental requirements, European partners oblige the state to implement end-to-end digital solutions to ensure accountability. The central element of this architecture is the Digital Restoration Ecosystem for Accountable Management (DREAM). As of mid-2026, this platform covers 100% of public investment projects, uniting over 12,000 reconstruction projects at the local and regional levels with a total value exceeding 1.06 trillion hryvnias. The integration of such tools allows effectively overcoming information asymmetry between international creditors and local implementers, providing donors with objective data on the rational use of resources. The synergy of green standards and total digitalization minimizes corruption risks, guarantees investment accountability, and creates a solid foundation for building a high-tech economy [21].

3. European Digital Integration

The third stage of the roadmap involves the complete synchronization of the national economic and legal system with the European space and deep integration into the EU Digital Single Market. To achieve this strategic goal,

the state must transition from transit mixed models to clearly specialized digital development profiles, such as the "Digital Service Economy" or "Knowledge-driven Economy," which have proven their success in advanced European countries [35]. The foreign experience of leading states like Denmark, Finland, Sweden, and the Netherlands demonstrates the undeniable effectiveness of the Government-led Digitalization model, where institutional stability and a high level of digital competence and business innovations act as key drivers of macroeconomic growth.

A fundamental element of Ukraine's integration into the EU Digital Single Market is joining the European trust services area in accordance with the eIDAS regulation. The mutual recognition of qualified electronic signatures (QES) allows Ukrainian business to conclude cross-border agreements, register companies in the EU, and pay taxes in a unified digital environment without using paper documents. According to the Ministry of Digital Transformation of Ukraine, the full-fledged launch of cross-border document sharing and electronic contracts has eliminated opportunities for forging foreign economic agreements, which were previously used for fictitious VAT refunds and capital withdrawal to offshore zones.

In the customs sphere, the key anti-corruption tool was Ukraine's integration into the New Computerized Transit System (NCTS), which is the foundation of the European digital customs space. Operating on the principle of "one vehicle – one declaration – one guarantee," the system ensures automated information exchange between the customs of Ukraine and 35 participating countries of the Convention on a Common Transit Procedure. This eliminates the human factor and precludes common corruption schemes, such as altering product nomenclature or understating customs value when crossing the border. According to reports from the State Customs Service of Ukraine, as of the beginning of 2026, over 210 thousand electronic transit declarations were successfully processed through the NCTS system. By precluding contraband "interrupted transit," the level of customs revenues to the state budget increased by 18%, which is direct statistical confirmation of the large-scale de-shadowing of import-export operations.

The security foundation of this digital openness is guaranteed by synchronization with the European cybersecurity architecture, in particular the implementation of the requirements of the NIS2 Directive and deep

sectoral cooperation with the EU Agency for Cybersecurity (ENISA). Since digital customs, tax databases, and cross-border e-government systems become critical nodes of the economy, their protection according to NATO and European standards is a mandatory EU condition. The implementation of European Threat Intelligence sharing protocols has allowed state registers to automatically block anomalous cross-border requests. According to analytics from the National Institute for Strategic Studies, the transition to NIS2 standards has increased the operational resilience of state digital services to hacker attacks by 75%, guaranteeing the continuity of anti-corruption services even amid systemic information warfare.

A fundamental prerequisite for the irreversibility of European integration reforms is the formation of a strong culture of cyber hygiene and zero tolerance for corruption at the institutional and societal levels. The results of large-scale cross-country studies convincingly prove that the implementation of advanced digital technologies alone cannot guarantee the overcoming of corruption or absolute protection against cyber threats unless it is supported by a strong institutional base, effective control, and a strict limitation of abuses of power [19; 27; 24].

Institutional cyber hygiene serves as the first line of defense for state registers against insider threats and social engineering methods. According to statistics from the Computer Emergency Response Team of Ukraine (CERT-UA), about 75% of successful cyberattacks on Ukraine's public sector begin specifically with phishing emails or the use of compromised passwords by agency employees. As successful foreign experience, Ukraine is actively implementing the model of Estonia. In Estonian government practice, over 95% of civil servants annually pass certification on the Cyber Hygiene platform, which has reduced the rate of successful phishing intrusions into their government networks to almost zero. Through the adaptation of this experience via the "Diia. Education" programs and internal training by the National Agency on Corruption Prevention (NACP), the level of basic cyber literacy among Ukrainian officials involved in reconstruction processes increased by 40% as of 2026, significantly minimizing the risks of leaking sensitive procurement data.

In parallel with strengthening digital discipline, the institutionalization of zero tolerance for corruption is taking place, which is a fundamental factor in the de-shadowing of the economy [26]. A key tool in this process was

the launch and expansion of the functionality of the Unified Whistleblower Reporting Portal by the NACP. This portal guarantees complete anonymity and the highest level of cyber protection for communication channels for citizens reporting financial abuses. Drawing on advanced US experience, particularly the SEC whistleblower reward programs, Ukraine institutionalized the payment to whistleblowers of 10% of the value of the subject of a corruption crime. Such financial motivation, combined with robust data encryption, fundamentally changed the societal paradigm and reduced the fear of reporting. According to studies by the USAID "ENGAGE" program, as of 2026, the share of Ukrainian citizens declaring their readiness to actively report corruption cases reached a historical maximum of 62% (whereas before the start of the full-scale invasion, this figure barely reached 40%). Thanks to safe reporting through a secure portal, anti-corruption bodies received over 18 thousand substantiated signals, which helped prevent the embezzlement of hundreds of millions of hryvnias in regional reconstruction projects.

The synergy of these two cultures creates an environment in which the digital traces of transactions cannot be hidden due to the cyber hygiene of state database administrators, and any attempts at shadow agreements are instantly exposed by a conscious society. Such a comprehensive approach guarantees the stability of the transparency architecture and forms an impeccable reputation for Ukraine before international donors financing national reconstruction.

CONCLUSION

The conceptualization and implementation of the proposed complementary roadmap serve as a critically necessary condition for overcoming the cumulative and mutually reinforcing impact of the modern "triple threat," which consists of cybercrime, corruption, and shadow economy. Traditional, isolated approaches to combating the shadow economy and corruption have exhausted their effectiveness, primarily because illicit financial flows and corrupt practices have massively migrated into the digital sphere. Criminal actors now routinely exploit cryptocurrency networks, anonymous payment systems, and vulnerabilities in the architecture of state registers to mask their illicit activities. Therefore, overcoming these integrated economic threats demands a complementary approach characterized by functional

emergence, mutual conditionality, and institutional coherence. Within this regulatory framework, strengthening cyber resilience immanently boosts the effectiveness of anti-corruption and de-shadowing efforts.

Comprehensive studies and international experiences confirm that technological innovations and the development of digital infrastructure, in and of themselves, are fundamentally incapable of guaranteeing macroeconomic security. The isolated implementation of legal frameworks or technological tools is insufficient to overcome the shadow economy if it is not firmly underpinned by a strong institutional foundation, effective anti-corruption compliance, and rigorous control over authoritative powers. Digital transformation must be coupled with a societal culture of zero tolerance for corruption to be truly effective. Proactive cybersecurity acts not merely as a technical superstructure, but as the fundamental basis for successful anti-corruption and de-shadowing reforms, forming a holistic and resilient architecture of the national economy. Without ensuring the confidentiality and availability of the state's information assets, attempts to bring the economy out of the shadows are neutralized by technological vulnerabilities, allowing corruption to bypass traditional oversight and acquire a latent, high-tech form.

To achieve this resilient architecture, the sequential passing of three logically structured stages of reforms (Resilience, Reconstruction, and Integration) is fundamentally required. The first stage, "Resilience," addresses the wartime emergency period by focusing on the vital cyber defense of critical digital infrastructure and the establishment of total digital control over the distribution of massive international financial and military aid. This emergency protection is necessary to prevent the strategic destruction of critical infrastructure by targeted cyberattacks and to ensure absolute accountability. By utilizing digital financial technologies and automated tracking systems, the state can completely neutralize the human factor, thereby protecting international donor investments from embezzlement and maintaining institutional trust on the part of global partners.

The second stage, "Reconstruction," focuses on the immediate post-war years and aims at the irreversible de-shadowing of capital through the comprehensive regulation of virtual assets and the cryptocurrency market. A pivotal component of this phase is the creation of a sophisticated

financial monitoring ecosystem driven by artificial intelligence, machine learning algorithms, and big data analytics. The deep integration of artificial intelligence into national financial monitoring systems facilitates a crucial transition from reactive to predictive response models. This provides the ability to proactively detect hidden financial anomalies, recognize shadow flows, and effectively counter illicit practices by making blocking decisions based solely on mathematical models, which strictly precludes bribery or manual intervention by inspectors. Furthermore, this reconstruction phase mandates adherence to the principles of the green and digital "twin transition," ensuring that environmental sustainability and digitalization remain inseparable in recovery projects to meet the rigorous investment criteria of European partners.

The third and final stage, "Integration," involves the complete synchronization of the national economic, legal, and customs systems with the European Union's Digital Single Market. This long-term strategic goal requires the state to qualitatively transform its economic structure, transitioning from mixed transitional models to highly specialized and resilient profiles, such as a "Digital Service Economy" or a "Knowledge-driven economy," which are characteristic of advanced European states. A fundamental prerequisite for the success and irreversibility of this integration is the deep rooting of an institutional culture of cyber hygiene and the institutionalization of strict whistleblower protections.

Ultimately, the synergy of reliable cyber protection, transparent digital ecosystems, and an institutionalized societal culture of zero tolerance for corruption will create a stable, secure, and transparent business environment. This comprehensive and complementary model guarantees the irreversible de-shadowing of capital, completely neutralizes the risks of embezzlement of international aid, and ensures the country's successful, long-term economic, legal, and technological transformation into a specialized, knowledge-driven European economy.

References:

1. Abdullahi, A. O., & Ali Mohamed, I. S. (2025). E-Government as a tool to combat corruption in post-conflict Somalia. *Journal of Somali Studies*, 12(1), 9–30. https://doi.org/10.31920/2056-5682/2024/v12n1a1

2. Baskoro, A. (2025). Combating corruption in procurement: The synergy of law enforcement, civil society, and digital oversight. *Jurnal Pengadaan Indonesia*, 4(1), 24–39. https://doi.org/10.59034/jpi.v4i1.59

3. Berdiev, A. N., Goel, R. K., & Saunoris, J. W. (2024). Global cryptocurrency use, corruption, and the shadow economy: New insights into the underlying linkages. *American Journal of Economics and Sociology*, 83(3), 609–629. https://doi.org/10.1111/ajes.12566

4. Bojan, A., & Achim, M. V. (2025). Does information and communication technology influence the shadow economy? A panel data analysis for EU countries. *Proceedings of the International Conference on Business Excellence*, 19(1), 2843–2862. https://doi.org/10.2478/picbe-2025-0219

5. Chainalysis. (2025). Crypto adoption in Europe: Global crypto adoption index. Chainalysis Blog. https://www.chainalysis.com/blog/europe-crypto-adoption-2025/

6. Cheng, S., Li, J., Luo, L., & Zhu, Y. (2024). Cybersecurity governance and digital finance: Evidence from sovereign states. *Finance Research Letters*, 65. https://doi.org/10.1016/j.frl.2024.105533

7. Derzhavna mytna sluzhba Ukrainy [State Customs Service of Ukraine]. (2026). Pidsumky zastosuvannia Novoi kompiuteryzovanoi tranzytnoi systemy (NCTS) v Ukraini: statystyka ta antykoruptsiinyi efekt [Results of the application of the New Computerized Transit System (NCTS) in Ukraine: Statistics and anti-corruption effect]. Ofitsiinyi vebportal Derzhmitsluzhby [Official web portal of the State Customs Service]. https://customs.gov.ua

8. Habiburrochman, H., Saa, S., Indrayana, D., Khairunnisah, K., & Rahma, F. (2024). Tackling corruption in the public sector: Innovative approaches and policy reforms. *Join: Journal of Social Science*, 1(6). https://doi.org/10.59613/ejan4589

9. Kelemen, R. (2026) The Cyberfare state: divergent models of digital governance and control. *Frontiers in Political Science*, 8. https://doi.org/10.3389/fpos.2026.1748562

10. Kormych, L., Krasnopolska, T., & Zavhorodnia, Y. (2024). Digital transformation and national security ensuring. *European political and law discourse*, 11(1), 29–37. https://doi.org/10.46340/eppd.2024.11.1.4

11. Leheza, Y., Kulinich, O., Zhuravlova, T., Khainatskyi, Y., & Sainchyn, S. (2025). Combating Corruption Offenses: Foreign Experience, Theoretical, Practical, Legal Regulations, and Improvement. *Jurnal Hukum Islam*, 23(1), 305–335. https://doi.org/10.28918/jhi.v23i1.10

12. Lesmana, D., Afifuddin, M., & Adriyanto A. (2023). Challenges and cybersecurity threats in digital economic transformation. *International Journal of Humanities Education and Social Sciences*, 2(6). https://doi.org/10.55227/ijhess.v2i6.515

13. Lyeonov, S., Yarovenko, H., Reshetniak, Y., & Bilan, Y. (2025). The triple threat: Understanding the effects of cyber threats, corruption, and money laundering on the business environment. Equilibrium. *Quarterly Journal of Economics and Economic Policy*, 20(3), 1087-1129. https://doi.org/10.24136/eq.3846

14. Mara, E. R. (2025). Quo Vadis Shadow Economy in A Digitalized World? Evidence from Panel Cointegration for EU Countries. Journal of Innovation Economics & Management, Prépublication (0), I179-XL. https://doi.org/10.3917/e.jie.pr2.0179

15. McKinsey. (2022). The fight against money laundering: Machine learning is a game changer. New York: McKinsey Risk Practice. URL: https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/the-fight-against-money-laundering-machine-learning-is-a-game-changer

16. Ministerstvo finansiv Ukrainy [Ministry of Finance of Ukraine]. (2024). Rada YeS zatverdyla instrument Ukraine Facility obsiahom 50 mlrd yevro na 2024-2027 roky [The EU Council approved the Ukraine Facility instrument in the amount of EUR 50 billion for 2024-2027]. Uriadovyi portal [Government portal]. https://eu-ua.kmu.gov.ua/news/rada-yes-zatverdyla-instrument-ukraine-facility-obsyagom-50-mlrd-yevro-na-2024-2027-roky/

17. Ministerstvo finansiv Ukrainy [Ministry of Finance of Ukraine]. (2025). U 2025 rotsi Minfin zaluchyv 52,4 mlrd dolariv SShA zovnishnoho finansuvannia, z yakykh ponad 70% - za rakhunok dokhodiv vid zamorozhenykh aktyviv RF [In 2025, the Ministry of Finance attracted USD 52.4 billion in external financing, of which over 70% came from the revenues of frozen Russian assets]. Uriadovyi portal [Government portal]. https://www.kmu.gov.ua/news/u-2025-rotsi-minfin-zaluchyv-524-mlrd-zovnishnoho-finansuvannia-iz-iakykh-ponad-70-za-rakhunok-dokhodiv-vid-zamorozhenykh-aktyviv-rf

18. Natsionalnyi bank Ukrainy [National Bank of Ukraine]. (2025). Stratehiia rozvytku finansovoho sektoru Ukrainy: napriam tsyfrovizatsii, kiberzakhystu ta finmonitorynhu v umovakh vidnovlennia [Strategy for the development of the financial sector of Ukraine: Direction of digitalization, cyber defense, and financial monitoring in the context of recovery]. Kyiv. https://bank.gov.ua

19. Nguyen, C. P., Schinckus, C., Nguyen, Q. B., & Le Tran, D. T. (2024). Digitalization and informal economy: a global evidence of internet usage. Journal of Industrial and Business Economics, 51(1), 1–37. https://doi.org/10.1007/s40812-023-00278-w

20. Ningsih, D. N. C., Rokhimakhumullah, D. N. F., Suryani, Y., & Mahendra, I. I. (2025). An effectiveness analysis of tax administration digitalization reducing the shadow economy in Indonesia. KnE Social Sciences, 10(13), 93–117. https://doi.org/10.18502/kss.v10i13.18943

21. Omotoye, A. M., & Holtzhausen, N. (2025). Integration of digital technologies in anti-corruption initiatives in Botswana: lessons from Georgia, Ukraine and South Africa. Transforming Government: People, Process and Policy, 19(1), 22–36. https://doi.org/10.1108/TG-01-2024-0002

22. Prohrama spryiannia hromadskii aktyvnosti “Doluchaisia!” (USAID/ENGAGE) [Civic engagement promotion program “Join in!” (USAID/ENGAGE)]. (2026). Zahalnonatsionalne opytuvannia shchodo hromadskoho zaluchennia: dynamika tolerantnosti do koruptsii v umovakh vidbudovy [National survey on civic engagement: Dynamics of tolerance to corruption in the context of recovery]. Pact Ukraine.

23. Przekota, G., Kowal-Pawul, A., & Szczepańska-Przekota, A. (2025). Determinants of the Shadow Economy – Implications for Fiscal Sustainability and Sustainable Development in the EU. *Sustainability*, 17(20). https://doi.org/10.3390/su17209033

24. Rahmafillah, R., Yuliandari Aida Putri, R., & Sartika, R. (2025). The effectiveness of anti-corruption policies in the digital age: a literature review on the use of technology in the eradication of corruption. *Hermeneutika : Jurnal Ilmu Hukum*, 9(2), 146-150. https://doi.org/10.33603/hermeneutika.v9i2.10043

25. Remeikiene, R., Gaspareniene, L., & Schneider, F. G. (2018). The definition of digital shadow economy. *Technological and Economic Development of Economy*, 24(2), 696–717. https://doi.org/10.3846/20294913.2016.1266530

26. Rudiyansah, M. M. D. H., & Rezki, Moch. G. F. (2025). The impact of corruption on economic development and community welfare from local and national perspectives. *Abdurrauf Social Science*, 2(2), 138–158. Retrieved from https://journal.abdurraufinstitute.org/index.php/arsos/article/view/349

27. Santiso, C. (2022). Govtech against corruption: What are the integrity dividends of government digitalization? *Data and Policy*, 4(3). https://doi.org/10.1017/dap.2022.31

28. Saputra, D. H., & Kusumah, F. (2025). Blockchain Forensics and the Evidentiary Challenges of Crypto-Based Corruption in Developing Countries. *Indonesian Journal of Criminal Law Studies*, 10(2), 615-658. https://doi.org/10.15294/ijcls.v10i2.28795

29. Stefanchuk, M., Polyvoda, V., Kikalishvili, M., Bodunova, O., & Yermolenko-Kniazieva, L. (2021). Digitalization of public services in countering criminal corruption offenses. *Estudios de Economia Aplicada*, 39(7). https://doi.org/10.25115/eea.v39i7.5012

30. Syed, A. A., Ahmed, F., Kamal, M. A., & Trinidad Segovia, J. E. (2021). Assessing the role of digital finance on shadow economy and financial instability: An empirical analysis of selected South Asian countries. *Mathematics,* 9(23). https://doi.org/10.3390/math9233018

31. TRM Labs. (2026). 2026 crypto crime report: Illicit activity on the blockchain. TRM Labs Insights. https://www.trmlabs.com/reports-and-whitepapers/2026-crypto-crime-report

32. United Nations Office on Drugs and Crime. (n.d.). Money laundering. URL: https://www.unodc.org/unodc/en/money-laundering/overview.html

33. Velchev, A. (2025). Role of economic sustainability in strengthening national security: Case of post-soviet countries. International Journal of Accounting and Economics Studies, 12(2), 361–371. https://doi.org/10.14419/zf7kfx55

34. World Bank. (2026). Ukraine Fifth Rapid Damage and Needs Assessment (RDNA5), February 2022 – December 2025. World Bank. https://doi.org/10.1596/44369

35. Yarovenko, H., Bozhenko, V., Lešetický, J., & Oláh, J. (2026). Configurational analysis of digital transformation profiles across European countries. *Journal of International Studies*, 19(2), 117-150. https://doi.org/10.14254/2071-8330.2026/19-2/6

36. Yarovenko, H., Hurochkina, V., Cugova, A., & Mohylna, K. (2026). Forecasting Illicit Practice Impacts on Economies of Conflict Countries: XGBoost Approach. *Business Ethics and Leadership*, 10(1), 105-129. https://doi.org/10.61093/bel.10(1).105-129.2026

37. Yarovenko, H., Pakhnenko, O., Riabushka, L., Tarasenko, I., & Khmurova, V. (2026). GRU-based forecasting of conflict-related socio-economic vulnerabilities under illicit practices. *Problems and Perspectives in Management*, 24(3), 15-36. https://doi.org/10.21511/ppm.24(3).2026.02

ENTREPRENEURIAL CAPITAL MIGRATION: TRANSFORMATION AND CHALLENGES UNDER WAR

Halyna Haman[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-3

Abstract. This monograph chapter examines the transformation of entrepreneurial capital migration flows on a global scale and their specific characteristics under the martial law economy of Ukraine; in particular, it outlines the prospects for business relocation and the conditions for their financial support. The catastrophic consequences of Russia's military aggression against Ukraine – manifested in a deep demographic crisis, loss of human capital, and colossal infrastructure destruction – have caused tens of billions of dollars in business losses and threatened the survival of the entire national productive capacity. Under these critical conditions, there is an urgent need to shift the management paradigm, including the relocation of businesses to safer areas. The purpose of the paper is to provide a comprehensive analysis and theoretical-methodological substantiation of how global capital movement processes are transformed under the impact of the war in Ukraine, and what financial mechanisms are required to preserve this capital through business relocation. *Methodology* of the study is based on a wide range of systematic economic analysis methods. In particular, the synthesis method is applied to outline the determinants of capital migration within modern ecosystems, alongside the analytical method with graphical representation to illustrate the consequences of large entrepreneurial capital migration abroad, which impacts most of the country's macroeconomic indicators. Furthermore, the comparative method is used to juxtapose classical and wartime financial business paradigms, while predictive analytical methods are employed to forecast the prospects of entrepreneurial capital relocation. *Results* of the survey showed that the domestic experience of business migration is unique, and its investigation serves as a starting point for further research. This is because the functioning

[1] PhD (Economics), Associate Professor,
Department of Economic Theory, Accounting and Taxation,
Kyiv National University of Construction and Architecture, Ukraine

© Halyna Haman

of Ukraine's economy under martial law highlights the critical need for a management paradigm shift—moving from a passive model of liquidity preservation and the destructive depletion of existing capital toward the proactive stimulation of productive capacity development. *Practical implications* lie in the development of specific applied recommendations for stabilizing the financial system and preserving domestic business potential amid geopolitical crises and martial law. Furthermore, the developed approaches to managing capital migration flows within modern ecosystems offer practical value for international donor organizations and financial institutions when designing targeted programs for grant support and preferential lending for Ukrainian entrepreneurship. The research materials can also serve as an applied foundation for enterprise executives in developing cross-border relocation strategies and minimizing security risks, as well as in the educational process of higher education institutions for designing courses in international economics. *The value/originality of* the obtained results is substantiated by outlining the strategic prospects for the cross-border relocation of domestic businesses and identifying the financial instruments and conditions for their support, which establishes a foundation for preserving the country's entrepreneurial potential and its subsequent post-war recovery.

INTRODUCTION

In the modern international economy, capital has ceased to be a mere resource; under the influence of numerous factors – specifically globalization, technological progress, and security challenges – a new phenomenon has emerged: the large-scale migration of entrepreneurial capital. This process involves transferring a business's tangible, financial, intellectual, and operational assets from one trajectory to another to ensure their preservation, diversification, or search for potential growth.

Migration processes are a subject of significant interest among researchers in scientific literature. Many scholars demonstrate that migration processes influence the economic development of the home country through capital accumulation and entrepreneurship. In particular, Chinese researchers Hu M., Su Y., & Zhang H. [1] investigated the impact of family structure on the entrepreneurial activity of migrants in Chinese cities. German scholars

Mrożewski M.J. and Hering D. [2] analyzed how a vast cultural distance between countries hinders migrant entrepreneurship, while high human capital (education and skills) offsets this negative effect. British authors A. Brown, R. Meriton, T. Devinney, M. Kafouros, F. Silvestre Gerardo, and R. Bhandal [3] studied the impact of entrepreneurs' human and political capital on the financial performance of companies across four transition economies, proving that the value of these resources depends on the country's level of institutional development. According to the definition by A. Slywotzky [4], a scholar of Ukrainian descent and business consultant at Oliver Wyman, capital migration represents the redistribution of market value in favor of business models that demonstrate higher efficiency and customer-centricity.

While highly valuing the significant contribution of many scholars to the research on entrepreneurial capital migration, I nevertheless believe that this topic currently requires a contemporary analysis of existing challenges, incorporating Ukraine's experience, particularly regarding business relocation under martial law due to Russian aggression. These challenges have not only shocked the domestic market but have also influenced the general trends of international capital movement. This is precisely what shaped the purpose of this monograph section, namely:

– investigated the international movement of entrepreneurial capital, summarized seven influencing factors, and provided their characteristics (Section 1);

– determined the specifics of Ukrainian capital migration in wartime, including the impact of business relocation on the country's macroeconomic indicators (Section 2);

– examined the issues of financial and investment support for business relocation, where a special place belongs to human capital (Section 3);

– concluded the study and outlined the prospects of the topic for future scientific research (Conclusions).

The study’s methodology is based on systematic economic analysis that combines methods of synthesis, comparison, graphical modeling, and forecasting to comprehensively examine the factors, macroeconomic consequences, and prospects of entrepreneurial capital migration under wartime conditions.

1. International Movement of Entrepreneurial Capital

The primary driver for exporting any domestic capital is its relative surplus in the domestic market, which stimulates the search for more profitable areas of application abroad. The international movement of capital is intensified by investors' desire to diversify risks or protect assets from domestic inflation and political instability, helping to secure strategic geo-economic interests in foreign territories over the long term.

Business migrants who move their assets abroad close down jobs in Ukraine, forcing the working-age population to migrate in pursuit of wages or business income. The departure of skilled professionals diminishes the country's investment attractiveness, as investors do not commit funds where there is a lack of workforce, thereby creating a vicious circle. The loss of intellectual and labor potential due to prolonged migration will hinder effective post-war recovery, as the taxpaying base required to sustain pensioners is critically shrinking, and there is a physical shortage of manpower.

The movement of migratory capital within a market economy does not imply state intervention; however, it must comply with the regulations of the domestic legislative framework. Over the past two decades, the migration of entrepreneurial capital has triggered a large-scale transfer of technology to developing countries. For traditional exporting countries, this has resulted in deindustrialization and the dominance of financial capital over the real sector. Such a transformation of the global economy makes it possible to forecast a shift in global leaders by GDP volume in the near future.

The study by Chinese scholars Hu M., Su Y., & Zhang H. [1] identifies three key mechanisms through which family influences the entrepreneurial activity of migrants in China: emotional support, social capital, and human capital, which compensate for the lack of external institutional support in a new environment. The probability of entrepreneurship increases by 1.4% with each additional family member living together, contributing to a 7.87% growth in the entrepreneurship rate compared to the country's average.

German scholars Mrożewski M.J. and Goering D. [2] conducted research and established that educated migrants are capable of transforming cultural differences into a business stimulus. Meanwhile, British scientists E. Brown, R. Meriton, T. Devinney, M. Kafouros, F. Silvestre Gerardo,

and R. Bhandal [3] studied the impact of human capital, finding that the human capital of domestic entrepreneurs who have never left their home country better stimulates business development; in contrast, the excessive human capital of migrants (higher education and experience) unexpectedly demonstrated an overall negative impact on enterprise performance due to a decreased propensity for risk.

An analysis of the computer market transformation in the 1990s through the prism of A. Slywotzky's [4] research reveals the phenomenon of 'profit pool slippage,' where capital flows away from industry leaders toward new players (Microsoft, Intel, Dell) that offer more efficient value creation structures under conditions of identical technological availability. The evolution of global corporations, such as Toyota, Walmart, and Bloomberg, demonstrates the possibility of rapid scaling, provided that market transformations are leveraged effectively. At the current stage, similar capital migration processes are observed in the education industry, driven by the accelerated digitalization of the sector. According to forecasted metrics, the online learning segment is projected to demonstrate nearly twofold growth over the next five years.

A company's strategic survival depends on its ability to process three development vectors in a timely manner:

1) profitability forecasting → identification of future revenue streams;

2) consumer evolution → search for new niches through the analysis of changing customer needs;

3) model transformation → development of a business structure capable of capitalizing on new opportunities.

The consequences of the international movement of capital are contradictory. While promoting labor productivity growth and accelerating innovation, large-scale financial flows can simultaneously undermine the stability of national financial systems and exacerbate the unevenness of global development.

In general, capital movement can be triggered by various factors: wars, pandemics, migration, financial crises with access to cheap credit, or even new social trends, such as sustainability or veganism. However, the primary threat to a business is not the crises themselves, but rather the internal inertia of companies – their complacency and reluctance to respond to these changes in a timely manner and transform [5].

In contemporary conditions, the international movement of capital creates complex and interconnected challenges that significantly destabilize national and global economic ecosystems. One of the primary threats is large-scale capital flight from countries with a high level of geopolitical risk. This process deprives the economy of domestic financial resources, deepens structural crises, and blocks opportunities for recovery. Simultaneously, sharp cross-border movements of financial assets amplify state vulnerability to external shocks, provoking imbalances in the balance of payments and rapid fluctuations in national currency exchange rates under the pressure of speculative flows. The situation is further complicated by the rapid development of digital platforms and ecosystems, which create information asymmetry and allow capital to migrate bypassing traditional banking monitoring, substantially reducing the efficiency of state regulation and taxation. Under martial law, these challenges become critical, giving rise to an acute regulatory dilemma: the necessity to strictly restrict the outflow of national capital to preserve financial stability contradicts the strategic need to attract foreign investment and stimulate international support for relocated businesses.

Capital migration processes are driven by a complex of interconnected factors, specifically highlighted by seven key drivers, which are presented in Table 1.

An important subjective factor is society's readiness to adopt new social standards (the greening of consumption, sustainable development, etc.). To minimize the impact of these factors, it is advisable for business entities to develop migration risk management measures by applying strategic tools through comprehensive monitoring of the market environment, specifically ongoing analysis of competitive dynamics and tracking of innovative developments in related industries.

However, exogenous shocks represent sharp external events that cannot be controlled from within a country or market, yet strongly impact macroeconomic indicators (inflation, GDP, exchange rates). Their primary characteristics include: external origin, specifically that the source of the problem lies beyond the control of the national economy or individual enterprises; unpredictability, as such events typically cannot be accurately forecasted using existing indicators; and a destructive effect, which manifests through negative macroeconomic phenomena that cannot be fully reversed.

Table 1

Drivers of entrepreneurial capital migration in modern ecosystems

Factors	Characteristics
Globalization and intensifying competition	Entry of new players and innovative products into the markets
Industry reforming	Expanding borders between traditional industries and developing cross-sector partnerships
Transformation of consumer priorities	Evolution of consumer needs and value orientations
Institutional regulation	Changes in the regulatory framework that stimulate or restrict the development of specific sectors
Digital and software solutions	Emergence of technologies that fundamentally transform industry capabilities through the integration of digital tools
Innovative business models	Implementation of new mechanisms for generating business processes
Impact of exogenous shocks	Military conflicts, pandemics, geopolitical crises, mass migration processes, financial crises, and changes in global energy prices

Source: compiled by the author

The study of contemporary challenges regarding the migration of entrepreneurial capital on the international stage allows us to state a shift from the classical investment paradigm in favor of security factors, which is particularly relevant for the Ukrainian market.

2. Features of Ukrainian Capital Migration under War Conditions

The migration of Ukrainian capital is unique and heavily influenced precisely by exogenous shocks, as Russia's war in eastern Ukraine since 2014 provoked the forced migration of people, capital, resources, and enterprises to the government-controlled territory of Ukraine, while the full-scale war since 2022 has only accelerated this flow, pushing it to a critical level and beyond the country's borders. According to the United Nations High Commissioner for Refugees, more than 5.7 million Ukrainians have fled abroad since 2022, and taking into account the period since the beginning of Russian aggression in 2014, this figure has already reached 8.5 million people [6].

Since the beginning of the full-scale war, Russian attacks have destroyed more than 400,000 square meters of commercial warehouses owned by Ukrainian businesses, which is roughly equivalent in area to 56 football fields [7]. In August 2026, the Russian army intensified its terror against Ukraine's civilian sector, deliberately targeting large logistics centers, distribution hubs, and retail infrastructure. This inflicted approximately $6 billion in damages on big business and destroyed over 400,000–500,000 square meters of warehouse space, plunging the market into a shortage crisis of essential goods, books, building materials, toys, and tableware, while international brands also suffered losses.

Warehouse relocation is a complex challenge, yet it remains a viable option for rescuing a portion of inventory. Large retailers are urgently abandoning giant centralized hubs in favor of a network of smaller regional warehouses. While this increases logistics costs, it minimizes the risk of losing everything in a single strike. The Cabinet of Ministers has offered relocation assistance and the allocation of certain state-owned facilities for use as warehouses. Businesses are highly interested in concessional lending and support for war risk insurance, as rebuilding on such a scale using their own funds is nearly impossible.

In parallel, Russia continued its systemic attacks on the ports of Odesa, where the agricultural sector forecasts significant losses due to maritime export restrictions and infrastructure damage. The relocation of shipping and the search for capacity via alternative routes (specifically the Danube) are limited, making it impossible to find other maritime transport paths. The inability to utilize domestic ports at full capacity threatens to leave millions of tons of the new grain harvest unshipped and rotting. Bloomberg estimates that due to these attacks, Ukraine risks losing up to 2% of its GDP.

Despite significant capital migration and economic losses, the relocation of enterprises has opened new prospects for regional development within Ukraine and expanded beyond the country, integrating into the European market and global space. The main hubs for business migration became both domestic locations – specifically western and central regions protected by their geographical distance from the Russian border – and the EU market. The transfer of capacities stimulated local entrepreneurship, improved infrastructure and logistics, and increased tax revenues for local budgets. These processes have significantly altered the structure of

public finances, particularly the system of vertical and horizontal fiscal equalization. Regions that hosted the largest number of internally displaced persons (IDPs) received additional intergovernmental subventions to meet their basic needs. At the same time, due to the state budget deficit and high dependence on international aid, an imbalance emerged in the revenue structure. For instance, in 2025, the ratio of tax to non-tax revenues stood at 52% to 46%. The instability and unpredictability of foreign financing pose serious risks to the financial security of the state [8].

The migration of large entrepreneurial capital abroad (the so-called "capital flight") triggers a chain reaction that directly degrades the country's macroeconomic indicators. Let us analyze the main indicators and demonstrate their impact on the Ukrainian market.

1. Demographic situation

Capital migration is mostly accompanied by the migration of owners and key employees, which deepens the labor market crisis and negatively impacts the gross domestic product (GDP). As of early 2026, the demographic situation in Ukraine remains critical, which is directly linked to "capital migration" in its two forms: physical capital (money and businesses) and human capital (talents and the working-age population).

We can observe a sharp decline in the birth rate in Figure 1, whereas the mortality rate was at its highest in 2021 due to the impact of the Covid-19 pandemic. According to Opendatabot [9], during the first half of 2026, the mortality rate in Ukraine exceeded the birth rate nearly fourfold, marking the first official increase in the number of deaths over the last 5 years, rising to 259,853 individuals. On average, about 12,000 babies are born in Ukraine each month, which is 20,000 fewer than 10 years ago. The lowest birth rates are recorded in front-line areas, while the highest, despite massive attacks, is in Kyiv – accounting for every ninth baby (8,352). Nonetheless, the capital also leads in mortality, with 20,121 cases recorded during the first 6 months of 2026.

Due to the emigration of youth and women of reproductive age (with around 18% of children under the age of 9 currently abroad), the population's average age structure is rapidly shifting toward older cohorts. This points to the impossibility of population replacement, signaling an aging nation.

The aging of the nation, as a international trend, has two sides: it reflects longevity, as people live longer, yet it increases the burden on the working-

age population and leads to labor shortages, which in turn reduces overall labor market mobility and slows down the adoption of new technologies.

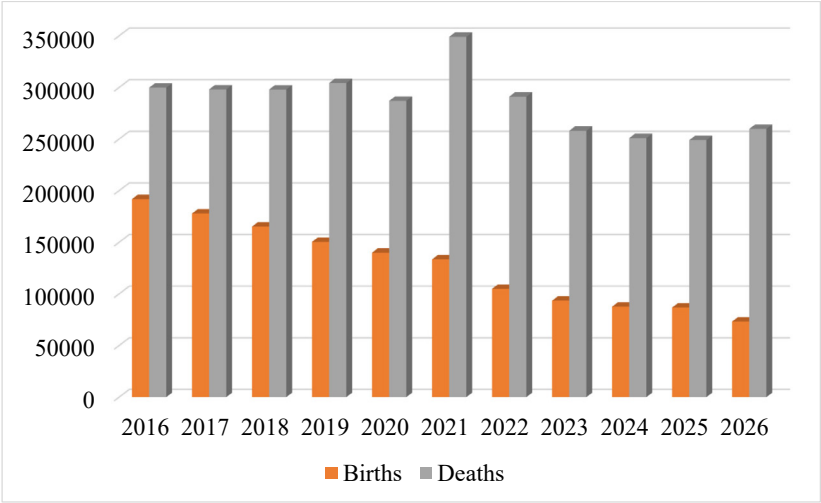


Figure 1. Trends in Birth and Mortality Rates in Ukraine for the Period 2016–2026

Source: compiled by the author based on [9]

2. Impact on GDP

Direct investments are a vital resource for GDP. Capital outflow means that funds are not being invested in domestic factories, equipment, and technologies, which hampers economic growth and, consequently, leads to a disinvestment process. The only exception may be the defense industry, as a strategically and perhaps even critically essential sector of the economy under the conditions of Russia's war against Ukraine. Overall, according to World Bank [10] data, we can observe a sharp decline in GDP at the beginning of the full-scale war in 2022 to -28% in Figure 2; however, during the following year of struggle, Ukrainians managed to achieve 5.5%, although by 2025, GDP growth reached only 1.8% due to the prolonged war and a significant outflow of resources.

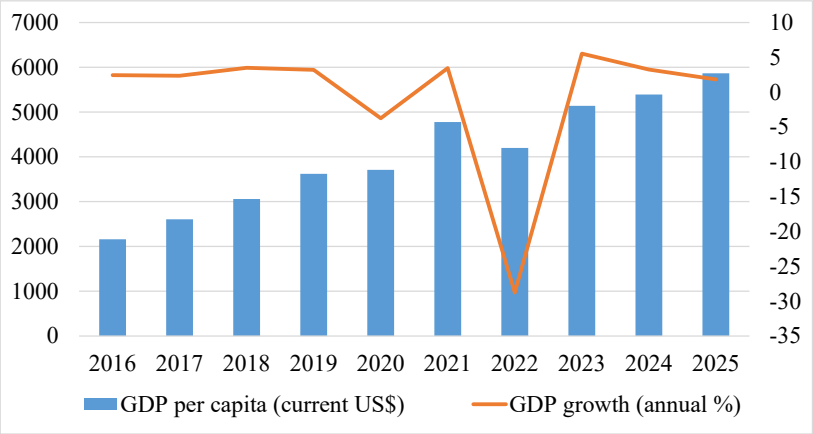


Figure 2. GDP per capita and GDP growth rates for the period 2016–2025

Source: compiled by the author based on [10]

3. Hryvnia exchange rate stability

To expatriate capital, major players mass-purchase foreign currency (US dollars, euros), which creates a deficit in the domestic market and puts pressure on the exchange rate. Consequently, there is a surge in demand for foreign currency. This, in turn, exerts pressure on the foreign exchange reserves of the National Bank of Ukraine (NBU), forcing it to conduct currency interventions and deplete reserves to maintain hryvnia stability and prevent sharp devaluation. Thus, 2025 marks a transition to a policy of gradual hryvnia depreciation, or a relaxation of the NBU's controlled devaluation policy. According to forecasts, the average annual exchange rate may reach around 45 UAH/USD and 53 UAH/EUR. To combat "unproductive capital outflow," the NBU regularly updates and tightens foreign exchange restrictions for businesses.

4. Tax revenues and «shadow» economy

The relocation of businesses abroad leads to a loss of tax revenues, which increases the budget deficit. Following February 24, 2022, a key challenge in labor taxation became preventing a double tax burden on the incomes of Ukrainian migrants. Today, mass migration has transformed

from a purely humanitarian issue into a powerful economic factor heavily impacting the financial systems of European countries. A portion of the capital that physically remained in the country, but partially moved into the "shadow economy" due to high war risks and tight NBU foreign exchange restrictions, has lowered overall tax compliance in volatile economic sectors. Concurrently, some companies opted for "legal relocation" – reregistering trademarks and financial centers abroad – meaning that taxes from their integration into the global space now settle in foreign jurisdictions.

5. Labor market

The labor market crisis remains a distinct challenge. According to "24 Business," 75% of businesses are experiencing a "personnel drought," or an acute shortage of staff. Today, approximately 31 million people reside in government-controlled territories of Ukraine, yet only about 13 million citizens are officially employed, and a mere 10.5 million pay the single social contribution [11].

The staff shortage in the domestic labor market varies by business sector and is driven by several key factors. Among the main causes are the war, mobilization, the mass migration of people abroad, unemployment, the demographic situation, and a rapidly aging population. Furthermore, there is a lack of required competencies; specifically, the knowledge and skills of job seekers often do not match the requirements of employers, creating a severe mismatch between demand and supply in the labor market.

Due to the ongoing labor shortage, the recruitment of migrants from Africa, India, Bangladesh, Vietnam, the Philippines, and other countries is currently being actively discussed. The highest demand for foreign workers is observed in construction, retail, and the manufacturing industry. According to various estimates, they receive a salary lower than Ukrainians in similar positions—averaging around 15,000 UAH – but they are provided with meals and dormitory accommodation.

According to business estimates, the full legalization (including work permit processing, visa, temporary residence permit, and other administrative costs) of a single foreign worker costs around 40,000 UAH. Consequently, the upfront onboarding costs for a foreigner are 25–30% higher compared to hiring Ukrainians [12]. Frequently, migrants fail to adhere to corporate and professional ethics, as well as the legal framework of the host territory.

I hold my own perspective on attracting foreign workers into economic sectors, which lies somewhere between allowing their free migration and implementing production automation to fill corporate vacancies. It is essential to build an individual approach to each separate case and weigh all factors. Naturally, Ukrainians must remain the priority for the domestic labor market, and companies that recruit migrants should familiarize them with the specifics of the legal framework and corporate responsibility.

The projected growth of the foreign workforce in Ukraine necessitates reforming the legal mechanisms of migration policy. Specifically, the development and implementation of the Migration Development Strategy must take into account current EU practices, which are based on strictly linking residency preferences to an active employment contract. It is worth noting that each migrant will bring their own culture, traditions, communication ethics, hygiene, social order, and other components that may significantly differ from Ukrainian ones. A prime example of this is the systemic risks experienced in Europe regarding national security and law enforcement. The crisis of the European asylum system (in particular, the inefficiency of the Dublin Regulation) revealed an inability to rapidly adapt the regulatory framework to mass migration waves. This resulted in the spread of illegal employment, distortion of the domestic labor market, wage dumping, and a worsening crime situation, which underscores Ukraine's urgent need to develop preventive security mechanisms.

A pronounced structural asymmetry is observed in the domestic labor market: the demand for remote employment significantly outstrips its supply, which currently accounts for only 7% of total vacancies. The heightened interest in the remote format is driven by the security risks of martial law – particularly in front-line areas – large-scale processes of internal and external population relocation, a desire to optimize time resources, as well as the need for the socioeconomic inclusion of vulnerable groups, including war veterans and individuals with disabilities.

The current Labor Code – namely the Labor Code of Ukraine from 1971 [13] – is part of an obsolete Soviet legacy designed for the industrial economy of the last century; however, the modern labor market requires significant changes, particularly the integration of contemporary flexible forms of employment, remote work, and the contract-based system. The primary goal of the draft new Labor Code is to adapt to these changes

and help everyone secure official employment in the new realities [14]. This regulatory act aims at the comprehensive digitalization of labor relations, the modernization of procedures for confirming and terminating employment contracts, the regulation of remote work, and the introduction of an institutional framework for the out-of-court settlement of labor disputes. The document is fully harmonized with EU legal standards, which serves as a baseline condition for the systemic reform of the labor market and for achieving the target indicators of the National Employment Strategy until 2030 [15].

3. Financial and Investment Support for Business Relocation

Under martial law, the classical capital structure (Modigliani-Miller theory, Trade-off theory) ceases to function due to a critical surge in the country risk premium, leading to the forced substitution of market financial instruments with non-market and subsidized ones.

Grants from foreign governments and funds (EBRD, World Bank, EU programs) take center stage, transforming from an auxiliary tool into an absolute alternative-free source for financing development. The unique feature of this capital is its non-repayable nature, coupled with highly strict target regulation (funds are granted strictly for equipment procurement, energy modernization, or job creation, which limits the company's financial flexibility).

Russia's war against Ukraine has shifted the traditional classical vector toward a strategy of adaptive survival (resilience). Traditional financial theory posits that the primary objective of corporate strategy is to maximize shareholder wealth through increasing the market value of the enterprise. The war paradigm entails measures that significantly alter the business focus (Table 2).

A resilience-oriented strategy in wartime focuses on prioritizing liquidity over profitability, financing autonomization (energy independence, digitalization), and decentralizing production to distribute risks. Corporate investments are directed toward ensuring business continuity, while the planning horizon shrinks to 6–12 months, freezing long-term projects. This strategy is typically implemented by large businesses and the IT sector, whereas mid-sized industrial and agricultural capital remains trapped due to its high dependency on the geographical location of assets.

Table 2

Comparison of Classical and Wartime Financial Business Paradigms

	Classical Paradigm (Growth)	Wartime Paradigm (Resilience)
Strategy	Value Maximization	Liquidity Risk Minimization
Planning Horizon	3-5 years	1-3 months
Mission	Scaling and Expansion	Diversification and Autonomization
Strategic Focus	Capital Expenditures	Operational Flexibility

Source: compiled by the author

Business relocation, while being a critical component of its security, simultaneously forces regions to actively invest in the development and retraining of human capital. To retain new businesses and convert their presence into long-term development, local communities must invest in their primary asset – people. This requires providing them with new competencies, retraining them for other economic sectors, and teaching them modern digital technologies.

The main paradox of relocation is that companies rarely move 100% of their staff. Typically, only top management and key engineers relocate. Business seeks the bulk of its frontline personnel, process engineers, and mid-level specialists within the new location. This is where a technological gap emerges. The local labor market often proves unprepared for the requirements of relocated companies – be it a modern woodworking enterprise, an IT hub, or a high-tech food processing plant. The old skills of the local population become obsolete. Communities are faced with a choice: either watch the business decline due to a labor shortage and eventually leave, or take proactive measures.

Alternatively, businesses can increasingly engage people over 60, retrain employees, integrate people with disabilities, and recruit women into traditionally male-dominated professions. At the same time, companies will be forced to raise salaries and boost work motivation, thereby creating a new corporate culture and teamwork dynamics.

Regions that win the competition for business invest in human resource development across three main pillars:

Dual education and rapid retraining. Dual education entails a collaborative model consisting of 30% academic learning at higher education institutions and 70% practical training at enterprises (directly at new production

facilities). Furthermore, municipalities, in cooperation with relocated businesses, launch short-term intensive courses, while employment centers transform from benefit-disbursing bodies into dynamic educational hubs.

Integration and synergy with Internally Displaced Persons (IDPs). Displaced specialists from other oblasts bring unique expertise; thus, it is rational to establish shared coworking spaces, business incubators, and mentorship programs where incoming professionals train local staff, fostering a new professional culture. Concurrently, local communities invest in programs for their social and professional adaptation.

Development of soft skills and digital literacy. Modern production demands automation – for example, workers at construction companies now pilot drones. Municipalities open hubs dedicated to language learning, project management, and basic IT, thereby raising the general qualification level of the population.

Knowledge serves as the foundation for building and successfully growing any business. Rather than merely complementing a leader's personal qualities, it acts as the core baseline for shaping entrepreneurial capital. Specifically, knowledge and critical thinking minimize risks. Entrepreneurship is inherently tied to risk, but a "successful risk" is an informed and calculated one. Without knowledge, decisions are often made intuitively or emotionally, which significantly increases the likelihood of mistakes. Equipped with knowledge (such as financial literacy, analytical thinking, and strategic potential), an entrepreneur can forecast potential threats, develop risk mitigation strategies, and make more balanced, well-considered decisions.

Knowledge ensures management efficiency, as starting a business and developing a business plan is not just about having an idea, but knowing how to execute it operationally. Managerial knowledge (management, HR, project management) allows for the efficient use of resources: time, money, and human capital. Legal and tax knowledge helps ensure compliance with legislation, avoid fines, and optimize operations, which is critical for the long-term survival of a business.

The circulation of investment in human capital can be visually illustrated in the form of successive stages of the competitive development of a region with relocated enterprises, which will facilitate both the upskilling of employees and the enhancement of the region's overall welfare, as depicted in Figure 3.

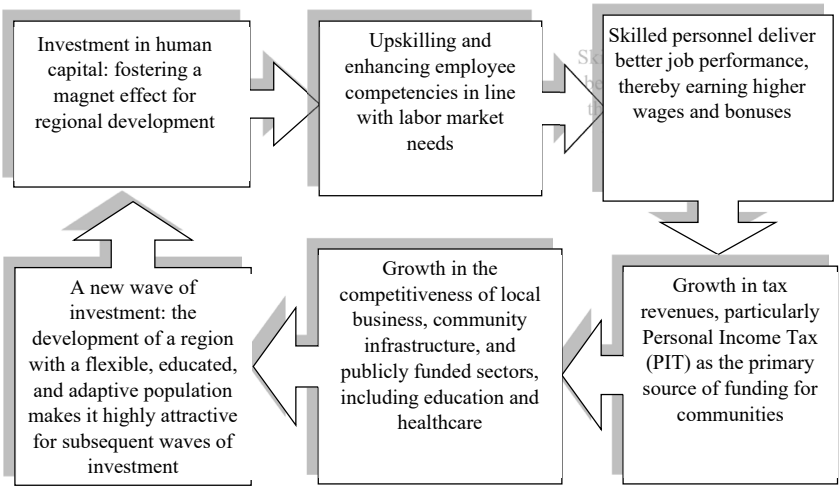


Figure 3. The circulation of investment in human capital

Source: compiled by the author

The digital transformation of the economy and the implementation of innovation across all sectors of economic activity are the primary drivers of the migration capital market, which necessitates updating labor migration legislation. State policy must focus on developing private investment channels and directing them into the real sector of the economy. Increasing the investment potential of migration funds is possible through the improvement of digital infrastructure, which will stimulate support for small and medium-sized businesses.

CONCLUSIONS

Summing up the results of the conducted research, it should be noted that in the face of constant changes in the international market and globalization challenges, knowledge becomes the primary driver of innovation and competitiveness. Sector-specific expertise and a deep understanding of technological trends enable businesses to adapt timely and outperform competitors, which requires continuous private and public investment in human potential to ensure long-term socio-economic returns for both individuals and the state.

Under martial law, Ukraine's economy must urgently transition from a survival or capital-depletion model toward stimulating production capacities, particularly through their relocation to safer regions, as domestic demand is currently outpacing national production capabilities. The unprecedented coordinated strikes on the capital region's logistics infrastructure in August 2026, which resulted in product shortages, supply delays, soaring corporate operational costs, and job losses, underscore the scale of these challenges; meanwhile, total damages to Ukraine's logistics sector over the course of the full-scale war have already exceeded $1.5 billion [16].

The relocation of businesses serves as a rigorous test for regional leaders, demonstrating that the territories winning the competition are not those offering cheaper land or tax incentives, but those capable of providing businesses with skilled and adaptive human capital. Despite the projected acceleration of cross-border business migration and the associated risks of permanently losing national entrepreneurial capital to international relocation intermediaries, this migration simultaneously lays the groundwork for a migration capital market. Efficiently leveraging migrant remittances and the assets of relocated enterprises maintaining Ukrainian registration requires robust regulatory tools, including payment digitalization, lower transaction costs, and monitoring systems to foster territorial development.

Ultimately, wartime conditions have triggered a fundamental transformation in corporate finance: traditional market-based entrepreneurial capital is increasingly replaced by state-subsidized programs and international donor grants. Concurrently, corporate investment strategies are evolving from a growth-oriented focus on maximizing market value toward a resilience-oriented model aimed at ensuring operational autonomy and stability in response to military risks. This shift forces businesses to abandon large, complex facilities in favor of decentralization and renting networks of smaller warehouses across multiple regions; although more costly, this approach effectively mitigates the risk of catastrophic, simultaneous asset destruction during attacks.

References:

1. Hu, M., Su, Y., & Zhang, H. (2021). Migrant Entrepreneurship: The Family as Emotional Support, Social Capital and Human Capital. *Emerging Markets Finance and Trade,* 57(12), 3367–3386. DOI: https://doi.org/10.1080/1540496X.2019.1693364

2. Mrożewski, M.J., Hering, D. (2023). What makes migrants more entrepreneurial? Investigating the role of cultural distance and human capital. *Int Entrep Manag J.* 19, 151–176. DOI: https://doi.org/10.1007/s11365-022-00813-6

3. Brown, A., Meriton, R., Devinney, T. et al. (2021). Migrant human and political capitals value in entrepreneur enterprise performance. A comparative study of four emerging markets. *Int Entrep Manag J.* 17, 665–692. DOI: https://doi.org/10.1007/s11365-020-00710-w

4. Slywotsky, Adrian J. (1995). Value Migration: How to Think Several Moves Ahead of the Competition (Management of Innovation and Change). Harvard Business School Press. Boston, MA. 328 p.

5. Opatska, S., Voronovska, R. (2021). Yak kompanii ne progavyty mihratsiiu kapitalu z haluzi ta vriatuvaty biznes vid krakhu [How a company can avoid missing value migration from the industry and save its business from collapse]. *Forbes Ukraine.* URL: https://forbes.ua/money/yak-kompanii-ne-progaviti-migratsiyu-kapitalu-z-galuzi-ta-vryatuvati-biznes-vid-krakhu-03062021-1632

6. Karbunar N. (2026, 7 June). Lubinets rozkryv, skilky liudei pokynuly Ukrainu vid pochatku viiny [Lubinets revealed how many people have left Ukraine since the start of the war]. *Hlavkom.* URL: https://glavcom.ua/country/society/lubinets-rozkriv-skilki-ljudej-pokinuli-ukrajinu-vid-pochatku-vijni-1124179.html

7. Storozhuk I. (2026, 6 August) Pislia atak Rosii ukrainskyi biznes vtratyv ponad 400 tys. kv. m skladiv – Forbes [Following Russian attacks, Ukrainian businesses have lost over 400,000 square meters of warehouse space – Forbes.] *Hlavkom.* URL: https://glavcom.ua/economics/business/pislja-rosijskikh-atak-ukrajinskij-biznes-vtrativ-ponad-400-tis-kv-m-skladiv-forbes-1135358.html

8. Haman, H., & Servatynska, I. (2025). Financial Losses of the Ukrainian Economy from the Relocation of Enterprises During the War. *Transformational Economy*, (4 (13), 32-39. DOI: https://doi.org/10.32782/2786-8141/2025-13-5

9. Opendatabot (2026, 22 July). Smertnist uchetvero perevyshchuie narodzhuvanist [Mortality exceeds the birth rate fourfold]. URL: https://opendatabot.ua/analytics/birth-death-2026

10. World Bank Group. Ukraine. URL: https://data.worldbank.org/country/ukraine?locale=uk

11. Kovpak A. (2026). Kadrovyi holod nakryv Ukrainu: 75% biznesiv u panitsi, vlada perepysuie Trudovyi kodeks [Labor deficit strikes Ukraine: 75% of companies alarmed, authorities redrafting the Labor Code]. *Biznes 24.* URL: https://24tv.ua/business/robota-ukrayini-biznes-skarzhitsya-defitsit-kadriv-tomu-prezentuvali_n3063451

12. Kovpak A. (2026). Mihranty z Banhladesh vzhe zapolonyly Ukrainu: yakyi biznes bere yikh na robotu ta skilky tse koshtuie [Bangladeshi migrants in Ukraine: what industries hire them and what are the costs]. *Biznes 24.* URL: https://24tv.ua/business/migranti-ukrayini-skilki-koshtuye-naym-trudovih-migrantiv-uk_n3063945

13. The Labour Code of Ukraine (2026, 31 July). Approved by Law No. 322-VIII of 10.12.71. Verkhovna Rada of Ukraine. URL: https://zakon.rada.gov.ua/laws/show/322-08#Text

14. Proiekt Trudovoho kodeksu Ukrainy [Draft Labor Code of Ukraine] (2026). Verkhovna Rada of Ukraine. URL: https://itd.rada.gov.ua/billinfo/Bills/Card/69516

15. Stratehiia zainiatosti naselennia do 2030 roku [Employment Strategy for the Population until 2030] (2026, 7 January). Rozporiadzhennia Kabinetu Ministriv Ukrainy № 92-r. URL: https://zakon.rada.gov.ua/laws/show/92-2026-%D1%80#n18

16. Ukraine Business News (2026, August 13). Ukraine's Logistics Sector Has Suffered More Than $1.5B in War-Related Losses. URL: https://ubn.news/ukraines-logistics-sector-has-suffered-more-than-1-5b-in-war-related-losses/

STRUCTURAL ASYMMETRIES IN THE DISTRIBUTION OF LOAN CAPITAL IN THE ECONOMY

Mykhailo Hantsiak[1]
Igor Guzhva[2]

DOI: https://doi.org/10.30525/978-9934-26-715-4-4

Abstract. The efficiency of the loan capital market is largely determined by the nature of the distribution of credit resources across individual sectors of the economy. Disruptions to the balance of this process give rise to structural asymmetries, which gradually weaken the performance of the financial intermediation function of financial institutions, restrict business entities' access to financial resources, and adversely affect economic development. *The subject of the study* is the process through which structural asymmetries emerge during the redistribution of loan capital in Ukraine's economy. *The purpose of the study* is to develop the theoretical and methodological foundations for examining structural asymmetries in the distribution of loan capital in the economy, as well as to identify, analyse, and determine approaches to mitigating them. The study follows the logic of a sequential transition from the theoretical substantiation of the nature of structural asymmetries to the assessment of their manifestations in Ukraine's loan capital market and the identification of measures for their prevention and mitigation. The theoretical foundations of the functioning of the loan capital market are examined, and approaches to interpreting the causes of structural imbalances arising in the course of its functioning are systematised. The authors' approach to defining the essence of structural asymmetries in the distribution of loan capital is substantiated, and a conceptual framework explaining the mechanism of their emergence and manifestation is developed. The study analyses the dynamics of bank lending to the corporate sector, households, and the general government

[1] PhD in Finance, Banking and Insurance,
Acting Head of the Financial Policy Department,
State Scientific Research Institute for Informatization and Economic Modeling, Ukraine
[2] Doctor of Economic Sciences, Acting Director,
State Scientific Research Institute for Informatization and Economic Modeling, Ukraine

© Mykhailo Hantsiak, Igor Guzhva

sector, as well as indicators of the adequacy of credit support for Ukraine's economy, the structure of banks' asset portfolios, and trends in the allocation of resources to government debt securities. The study finds that structural asymmetries in the distribution of loan capital are predominantly latent and cannot always be identified on the basis of individual indicators of lending activity. It is demonstrated that their comprehensive assessment requires the simultaneous analysis of credit penetration indicators, the structure of banks' asset portfolios, the dynamics of lending to different categories of borrowers, and manifestations of the financial intermediation paradox. It is substantiated that the increasing concentration of banks' resources in government debt securities creates conditions for the formation of structural asymmetries manifested in insufficient credit support for the corporate sector, the emergence of investment and fiscal crowding-out effects, constraints on private investment, and the slowing of technological modernisation and innovation-driven economic development. *The scientific novelty* of the study lies in the development of a methodological approach to identifying structural asymmetries in the distribution of loan capital, which combines the conceptual substantiation of the mechanism of their emergence with a system of quantitative assessment indicators and enables the comprehensive detection of latent imbalances in the functioning of the loan capital market. A system of measures is proposed, grouped according to the areas of addressing the mechanisms underlying the emergence of structural asymmetries and mitigating their adverse economic consequences. The practical significance of the findings lies in their potential application to the formulation of public policy aimed at developing the credit market, improving loan capital allocation mechanisms, and strengthening the financial intermediation function of Ukraine's credit institutions.

INTRODUCTION

The distribution of loan capital is one of the key mechanisms underpinning the functioning of the economic system, as it determines the mobilisation and allocation of financial resources across individual sectors of the economy. The efficiency of such distribution largely determines the intensity of investment processes, the structural modernisation of production, the development of innovation activities, and the long-term pace of economic growth.

The state plays a pivotal role in shaping the distribution of loan capital through budgetary, debt, monetary, fiscal, and investment policy instruments that influence the concentration and allocation of financial resources across different sectors of the economy. The extent of such intervention determines the capacity to finance priority areas of economic development, support strategic industries, stimulate innovation activities, and implement investment projects.

At the same time, individual sectors of the economy differ in their capacity to generate gross value added, foster innovation potential, promote technological modernisation of production, and enhance the overall competitiveness of the economy. Under such conditions, ensuring the efficient allocation of loan capital across sectors in accordance with their economic significance and their potential to generate multiplier effects on economic growth becomes particularly important.

Highly developed economies are typically characterised by a diversified system of financing sources for the corporate sector, ensuring adequate access to loan capital for enterprises operating in the real economy. In contrast, the current configuration of Ukraine's loan capital markets does not fully ensure the efficient redistribution of financial resources, with the result that productive sectors of the economy frequently face constrained access to financing.

The causes of such structural asymmetries are both objective and subjective in nature. Objective factors are associated with the effects of global economic crises, wartime risks, macroeconomic instability, and other external shocks, whereas subjective factors stem from imperfections in the institutional environment, government regulatory mechanisms, and the instruments used to mitigate structural asymmetries in the distribution of loan capital.

These processes result in the insufficient mobilisation of available financial resources, their inefficient allocation across sectors of the economy, and the emergence of structural asymmetries manifested in various segments of the financial market. One of the most prominent manifestations of these asymmetries is the crowding-out effect, particularly investment and fiscal crowding out, whereby financing opportunities for the private sector are reduced as an increasing share of loan capital is concentrated on meeting the financing needs of the state.

The specific features of the formation and manifestation of structural asymmetries in the distribution of loan capital in Ukraine are shaped by the characteristics of the domestic financial market, the structure of government borrowing, and the mechanisms of economic financing. This underscores the need for comprehensive scientific research into these asymmetries in order to develop theoretical foundations and practical recommendations aimed at improving the efficiency of loan capital distribution and ensuring adequate financing for the sectors that constitute the foundation of long-term economic growth.

The subject of the study is the process through which structural asymmetries emerge during the redistribution of loan capital in Ukraine's economy.

The purpose of the study is to develop the theoretical and methodological foundations for investigating structural asymmetries in the distribution of loan capital in the economy, as well as to identify, analyse, and determine approaches to mitigating them. To achieve this purpose, the following objectives are addressed: (1) to substantiate the essence of structural asymmetries in the distribution of loan capital; (2) to assess the dynamics of indicators reflecting the adequacy of credit provision to the economy; and (3) to develop a methodological approach to identifying and assessing structural asymmetries and to propose measures for their mitigation.

To accomplish these objectives, the study is structured around a sequential progression from the theoretical substantiation of the nature of structural asymmetries in the distribution of loan capital to the assessment of their manifestations in Ukraine's credit market and the identification of practical measures for their mitigation. The first stage examines the theoretical foundations underlying the emergence of structural asymmetries in the process of loan capital allocation and develops a conceptual framework explaining the mechanism of their emergence and manifestation. The second stage evaluates the adequacy of credit support for Ukraine's economy as a prerequisite for identifying structural imbalances in the distribution of loan capital. The final stage is devoted to the analysis of crowding-out effects as the principal consequences of structural asymmetries, their quantitative identification, and the substantiation of a comprehensive set of measures aimed at preventing their occurrence and minimising their adverse impact on the economy.

1. Theoretical Foundations of the Emergence of Structural Asymmetries in the Distribution of Loan Capital in the Economy

The primary function of the financial market is to ensure the efficient redistribution of financial resources among economic agents in accordance with their financing needs and their capacity to generate economic value added. Through the mobilisation, transformation, and allocation of financial capital, the financial market creates the conditions necessary for investment activity, the structural modernisation of the economy, entrepreneurial development, and the adoption of innovations.

At the same time, contemporary economic research increasingly emphasises not the absolute volume of financing available to the economy, but rather the efficiency of the allocation of financial resources across individual sectors and business entities. Under such conditions, the quality of loan capital distribution becomes a key determinant of the productivity of its use, the pace of economic growth, and the long-term competitiveness of the national economy.

Contemporary research demonstrates that inefficient capital allocation significantly reduces the productive potential of the economy, constrains income growth, and adversely affects financial stability. In this context, what matters is not only the overall volume of lending but also the allocation of loan capital across individual sectors of the economy and enterprises. Analysing the functioning of the financial systems of euro area countries, Desislava Andreeva, Vasco Botelho, and their co-authors conclude that an inefficient distribution of credit resources among firms reduces aggregate economic productivity, whereas directing financing towards more productive companies promotes economic growth and strengthens financial stability. At the same time, the authors emphasise that banks do not always ensure the optimal allocation of credit resources, as their lending decisions are primarily driven by credit risk assessments rather than by the productivity-enhancing potential of firms [1].

Therefore, the efficiency of loan capital distribution should be assessed not only in terms of lending volumes or the pace of financial market development, but also by its ability to ensure adequate financing for those sectors of the economy that generate the highest gross value added, drive innovation, accelerate the technological modernisation of production, and create the foundations for long-term economic growth.

An important prerequisite for the efficient distribution of loan capital is the minimisation of information asymmetry between lenders and borrowers. A study by D. Aristei and G. Angori, based on firm-level data from eleven euro area countries, confirmed that the accumulation of borrower-specific information through long-term lending relationships significantly reduces firms' informational opacity and lowers the likelihood of credit rationing [2]. This suggests that improving the efficiency of loan capital distribution depends not only on increasing the supply of credit resources but also on developing institutional mechanisms that enable a more accurate assessment of borrowers' creditworthiness.

Innovation activity is one of the key drivers of long-term economic growth, the structural modernisation of the economy, and the enhancement of its international competitiveness. Contemporary economic theory widely recognises that extensive growth factors have limited potential, whereas sustainable long-term economic growth is determined primarily by the accumulation of knowledge, technological innovation, and scientific and technological progress. It is innovation that drives growth in total factor productivity, creates new competitive advantages, and enhances the overall efficiency of the economic system [3; 4].

The development of an innovation-driven economy is impossible without establishing an effective system of financial support for innovation activities. This necessitates the creation of conditions that ensure adequate financing for enterprises engaged in research and development (R&D), the adoption of new technologies, and the implementation of high-tech investment projects. Consequently, contemporary public policy is increasingly focused not only on expanding the volume of financing but also on improving the efficiency of its allocation across those sectors of the economy that have the greatest potential to enhance productivity, stimulate innovation, and foster long-term economic growth [5].

Bank lending plays a crucial role in the financial support of innovation. As noted by M. Arnone, A. Costantiello, and A. Leogrande, enterprises' access to bank credit provides the financial foundation for implementing innovation projects, advancing research activities, adopting new technologies, and enhancing the competitiveness of the economy. The economic impact of bank lending, however, largely depends on the extent to which it supports innovation activities and the technological

development of enterprises [6]. Nevertheless, bank lending alone is not sufficient to foster the development of innovation-oriented enterprises; this requires the effective functioning of a comprehensive financial and economic support mechanism. The combined effect of grants, bank lending, and investment activity substantially enhances firms' capacity to expand high-technology exports [7, p. 119].

Loan capital markets perform a range of interrelated functions, the most important of which include the mobilisation of temporarily available financial resources, their transformation into loan capital, their efficient redistribution among economic agents, the continuity of the investment process, the promotion of economic growth, and the facilitation of the economy's structural modernisation. The effective fulfilment of these functions is possible only through the efficient allocation of loan capital in accordance with economic efficiency, the productivity of its use, and the risk characteristics of borrowers.

At the same time, the presence of structural asymmetries in loan capital markets distorts the mechanisms of financial intermediation [8]. As a result, financial resources are not always channelled to those sectors and business entities capable of using them most productively, thereby reducing the effectiveness of the financial market's intermediation, distribution, and investment functions. Such a situation may be regarded as a manifestation of financial intermediation dysfunction, whereby the formal performance of financial institutions' functions fails to fulfil their underlying economic purpose.

An important cause of distortions in the credit market is not only information asymmetry and institutional imperfections but also the deviation of banking institutions from economically sound lending criteria under the influence of inadequate information, distorted economic incentives, and other institutional factors. Under such conditions, banks' pursuit of profit maximisation does not always coincide with the efficient allocation of credit resources, thereby weakening one of the banking system's core functions, namely the provision of financing to the most productive areas of economic activity. Consequently, regulatory mechanisms aimed at improving the quality of lending decisions, minimising market distortions, and creating conditions for a more rational allocation of credit financing

become increasingly important, thereby contributing to higher economic productivity [9, p. 39].

Structural asymmetries in the distribution of loan capital are persistent imbalances in the allocation of credit resources, whereby the mechanisms of financial intermediation fail to ensure their efficient redistribution to economic agents and areas of economic activity with the greatest potential to generate value added, foster innovation, and promote economic growth. Such asymmetries result in a reduction of the multiplier effect of lending, a distortion of the functional role of the loan capital market, and the emergence of adverse structural effects on the national economy.

Further development of the theoretical understanding of the essence of structural asymmetries in the distribution of loan capital requires a systematic synthesis of the cause-and-effect relationships between the mechanisms underlying their formation and their economic consequences. To this end, Figure 1 presents a conceptual framework illustrating the logic of the emergence of structural asymmetries, their impact on the performance of financial intermediaries' functions, and their subsequent implications for economic development.

As illustrated in Figure 1, structural asymmetries in the distribution of loan capital arise when banking institutions deviate from economically sound lending criteria, resulting in the inefficient allocation of credit resources and their uneven distribution across sectors of the economy, regions, and borrower groups. Under such conditions, credit financing becomes concentrated in areas that fail to generate the greatest economic benefits, thereby weakening the financial intermediation function performed by financial market participants.

At the same time, the consequences of structural asymmetries extend far beyond changes in the functioning of financial intermediaries. Distortions in the mechanisms governing the efficient distribution of loan capital give rise to a range of macroeconomic effects, including a reduction in the multiplier effect of lending, manifestations of investment and fiscal crowding out, weakened innovation activity, uneven development across sectors of the economy, and constraints on long-term economic growth. Structural asymmetries in the distribution of loan capital should therefore be regarded as a multidimensional economic phenomenon whose consequences are manifested sequentially at the levels of financial intermediation, the functioning of the loan capital market, and the economy as a whole.

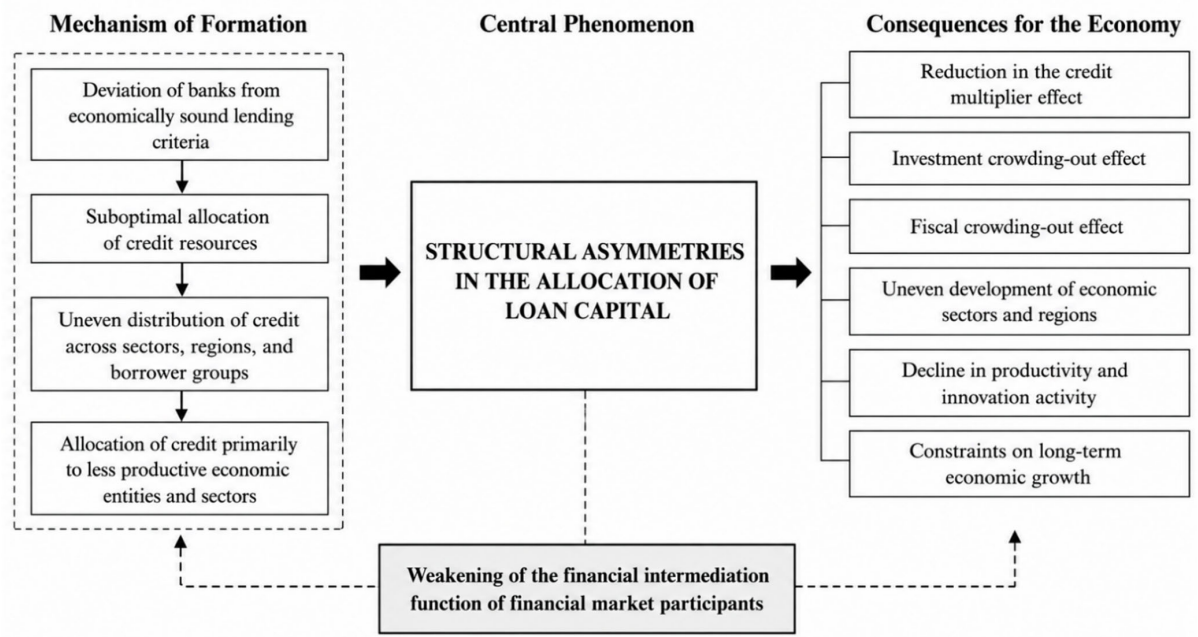


Figure 1. Conceptual Framework for the Formation and Manifestation of Structural Asymmetries in the Distribution of Loan Capital in the Economy

Source: Developed by the authors

2. Assessment of the Adequacy of Credit Support for Ukraine's Economy

In an environment where access to loan capital through the capital market remains constrained owing to its insufficient development, the limited availability of debt instruments for the corporate sector, low market capitalisation, limited liquidity, and weak investor confidence [10], bank lending assumes an increasingly important role in the redistribution of credit resources. Moreover, Ukrainian business entities continue to face a shortage of financing, particularly of internally generated funds, and are therefore compelled to seek external sources of finance. Lending remains one of the key mechanisms supporting sustainable economic development, financial stability, and the strengthening of Ukraine's economic potential, both during periods of military, political, and economic instability and throughout the post-war recovery [11]. Figure 2 illustrates the dynamics of lending to the corporate sector, households, and the general government sector.

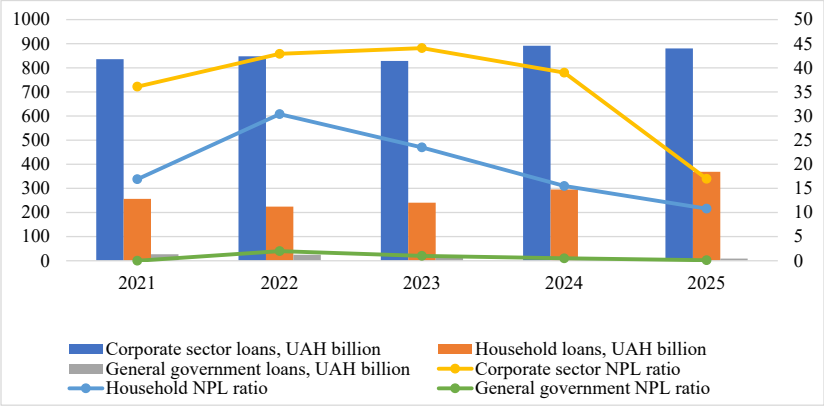


Figure 2. Indicators of Bank Lending to the Economy by Borrower Category, 2021–2025

Source: Developed by the authors based on [12]

The trends shown in Figure 2 indicate that lending to the corporate sector, measured on a cumulative basis, did not reflect a substantial expansion of banks' lending activity during the period under analysis.

In 2023, the growth rate of the corporate loan portfolio declined to 97.7%, indicating a contraction of the portfolio. In the remaining years, the corporate loan portfolio continued to expand, albeit at a modest pace, suggesting only a limited increase in the volume of newly issued bank loans.

The share of non-performing loans (NPLs) in the corporate sector remained high, reflecting elevated credit risk and limiting banks' willingness to extend credit to borrowers with weaker creditworthiness. Although the corporate sector NPL ratio declined significantly in 2025 (from 39% in 2024 to 17% in 2025), this should not be interpreted as evidence of an improvement in the creditworthiness of Ukrainian corporate borrowers. Rather, during January–March 2026, the National Bank of Ukraine implemented a number of measures aimed at resolving non-performing loans, particularly within state-owned banks [13].

An analysis of household lending by Ukrainian banks indicates that the expansion of lending to households was more pronounced than that of corporate lending. Between 2021 and 2025, the average growth rate of the household loan portfolio amounted to 112.7%. However, in 2022, household lending experienced a sharp decline, with the portfolio growth rate falling from 123% in 2021 to 87.5%.

Bank lending to central and local government authorities (the general government sector) remains negligible compared with lending to households and non-financial corporations. The corresponding bars in Figure 2 illustrate the limited volume of such lending. At the same time, the NPL ratio for loans to the general government sector also remains low.

The analysis of these indicators allows for broader conclusions regarding the functioning of Ukraine's loan capital market. Although the corporate sector accounted for the largest share of bank lending, the growth of the corporate loan portfolio remained modest throughout the period under analysis, indicating restrained lending activity by banks in financing enterprises in the real economy. At the same time, the high level of non-performing corporate loans generated additional credit risks, limiting banks' capacity to expand lending and prompting a reorientation of their lending policies towards lower-risk borrowers.

Although the volumes of lending to households and the general government sector remained substantially lower than those extended to the corporate sector, the overall configuration of banks' loan portfolios

indicates the presence of structural asymmetries in the distribution of loan capital. In particular, the pace of growth in lending to enterprises that generate a significant share of gross value added, investment activity, and technological development remained insufficient. Under such conditions, credit risk becomes a determining factor in banks' lending decisions, which is consistent with the proposed mechanism underlying the formation of structural asymmetries in the distribution of loan capital (Figure 1). As a result, the ability of financial intermediaries to ensure the efficient redistribution of credit resources in line with the needs of the economy's structural development is weakened.

These trends indicate that a high level of non-performing corporate loans not only limits banks' capacity to expand lending but also weakens the performance of their financial intermediation function. A synthesis of findings from recent studies confirms that the accumulation of non-performing loans constrains lending to the real economy, adversely affects banks' profitability, capitalisation, and financial resilience, and consequently impairs the allocation of loan capital in line with the needs of the economy's structural development [14].

An important direction for mitigating structural asymmetries in the financial market is to ensure an adequate level of bank lending to the corporate sector. Corporate lending creates the conditions for expanding production, modernising fixed capital, and fostering innovation, thereby transforming financial resources into long-term economic growth. In this context, not only the overall volume of lending but also its maturity structure is of crucial importance. Empirical evidence suggests that extending the maturity of bank loans makes a statistically significant contribution to stimulating corporate investment, whereas the predominance of short-term financing increases refinancing risks and constrains the implementation of long-term investment projects [15].

While short-term loans are primarily used to finance working capital and support firms' day-to-day operations, medium- and especially long-term loans provide the financial foundation for production modernisation, the renewal of fixed assets, and the enhancement of the corporate sector's competitiveness. Therefore, analysing the maturity structure of bank lending to corporate borrowers makes it possible to assess the investment orientation of banks' lending activities and their potential to reduce structural asymmetries in the financial market (Table 1).

Table 1

Corporate Sector Lending by Ukrainian Banks by Loan Maturity, 2021–2025

Years / Indicators	Short-term loans, UAH billion / Share, %	Medium-term loans, UAH billion / Share, %	Long-term loans, UAH billion / Share, %
2021	415,5 / 55	242,4 / 32	94,4 / 13
2022	412,6 / 55	241,0 / 32	100,8 / 13
2023	379,6 / 52	252,5 / 34	103,1 / 14
2024	391,3 / 50	286,9 / 37	103,9 / 13
2025	294,0 / 38	379,1 / 49	102,8 / 13

Source: Developed by the authors based on [16]

The results of the analysis indicate that throughout 2021–2025, short-term loans consistently accounted for the largest share of corporate lending, although their proportion gradually declined from 55% in 2021–2022 to 38% in 2025. At the same time, the share of medium-term loans increased from 32% to 49%, indicating a gradual extension of the maturity profile of bank lending to the corporate sector. In contrast, the share of long-term loans remained virtually unchanged throughout the entire period under review, fluctuating between 13% and 14%, while their outstanding volume ranged from UAH 94.4 billion to UAH 103.9 billion. This suggests that investment lending to enterprises did not expand substantially, despite the gradual recovery of the banking system.

Despite the decline in the share of short-term loans, the maturity structure of corporate lending remains primarily oriented towards financing firms' current business operations. The persistently low share of long-term loans limits opportunities for production modernisation, the implementation of capital-intensive investment projects, and structural transformation of the economy, thereby reducing the banking sector's capacity to mitigate financial asymmetries and support long-term economic development.

Although Ukraine's banking sector, like other sectors of the economy, operates under adverse macroeconomic conditions, where maintaining macroeconomic stability requires substantial policy efforts, it has paradoxically continued to demonstrate high levels of profitability and returns. A significant share of banks' income is generated by interest

earnings, with lending remaining one of their principal sources of revenue. However, other major income-generating assets, such as National Bank of Ukraine certificates of deposit and domestic government bonds, have also made a substantial contribution to banks' earnings [17]. Even under wartime conditions, the National Bank of Ukraine faces the challenging task of creating an enabling environment for banks to perform their core functions while mitigating the adverse effects of military aggression on the banking system [18].

Given the opportunity to earn record levels of returns and profitability, the National Bank of Ukraine has created highly favourable conditions for banks to invest in these financial instruments. However, the trends discussed above, which reflect banks' financial intermediation activity, indicate a weakening of this function and, consequently, a decline in the functional effectiveness of the banking system as a whole.

At the same time, the findings suggest that the banking system possesses sufficient financial resources to expand lending to the economy. Nevertheless, banks' asset allocation priorities have shifted markedly towards lower-risk financial instruments offering attractive returns. This is particularly evident in the case of domestic government bonds, which, alongside lending, remain one of the principal destinations for banks' asset allocation (Table 2).

Table 2

Selected Indicators Reflecting Banks' Asset Allocation Priorities, 2021–2025

Years / Indicators	2021	2022	2023	2024	2025
Bank loans, UAH billion	1065,3	1036,2	1024,7	1138,0	1220,3
Share of total assets, %	52,0	44,1	34,8	33,3	30,5
Weighted average interest rate, %	12,2	16,2	16,8	18,4	18,4
Domestic government bonds, UAH billion	605,2	532,7	734,5	990,8	1036,3
Share of total assets, %	29,5	22,7	24,9	28,9	25,9
Weighted average interest rate, %	11,3	18,3	18,7	15,9	16,04

Source: Developed by the authors based on [19; 20]

The data presented in Table 2 indicate that between 2021 and 2025, the total volume of bank loans increased from UAH 1,065.3 billion to UAH 1,220.3 billion. However, their share in banks' total assets declined from 52.0% to 30.5%, representing a decrease of more than 21 percentage points. This indicates a diminishing role of lending as the principal channel for banks' asset allocation.

At the same time, banks' holdings of domestic government bonds increased from UAH 605.2 billion to UAH 1,036.3 billion, while their share in total assets remained consistently high, ranging between 22.7% and 29.5% and amounting to 25.9% in 2025. Over the same period, the weighted average lending rate increased from 12.2% to 18.4%, whereas the average yield on domestic government bonds fluctuated between 11.3% and 18.7%. This suggests that banks' growing preference for investing in government securities is driven not so much by differences in yields as by the substantially lower credit risk, high liquidity, and stable interest income associated with these instruments.

Thus, despite possessing sufficient financial resources, the banking system has become increasingly oriented towards financing the public sector, while lending to corporate borrowers has gradually lost its dominant position within the structure of banks' assets. This trend reinforces structural asymmetries in the financial market and constrains investment support for the real economy.

Given the limited intensity of bank lending to the economy alongside the substantial share of domestic government bonds in banks' asset portfolios, a financial intermediation paradox emerges, whereby banks increasingly channel the financial resources they mobilise towards financing the public sector rather than providing credit support to business entities [21]. This trend does not imply that banks have abandoned their financial intermediation function; rather, it reflects a shift in loan capital allocation priorities, whereby lending to the real economy is gradually being displaced by investments in government debt securities.

The causes of this phenomenon should be examined through the prism of both objective and subjective factors. Objective factors include high levels of credit risk, a substantial share of non-performing loans, macroeconomic uncertainty, and the deterioration of the financial condition of certain categories of borrowers, all of which constrain banks' capacity to

expand lending. In contrast, subjective factors are associated with the state's creation of favourable conditions for investment in domestic government bonds, the expansion of opportunities for their use in banking operations, and banks' investment policies, under which government debt securities are regarded as a more predictable and less risky alternative to corporate lending. The combined effect of these factors reinforces structural asymmetries in the distribution of loan capital and limits the financial support available to the productive sectors of the economy.

3. Crowding-Out Effects as the Principal Consequences of Structural Asymmetries in the Credit Market

The financial intermediation paradox is not limited to changes in the composition of banks' asset portfolios or shifts in loan capital allocation priorities. Its economic consequences are far broader and are manifested in the emergence of effects that disrupt the balance between public and private demand for financial resources. Within the context of structural asymmetries in the distribution of loan capital, crowding-out effects represent one of the clearest manifestations of distortions in the financial intermediation mechanism, as they reflect the reallocation of financial resources in favour of financing the public sector at the expense of reducing the availability of credit for economic activity.

The issue of crowding-out effects occupies an important place in both classical and contemporary economic literature examining the implications of government borrowing for the functioning of financial markets and economic development. The literature generally distinguishes between two closely related forms of crowding out: investment crowding out and fiscal crowding out.

Investment crowding out occurs when an increase in government borrowing alters the allocation of financial resources, redirecting them from lending to the corporate sector towards financing public debt. As a result, business entities face reduced access to loan capital, adversely affecting investment activity, production modernisation, and economic growth.

Fiscal crowding out is primarily manifested over the long term and is associated with an increasing debt burden on public finances. The need to service and repay public debt necessitates either higher tax burdens or a

reallocation of government expenditure, thereby reducing incentives for private investment and overall economic activity.

Despite differences in their transmission mechanisms, both forms of crowding out share a common economic nature, as they arise from the reallocation of financial resources in favour of financing the public sector. Their principal distinction lies in the time horizon over which they materialise: while investment crowding out occurs directly through the reallocation of loan capital within the financial market, fiscal crowding out emerges indirectly through the future fiscal consequences of accumulating public debt.

Investment crowding out has traditionally been associated with an expansion of government borrowing, which alters the balance between the demand for and the supply of loan capital. According to the classical approach, an increase in government borrowing raises the demand for financial resources, which, all else being equal, leads to a higher cost of credit. As a result, access to loan capital for the private sector becomes more constrained, and some potential investment projects cease to be economically viable because of the higher cost of financing. At the same time, the contemporary mechanism of investment crowding out is considerably more complex than its classical interpretation, as it is determined not only by changes in interest rates but also by the structure of the financial market, the characteristics of financial intermediation, regulatory policies, and the institutional environment.

An empirical study by V. B. Nguyen, based on a sample of 98 developing countries, provides statistically significant evidence of the negative impact of public debt on private investment. The author demonstrates that government borrowing intensifies competition between the public and private sectors for available financial resources, while improvements in the institutional environment, in themselves, stimulate private investment activity [22]. However, when government borrowing reaches high levels, even a stronger institutional environment does not eliminate the crowding-out effect, as it enables the government to mobilise additional financial resources, thereby reducing their availability to private investors.

When banks increasingly reallocate loan capital in favour of financing the public sector, the consequences extend beyond the classical investment crowding-out effect. Under such circumstances, financial stability and

the banking system's capacity to provide credit to the economy become increasingly dependent on the parameters of the government's fiscal and debt policies. This is no longer merely a matter of reallocating financial resources between the public and private sectors; rather, it reflects the growing influence of public finances on the functioning of financial intermediation, the domestic credit market, and the effectiveness of monetary policy. The less sustainable the government's debt trajectory, the higher the refinancing risks associated with public debt, and the more expansionary its fiscal policy, the more the concentration of sovereign debt securities on banks' balance sheets constrains their capacity to provide credit support to the real economy [23].

These trends are also supported by contemporary empirical research. For example, L. Zherdetska and L. Ivanenko argue that stronger fiscal pressure and a growing share of government debt securities in banks' asset portfolios are associated with a decline in private sector lending as a result of the crowding-out effect. According to the authors, banks' increasing preference for lower-risk sovereign debt securities reduces the availability of financial resources for business entities and further strengthens the bank–sovereign nexus, thereby increasing the sensitivity of the financial system to the government's fiscal policy [24].

At the same time, assessing the implications of the expanding role of the state in the capital market should not be reduced to a straightforward interpretation based solely on the crowding-out effect. The impact of government expenditure and public financing on private investment activity depends on the configuration of capital markets, the quality of the institutional environment, the level of financial development, and the debt conditions under which the economy operates. In particular, J. N. Francois, M. Konte, and F. U. Ruch, analysing a sample of 109 developing countries over the period 1980–2019, demonstrate that public investment may not crowd out private investment; on the contrary, it can stimulate private investment when it enhances the marginal productivity of private capital. According to their estimates, each additional dollar of public investment increases private investment by approximately USD 1.6 on average, with this effect being stronger in countries characterised by lower levels of financial development and more effective control of corruption [25].

Therefore, the issue lies not merely in the expanding presence of the state in the loan capital market, but in the functional orientation of that presence. When government borrowing and banks' investments in sovereign debt securities are used primarily to finance current budgetary needs, they may reinforce structural asymmetries and constrain lending to the private sector. By contrast, public investment directed towards infrastructure development, the correction of market failures, and the enhancement of the productivity of private capital may, under certain conditions, complement rather than crowd out private investment.

At the same time, the economic conditions prevailing in Ukraine during the full-scale war differ fundamentally from those under which government borrowing may generate a complementary effect on private investment. Since 2022, the structure of public expenditure has been substantially reoriented towards financing the security and defence sector, resulting in an unprecedented increase in budgetary allocations for these purposes. While defence expenditure accounted for 2.3% of GDP in 2021, it increased to 21.8% of GDP in 2022 and reached 34.8% of GDP in 2025 [26, p. 34]. Under these circumstances, government borrowing is used primarily to finance defence needs and maintain the state's macro-financial stability, whereas its potential to stimulate productive investment and mitigate the adverse effects of crowding out remains substantially constrained.

Therefore, under Ukraine's current circumstances, government borrowing primarily serves to finance national defence and ensure the uninterrupted performance of the state's essential functions, rather than to stimulate investment-led economic development. Consequently, the mechanisms through which public investment in some countries is able to offset the adverse effects of crowding out can operate only to a limited extent within the context of Ukraine's wartime economy.

Given the absence of established methodological approaches to the quantitative assessment of crowding-out effects in the loan capital market arising from the dominance of particular categories of borrowers, it is appropriate to employ a system of interrelated indicators that capture different aspects of the functioning of the bank lending market. In our view, the identification of these effects should not rely on a single indicator but rather on a comprehensive analysis of the credit penetration ratio, the authors' financial intermediation paradox indicator, the growth rate of banks'

holdings of domestic government bonds, and the growth rates of lending to the corporate sector and households. Taken together, these indicators make it possible to assess both the overall level of credit provision to the economy and the structural changes in the allocation of bank resources between the public and private sectors. The results of the calculations for these indicators are presented in Table 3.

The credit penetration ratio characterises the overall level of loan capital provision to the economy, whereas the authors' financial intermediation paradox indicator reflects the extent to which banks' deposit resources are redirected towards financing public debt. Complementing the analysis with indicators of the growth in banks' holdings of domestic government bonds and the growth rates of loan portfolios across different categories of borrowers makes it possible to provide a comprehensive assessment of the nature of structural changes in the loan capital market.

Table 3

Indicators for Identifying Crowding-Out Effects in Ukraine's Loan Capital Market, 2021–2025

Indicators / Years	2021	2022	2023	2024	2025
Credit penetration ratio, %	19,5	19,9	15,7	14,9	13,7
Financial intermediation paradox indicator, %	40,2	28,1	30,7	35,7	32,0
Growth rate of banks' holdings of domestic government bonds, %	102,9	88,0	137,9	134,9	104,6
Growth rate of corporate sector loans, %	105,1	101,4	97,7	107,6	98,7
Growth rate of household loans, %	123,0	87,5	107,4	122,8	124,7

Source: Calculated by the authors based on [27; 28]

The findings indicate that, during 2021–2025, conditions conducive to the strengthening of structural asymmetries in the allocation of financial resources emerged in Ukraine's loan capital market. Despite the gradual decline in the credit penetration ratio from 19.9% in 2022 to 13.7% in 2025, indicating a reduction in the level of credit provision to the economy, the financial intermediation paradox indicator remained at approximately one-third of the banking system's deposit base throughout the period under analysis. This suggests that a substantial share of banks' deposit resources

was concentrated in holdings of domestic government bonds rather than being channelled into lending to the economy.

Additional evidence supporting these trends is provided by the relative growth rates of individual components of banks' asset portfolios. In 2023 and 2024, banks' holdings of domestic government bonds expanded at the highest rates (137.9% and 134.9%, respectively), whereas lending to the corporate sector remained virtually stagnant (97.7% and 107.6%), despite the substantial financing needs of the economy under martial law. At the same time, household lending exhibited considerably stronger growth (122.8–124.7% in 2024–2025), indicating an uneven allocation of loan capital across different categories of borrowers.

Taken together, these indicators do not permit an unequivocal quantitative assessment of the magnitude of crowding-out effects. Nevertheless, they enable the identification of persistent structural changes in the functioning of the loan capital market, whereby the public sector absorbs an increasingly larger share of banks' financial resources, while credit support for the corporate sector remains insufficient.

The proposed system of indicators is not intended to provide a universal method for the quantitative measurement of crowding-out effects. Nevertheless, it enables a comprehensive assessment of their potential manifestations through the simultaneous analysis of the credit penetration ratio, the structure of banks' asset portfolios, and the dynamics of lending to different categories of borrowers. The findings of this study provide grounds for concluding that the identified trends represent one of the manifestations of structural asymmetries in the distribution of loan capital, the conceptual framework of which is presented in Figure 1.

Although external creditors account for the largest share of Ukraine's public debt, the domestic government borrowing segment also remains highly active [29], primarily through the domestic government bond market. Banking institutions continue to play a key role in financing public debt by allocating substantial volumes of financial resources to sovereign debt securities. At the same time, the current structure of banks' asset portfolios does not indicate the absolute dominance of holdings of domestic government bonds over other asset classes. Nevertheless, the scale of banks' resource concentration in government debt securities already provides sufficient grounds to identify the existence of a financial intermediation

paradox, which influences the pattern of loan capital allocation within the economy.

The formation of such a configuration of the loan capital market is largely determined by the interaction of the state's monetary, debt, and fiscal policies, which shape the profitability and attractiveness of individual financial instruments. In the context of mitigating structural asymmetries, the coherence and synergy of these key areas of financial policy constitute a fundamental prerequisite, as their coordinated implementation underpins the development of the economy's financial resilience [30]. Under the current macro-financial conditions, investments in domestic government bonds offer banks a combination of high liquidity, minimal credit risk, and competitive returns, thereby objectively reducing incentives to expand lending to the real economy. As a consequence, banks' financial intermediation function is increasingly realised through the financing of public sector needs, while the provision of loan capital to the economy gradually becomes a secondary priority, creating conditions for the further deepening of structural asymmetries in the distribution of loan capital.

Ensuring the efficient distribution of loan capital requires a systemic approach aimed not only at mitigating the adverse consequences of structural asymmetries but also at addressing their underlying causes. Even under force majeure circumstances, particularly during martial law, a key objective of the state's financial policy should remain the preservation and strengthening of the financial intermediation function performed by financial market participants. This function ensures the efficient transformation of savings into credit resources and their allocation to those sectors of the economy with the greatest potential for generating value added. Within this context, two interrelated groups of policy measures can be identified (Table 4).

The proposed measures should not be viewed as mutually exclusive or alternative approaches. On the contrary, their practical implementation should be comprehensive and well-coordinated, taking into account the stage of development of structural asymmetries in the distribution of loan capital. While the first group of measures is primarily aimed at addressing the underlying causes of these imbalances through improving loan capital allocation mechanisms and enhancing the effectiveness of public regulation, the second group focuses on restoring the financial intermediation function of the financial market, expanding credit support

for the economy, and strengthening financial resilience under conditions where structural imbalances have already emerged. Only a combination of preventive and corrective measures can establish a comprehensive mechanism for mitigating structural asymmetries in the distribution of loan capital, thereby enabling the market to perform its financial intermediation function effectively even under conditions of heightened macroeconomic uncertainty.

Table 4

Policy Measures to Mitigate Structural Asymmetries in the Distribution of Loan Capital in the Economy

Measures Aimed at Addressing the Causes of Structural Asymmetries	Measures Aimed at Mitigating the Adverse Economic Effects of Structural Asymmetries
Improving the mechanisms for the efficient allocation of loan capital	Expanding credit support for the real economy
Enhancing the coordination of monetary, fiscal, debt, and regulatory policies	Limiting the effects of investment and fiscal crowding out
Creating economic incentives for lending to productive sectors of the economy	Improving access to loan capital for business entities
Diversifying the sources and channels of financing the economy	Strengthening the financial intermediation function of financial market participants
Reducing information asymmetry and credit risk	Improving the efficiency of the distribution of loan capital
Strengthening the institutional capacity of financial market regulators	Enhancing the financial resilience of the economy

Source: Developed by the authors

Addressing the underlying causes of structural asymmetries represents a more effective direction of public policy, as such measures are preventive and risk-oriented in nature. Unlike measures aimed at mitigating the adverse consequences of already established structural imbalances, they enable the timely identification of potential sources of imbalance and limit their spread before they evolve into systemic problems. This approach is consistent with the contemporary concept of macroprudential regulation, according to which financial stability should be based on the early identification of systemic risks, the timely implementation of corrective measures, and the prevention of local imbalances from evolving into systemic crises [31].

CONCLUSIONS

The findings of this study confirm that the distribution of loan capital is one of the key determinants of structural asymmetries in the financial market. Although these asymmetries are not always directly observable through quantitative indicators, they gradually alter the manner in which financial institutions perform their financial intermediation function. The proposed methodological approach enabled the identification of structural asymmetries within the current model of Ukraine's loan capital market. These asymmetries are manifested in insufficient credit support for the corporate sector, the strengthening of the financial intermediation paradox, the emergence of conditions conducive to investment crowding out, constraints on private investment, and the slowing of technological modernisation and innovation-driven economic development. The proposed conceptual framework explaining the emergence of structural asymmetries, supported by the results of their quantitative assessment, confirms the appropriateness of implementing a comprehensive set of preventive and corrective measures aimed at improving the allocation of loan capital, mitigating structural imbalances, and strengthening the financial intermediation function of credit institutions as an essential prerequisite for the balanced development of the financial market, the expansion of credit support for the economy, and the achievement of Ukraine's long-term economic growth.

The scientific novelty of the findings lies in the further development of the theoretical and methodological foundations for the study of structural asymmetries in the distribution of loan capital through substantiating their economic essence, developing a conceptual framework explaining the mechanism of their emergence and manifestation, and proposing a methodological approach to their identification based on the integrated analysis of indicators reflecting the adequacy of credit support for the economy, the structure of banks' asset portfolios, manifestations of the financial intermediation paradox, and crowding-out effects.

The practical significance of the findings lies in their potential application by public authorities, the National Bank of Ukraine, and other financial market regulators in the formulation of debt, monetary, and regulatory policies aimed at improving the allocation of loan capital. The proposed system of indicators and the comprehensive set of measures for preventing and mitigating structural asymmetries may be applied to monitor the

condition of the loan capital market, identify potential structural imbalances in a timely manner, improve regulatory mechanisms, and develop economic incentives aimed at strengthening the financial intermediation function of credit institutions, expanding access to credit resources for the real economy, and stimulating investment activity.

The findings provide a foundation for the further development of both theoretical and applied research on structural asymmetries in the distribution of loan capital and may serve as a basis for improving the methodological toolkit for assessing the efficiency of the loan capital market under conditions of structural economic transformation, increasing debt-related risks, and the growing role of the state in financial intermediation.

References:

1. Andreeva D., Botelho V., Ferrante A., Górnicka L., & Lenoci F. (2024) Low firm productivity: The role of finance and the implications for financial stability. *Financial Stability Review*, issue 2. European Central Bank. Available at: https://www.ecb.europa.eu/press/financial-stability-publications/fsr/special/html/ecb.fsrart202411_02~4161cc6124.en.html

2. Aristei D., & Angori G. (2022) Heterogeneity and state dependence in firms' access to bank credit. *Small Business Economics*, vol. 59, no. 1, pp. 47–78. DOI: https://doi.org/10.1007/s11187-021-00545-x

3. Romer P. M. (1990) Endogenous technological change. *Journal of Political Economy*, vol. 98, no. 5 (Part 2), pp. S71–S102. DOI: https://doi.org/10.1086/261725

4. Aghion P., Antonin C., & Bunel S. (2021) *The power of creative destruction: Economic upheaval and the wealth of nations*. Harvard University Press. Available at: https://www.researchgate.net/publication/358107890_P_Aghion_C_Antonin_S_Bunel_The_power_of_creative_destruction_Economic_upheaval_and_the_wealth_of_nations_400_pp_Belkap_Press_Cambridge_Mass_2021_3150

5. Organisation for Economic Co-operation and Development (2015) *The innovation imperative: Contributing to productivity, growth and well-being*. OECD Publishing. DOI: https://doi.org/10.1787/9789264239814-en

6. Arnone M., Costantiello A., & Leogrande A. (2024) *Banking credit and innovation technology: A global perspective* (MPRA Paper No. 122774). Munich Personal RePEc Archive. Available at: https://mpra.ub.uni-muenchen.de/122774/

7. Bondarchuk R., Fedash M., Chopenko D., Pankulych I., Tabakova N., & Shatun A. (2026) Financial and Credit Mechanisms for Supporting Innovation-Oriented Enterprises: The Role of Financial Instruments. *Financial and Credit Activity Problems of Theory and Practice*, vol. 1(66), pp. 111–122. DOI: https://doi.org/10.55643/fcaptp.1.66.2026.5177

8. Verheliuk Y., & Hantsiak M. (2026) Finansova bezpeka kredytnoho rynku v umovakh tsyfrovoi transformatsii [Financial security of the credit market in the context of digital transformation]. *Yevropeiskyi naukovyi zhurnal Ekonomichnykh*

ta Finansovykh Innovatsii – European Scientific Journal of Economic and Financial Innovation. 3(21), 29-42. DOI: http://doi.org/10.32750/2026-0302 (in Ukrainian)

9. Zhang J., & Hu H. (2024) Credit market distortions, matching of credit funding and total factor productivity. *China Journal of Economics*, vol. 11, no. 1, pp. 1–48. DOI: https://doi.org/10.26599/CJE.2024.9300101

10. Verheliuk Y., & Brutskyi Y. (2024) Instytutsiini osnovy orhanizatsii fondovoho rynku Ukrainy [Institutional Foundations of the Organization ff Ukraine's Stock Market]. *Yevropeiskyi naukovyi zhurnal Ekonomichnykh ta Finansovykh Innovatsii – European Scientific Journal of Economic and Financial Innovation*, vol. 2(14), pp. 295–303. DOI: https://doi.org/10.32750/2024-0227 (in Ukrainian)

11. Antoniuk O. (2024) Derzhavna pidtrymka kredytuvannia realnoho sektoru ekonomiky v Ukraini: realii sohodennia [State support for lending to the real sector of the economy in Ukraine: Current realities]. *Stalyi rozvytok ekonomiky – Sustainable Development of Economy*, vol. 3(50), pp. 386–392. DOI: https://doi.org/10.32782/2308-1988/2024-50-58 (in Ukrainian)

12. Natsionalnyi bank Ukrainy (n.d.) Nahliadova statystyka: Obsiahy aktyvnykh operatsii ta chastka nepratsiuiuchykh aktyviv u tsilomu po systemi [Supervisory statistics: Volumes of active operations and the share of non-performing assets in the banking system]. Available at: https://bank.gov.ua/ua/statistic/supervision-statist#3

13. Natsionalnyi bank Ukrainy (2026, May 8) Chastka NPL u bankivskomu sektori dali zmenshuietsia [The share of NPLs in the banking sector continues to decline]. Available at: https://bank.gov.ua/ua/news/all/chastka-npl-u-bankivskomu-sektori-dali-zmenshuyetsya

14. Ozili P. K. (2025) Bank non-performing loans research around the world. *Asian Journal of Economics and Banking*, vol. 9, no. 3, pp. 437–462. DOI: https://doi.org/10.1108/AJEB-09-2024-0103

15. Yarba İ., & Deniz B. (2024) Bank loan maturity and corporate investment. *Central Bank Review*, vol. 24, no. 4, Article 100178. DOI: https://doi.org/10.1016/j.cbrev.2024.100178

16. Natsionalnyi bank Ukrainy (n.d.) Kredyty, nadani depozytnymy korporatsiiamy. Hroshovo-kredytna statystyka [Loans granted by deposit-taking corporations. Monetary and financial statistics]. Available at: https://bank.gov.ua/ua/statistic/sector-financial

17. Asotsiatsiia ukrainskykh bankiv (2026, May 16) Prybutkovist bankiv zrostaie zavdiaky kredytuvanniu – NBU [Bank profitability is increasing due to lending, according to the NBU]. Available at: https://aub.org.ua/prybutkovist-bankiv-zrostaye-zavdyaky-kredytuvannyu-dani-nbu-za-i-kvartal-2026-roku/

18. Hnydiuk I., Marshuk L., & Timoshenko N. (2024) Suchasnyi stan dokhidnosti bankivskoho sektoru Ukrainy [Current state of profitability of the banking sector of Ukraine]. *Ekonomika ta suspilstvo – Economy and Society*, vol. 62. DOI: https://doi.org/10.32782/2524-0072/2024-62-28 (in Ukrainian)

19. Natsionalnyi bank Ukrainy (n.d.) Osnovni pokaznyky diialnosti bankiv Ukrainy. Nahliadova statystyka [Main performance indicators of Ukrainian banks.

Supervisory statistics]. Available at: https://bank.gov.ua/ua/statistic/supervision-statist

20. Natsionalnyi bank Ukrainy (n.d.) Dokhidnist OVDP na pervynnomu rynku. Statystyka finansovykh rynkiv [Yield on domestic government bonds in the primary market. Financial market statistics]. Available at: https://bank.gov.ua/ua/statistic/sector-financial#1ms

21. Verheliuk Yu. Yu., & Hantsiak M. O. (2025) Diialnist bankiv Ukrainy na rynku OVDP yak chynnyk finansovo-intermediatsiinoho paradoksu [Activities of Ukrainian Banks in the Government Bond Market as a Factor of the Financial Intermediation Paradox]. *Problemy ekonomiky – Problems of Economy*, vol. 1, pp. 288–295. DOI: https://doi.org/10.32983/2222-0712-2025-1-288-295 (in Ukrainian)

22. Nguyen V. B. (2022) The crowding-out effect of public debt on private investment in developing economies and the role of institutional quality. *Seoul Journal of Economics*, vol. 35, no. 4, pp. 403–424. DOI: https://doi.org/10.22904/SJE.2022.35.4.003

23. Koziuk V. (n.d.) Fiskalnyi Leviafan derzhbankiv chy efekt vytisnennia [Fiscal Leviathan of state-owned banks or the crowding-out effect]. Kyiv School of Economics. Available at: https://kse.ua/ua/community/stories/ksevoice-fiskalniy-leviafan-derzhbankiv-chi-efekt-vitisnennya/ (in Ukrainian)

24. Zherdetska L. V., & Ivanenko L. A. (2026) Opodatkuvannia bankivskoho sektoru v umovakh voiennykh shokiv: vplyv na prybutkovist i ryzyky [Taxation of the banking sector under wartime shocks: Impact on profitability and risks]. *Naukovyi visnyk Odeskoho natsionalnoho ekonomichnoho universytetu – Scientific Bulletin of Odesa National Economic University*, vol. 4(341), pp. 26–36. DOI: https://doi.org/10.32680/2409-9260-2026-4-341-26-36 (in Ukrainian)

25. Francois J. N., Konte M., & Ruch F. U. (2024) Crowding in effect of public investment on private investment revisited (Policy Research Working Paper No. 10881). World Bank. DOI: https://doi.org/10.1596/1813-9450-10881

26. Bogdan T. (2025) *Ukraine's public finance during a war: Directions of transformation and forward-looking challenges*. Growford Institute. Available at: https://www.growford.org.ua/wp-content/uploads/Research_final.pdf (in Ukrainian)

27. Minfin (2026) Valovyi vnutrishnii produkt v Ukraini [Gross domestic product in Ukraine]. Available at: https://index.minfin.com.ua/ua/economy/gdp/

28. Natsionalnyi bank Ukrainy (n.d.) Statystyka finansovoho sektoru [Financial sector statistics]. Available at: https://bank.gov.ua/ua/statistic/sector-financial

29. Brutskyi Ye. (2025) Osoblyvosti realizatsii skladovykh finansovoi polityky Ukrainy v umovakh nestabilnosti [Features of implementation of the components of Ukraine's financial policy under conditions of instability]. *Ekonomika ta suspilstvo – Economy and Society*, vol. 78. DOI: https://doi.org/10.32782/2524-0072/2025-78-17 (in Ukrainian)

30. Verheliuk Yu. Yu. (2025) Pidkhody do formuvannia finansovoi rezystentnosti Ukrainy v umovakh posylennia borhovoi zalezhnosti [Approaches to the formation of Ukraine's financial resistance under conditions of growing

debt dependence]. *Naukovi zapysky Natsionalnoho universytetu «Ostrozka akademiia». Seriia «Ekonomika» – Scientific Notes of Ostroh Academy National University. Series "Economics"*, vol. 36(64), pp. 69–75. DOI: https://doi.org/10.25264/2311-5149-2025-36(64)-69-75 (in Ukrainian)

31. Pacelli V., & Povia M. M. (2025) Macro-prudential policies to mitigate systemic risk: An international overview. In V. Pacelli (Ed.), *Systemic risk and complex networks in modern financial systems* (New Economic Windows, pp. 73–92). Springer. DOI: https://doi.org/10.1007/978-3-031-64916-5_4

THE LEADER/CLLD APPROACH AS A MECHANISM FOR SUPPORTING THE SUSTAINABLE DEVELOPMENT OF RURAL AREAS

Mariana Dobrivska[1]
Maria Yaroshko[2]

DOI: https://doi.org/10.30525/978-9934-26-715-4-5

Abstract. The sustainable development of rural areas requires a comprehensive support mechanism that combines local initiative, partnership-based interaction, integrated use of available resources, and the systematic application of data for evidence-based management decisions. *The purpose of the article* is to substantiate the LEADER/CLLD approach as a comprehensive mechanism for supporting the sustainable development of rural areas by combining partnership governance, strategic planning, financial instruments, systematic use of data, and support for local innovation. The objectives determine the logic of the study, covering the theoretical, methodological, and regulatory foundations of LEADER/CLLD; its practical implementation mechanism and European experience; and directions for introducing LEADER/CLLD in Ukraine, including institutionalisation, use in post-war recovery, and subsequent scaling. *The research methodology* is based on general scientific methods of analysis and synthesis, induction and deduction, generalisation and systematisation, as well as systemic, institutional, comparative legal, spatial, and process approaches. These methods were applied to analyse EU legislation and programme documents, materials of the European Commission, the EU CAP Network, the European Court of Auditors, and the Food and Agriculture Organization of the United Nations, and to review scholarly publications and compare the organisational and legal models of Local Action Groups in EU Member States. *The findings* show that the effectiveness of LEADER/CLLD is underpinned by the combination of a territorial approach,

[1] Candidate of Economic Sciences,
Senior Lecturer at the Professor J.S. Zavadskyi Department of Management,
National University of Life and Environmental Sciences of Ukraine, Ukraine
[2] Assistant at the Professor J.S. Zavadskyi Department of Management,
National University of Life and Environmental Sciences of Ukraine, Ukraine

© Mariana Dobrivska, Maria Yaroshko

the bottom-up principle, multi-sector partnership, integrated planning, networking, cooperation, and the use of local data. Data are used at every stage of local development, from identifying needs and setting priorities to selecting operations, monitoring implementation, evaluating performance, and adjusting management decisions. The model proposed for Ukraine envisages functionally coherent territories comprising several neighbouring communities, non-profit Local Action Groups, data-driven community-led local development strategies, transparent selection of operations, multi-source financing, digital support, and independent evaluation. *Practical significance.* The proposed provisions can be used by public authorities, territorial communities, Local Action Groups, and development partners to institutionalise LEADER/CLLD in Ukraine, prepare community-led local development strategies, and improve financing, digital support, monitoring, and evaluation. *Value/originality.* Integrating European experience with the conditions of Ukrainian decentralisation, wartime risks, and post-war recovery tasks makes it possible to view LEADER/CLLD as a comprehensive mechanism capable of ensuring evidence-based local priority setting, dissemination of innovation, economic diversification, stronger social cohesion, and greater resilience of rural areas.

INTRODUCTION

In contemporary academic discourse, rural development should be regarded not as a subsidiary area of agricultural policy but as an independent strategic priority. Rural areas are integrated socio-economic and spatial systems that combine agricultural production, the population's living environment, social infrastructure, a system of socio-economic relations, cultural heritage, and natural resources. Their viability therefore determines not only the gross value added of agriculture but also demographic resilience, the quality of human capital, environmental conditions, and the economy's long-term competitiveness.

For Ukraine, these issues are especially important because of depopulation, labour migration, uneven spatial development, infrastructure destruction, and the need for post-war recovery. Sectoral support instruments focused mainly on subsidising production do not comprehensively address the causes of rural vulnerability, including limited access to basic services, weak entrepreneurial ecosystems, excessive dependence on particular forms

of employment, the digital divide, and insufficient public participation in management decision-making.

An alternative is a place-based approach under which policy is designed with due regard to the characteristics of a functional territory, its resource potential, and the agreed interests of local stakeholders. LEADER/CLLD is one of the best-known mechanisms for implementing this approach. The name LEADER derives from the French *Liaison Entre Actions de Développement de l'Économie Rurale*, meaning "links between actions for the development of the rural economy", while CLLD (*Community-Led Local Development*) means "community-led local development" and refers to an approach in which local partnerships play the leading role in defining territorial priorities, preparing community-led local development strategies, and implementing development measures. LEADER/CLLD is not limited to supporting individual operations; it is a comprehensive multi-level governance mechanism combining strategic local development planning, public–private partnership, competitive selection and financing of operations, innovation, networking, cooperation, and accountability [1; 5; 6; 15].

The purpose of the study is to provide a theoretical substantiation of the LEADER/CLLD approach as a comprehensive mechanism for supporting the sustainable development of rural areas, to systematise European experience, and to develop proposals for an institutional model for its implementation in Ukraine. To achieve this purpose, systemic, institutional, comparative legal, spatial, and process approaches were applied, together with an analysis of official European Union documents, materials of the European Commission, the EU CAP Network, the European Court of Auditors, the Food and Agriculture Organization of the United Nations, and scholarly publications.

Sustainable rural development cannot be achieved solely by increasing agricultural output, because even economically successful agriculture does not always create enough jobs, guarantee access to social services, or stem youth out-migration. Sustainable development policy must therefore encompass not only support for productive enterprises but also the rural territory as an integrated socio-economic and spatial system that includes local labour markets, population mobility, education, culture, the environment, and the quality of governance.

1. Theoretical, Methodological, and Regulatory Foundations of the LEADER/CLLD Approach

LEADER/CLLD should be defined as an institutionally organised mechanism for local development in which a territorial partnership is empowered to develop and implement a community-led local development strategy, select operations, and mobilise resources in line with jointly defined territorial priorities. LEADER's effectiveness arises not from any single instrument but from the interaction of seven interrelated key features: a territorial approach; bottom-up initiative; local partnership; an integrated and multi-sectoral community-led local development strategy; innovation; networking; and interterritorial and transnational cooperation [6; 13; 20].

Under the LEADER approach, a territory is viewed not as a passive administrative unit but as a functional socio-economic system with shared challenges, resources, potential, and identity. The endogenous approach involves identifying, activating, and mobilising the internal potential of territories, including residents' knowledge and skills, local networks of interaction and trust, local brands, cultural heritage, natural resources and landscapes, productive capabilities, and entrepreneurial initiatives. In this approach, external financing has a catalytic function: it strengthens a territory's capacity for self-development rather than replacing its internal potential [1; 12].

The central instrument for implementing LEADER/CLLD is the community-led local development strategy, which links the results of territorial diagnosis with defined objectives, priorities, resources, a budget, a portfolio of operations, and a system of performance indicators. The integrated nature of the approach lies in the interconnected consideration of the territory's economic, social, environmental, cultural, and spatial dimensions. For example, the development of agritourism can simultaneously create jobs, support local processing and marketing of agricultural products, preserve cultural heritage, and maintain landscapes, thereby generating synergies for territorial development [1; 11].

The Local Action Group (LAG) serves as the institutional form of territorial partnership and the mechanism for collective decision-making, which includes representatives of local authorities, businesses, civil society organisations, educational and cultural institutions, farms, and

local residents. LEADER's added value may emerge in three interrelated dimensions: stronger social capital, improved local governance, and better results and long-term impacts from implementing the community-led local development strategy. However, the existence of a partnership alone does not guarantee these effects; their actual scale and effectiveness must be established through appropriate monitoring and evaluation [10; 17].

The support function of LEADER/CLLD encompasses four interrelated dimensions of sustainable rural development: economic, implemented through diversification of income sources, development of small businesses, optimisation of value chains and cooperation; social, through improved access to services, resident participation in management decision-making, and the integration of young people and vulnerable groups; environmental, through prudent resource use, climate-change adaptation, and support for nature-based solutions; and institutional, through stronger local self-government, partnership development, and greater capacity of territorial stakeholders to define and implement development priorities independently [8; 22; 25].

In this context, sustainable support requires aligning the short-term results of individual operations with the territory's long-term strategic interests. Support for an individual enterprise will have limited systemic effect if it is not linked to human capital development, workforce training, the formation of local supply chains, infrastructure development, and broader market access. LEADER/CLLD creates the institutional preconditions for combining these elements within a community-led local development strategy and forming a portfolio of complementary operations aimed at the territory's integrated development [10; 17].

One of the least visible yet decisive prerequisites for LEADER's effectiveness is social capital – the aggregate of trust, norms of reciprocity, horizontal ties, and participants' capacity for collective action. Rural areas may possess substantial natural, productive, and cultural resources, but without mechanisms for cooperation and coordination these resources remain fragmented and do not generate synergies. A LAG creates an organised space in which different groups within the territorial community identify common problems and priorities, agree on rules for interaction and resource allocation, and move from situational interaction to long-term partnership [2; 8; 27].

It should be noted that social capital is not homogeneous and develops at different levels of interaction. Bonding ties strengthen solidarity and mutual support within a particular group, but excessive closure may limit access to external resources and interaction with other social groups. Bridging ties connect farmers, entrepreneurs, civil society organisations, young people, educational institutions, and public authorities, creating conditions for exchanging knowledge, resources, and competencies. Linking ties integrate local initiatives into regional, national, and European governance systems, opening access to broader financial, informational, and institutional resources. An effective LAG should develop all three types of ties while ensuring openness, inclusiveness, and transparency in the partnership and preventing it from becoming a closed circle of permanent participants [10; 12].

Social capital can be assessed through the regularity of joint initiatives, the diversity and representativeness of participants, trust in decision-making and operation-selection procedures, the number of partnership applications for support, the ability to attract new participants, the intensity of cross-sectoral interaction, and the share of decisions adopted following consultation with the local community [10].

Sustainable development entails not only growth in aggregate economic indicators but also equal access to economic, social, and institutional opportunities for different social groups. Particular attention should be paid to involving young people, women, veterans, internally displaced persons, persons with disabilities, older residents, and inhabitants of remote settlements. Their participation must be ensured at every stage of LEADER/CLLD implementation – from diagnosing territorial needs and designing the community-led local development strategy to selecting, implementing, and evaluating operations [12; 13].

Practical instruments for ensuring inclusiveness may include targeted consultations with specific social groups, accessible communication formats, targeted representation mechanisms or minimum representativeness requirements, dedicated calls for small-scale operations, mentoring for potential applicants, and financing for the preparation of applications for operational support. It is important, however, to assess not only formal representation in LAG bodies but also the actual influence of represented groups on agenda-setting, decision-making, and resource allocation.

Overall, LEADER's inclusiveness should be determined not by the mere fact of representation but by the extent of different groups' actual participation in and influence over territorial development [10; 11].

LEADER's economic function is not to replace investment or agricultural policy but to complement them territorially by identifying and activating local links among producers, processors, service providers, tourism operators, and consumers. A community-led local development strategy should identify where value is lost along local value chains, which activities should be localised or developed locally, and which operations can bring about such changes. These directions may include primary processing, packaging, logistics, certification, joint marketing and branding, tourism services, development of local retail networks, or digital sales channels [12; 13; 17].

Short supply and value chains, cooperative models, local food networks, and territorial brands are particularly promising for retaining added value within a territory. Realising their potential requires an integrated combination of measures to ensure product quality, develop business competencies, build appropriate infrastructure, promote marketing, and strengthen trust among participants [12; 13].

Diversification of the territorial economy may also include non-agricultural activities: repair and household services, care services, creative industries, crafts, digital services, recreation and rural tourism, as well as renewable-energy generation and related services. Supporting these areas will help reduce seasonal employment, expand opportunities for young people and other social groups, create new income sources, and strengthen the resilience of the territorial economy to price fluctuations in agricultural markets.

LEADER's environmental dimension should be integrated into all priorities and measures of the community-led local development strategy rather than confined to separate environmental calls. Community-led local development strategies should consider the condition of soils and water resources; risks of drought, flooding, and fire; landscape degradation; biodiversity-conservation needs; waste-management problems; and energy vulnerability. Environmental and climate risks should therefore be included in the territorial diagnosis and, where relevant data are available, supplemented by mapping ecosystem services, natural resources, and areas of climate vulnerability [12; 13; 17].

The portfolio of operations may include restoring riparian buffer strips and small watercourses, developing agroforestry, improving the energy efficiency of public buildings, creating local energy cooperatives, composting, water conservation and efficient irrigation, resource reuse, and implementing nature-based solutions. Operations should be selected with regard not only to their immediate environmental effects but also to their capacity to reduce long-term costs and environmental and climate risks, and to improve resource efficiency and the resilience of the territorial community [13; 17].

For Ukraine's post-war reconstruction, the environmental dimension of LEADER/CLLD acquires additional importance and should include determining the safety and suitability of land for further use, assessing contamination levels, restoring damaged ecosystems, conserving natural areas, and preventing unsustainable development. In this context, a LAG can provide local coordination, involve residents in setting priorities, facilitate partnerships, and support relevant initiatives. At the same time, demining, assessment of technological and war-related risks, specialised clearance work, and other security and recovery measures must be undertaken by authorised public bodies and specialised institutions within their defined mandates [13; 18].

LEADER was launched in 1991 as an experimental European Community initiative aimed at finding an alternative to overly centralised rural-development policies. Under LEADER I (1991–1993), the approach covered 217 Local Action Groups in disadvantaged rural areas; LEADER II (1994–1999) expanded its use to 906 Local Action Groups and placed greater emphasis on innovation, pilot initiatives, and cooperation; LEADER+ (2000–2006) extended the approach to all EU rural areas and covered 1,153 Local Action Groups, strengthening the importance of integrated, innovative, and participatory strategies, networking, interterritorial cooperation, and transnational cooperation. In the 2007–2013 programming period, LEADER moved from being a stand-alone initiative to a mandatory axis of rural development programmes financed by the European Agricultural Fund for Rural Development (EAFRD), covering 2,402 Local Action Groups [1; 4; 11; 13; 32].

In the 2014–2020 programming period, the LEADER methodology was expanded within Community-Led Local Development (CLLD),

enabling community-led local development strategies to be supported by resources from several European Structural and Investment Funds. In the 2021–2027 programming period, the general legal framework for CLLD is established by Regulation (EU) 2021/1060: Articles 31–34 govern community-led local development, the content and selection of community-led local development strategies, the composition and functions of Local Action Groups, and forms of support from the funds. Regulation (EU) 2021/2115 links LEADER to CLLD within the meaning of Article 31 of Regulation (EU) 2021/1060 and classifies it among the cooperation interventions provided for in Article 77. Under Article 92 of Regulation (EU) 2021/2115, at least 5% of the total EAFRD contribution to the Common Agricultural Policy Strategic Plan is reserved for LEADER [5; 14; 15; 16].

Regulation (EU) No 1305/2013 remains an important legal source for analysing the 2014–2020 programming period, although in the current cycle it has been repealed by Regulation (EU) 2021/2115 subject to transitional provisions. The monitoring and evaluation system of the current Common Agricultural Policy (CAP) is specified in Commission Implementing Regulation (EU) 2022/1475, which lays down detailed rules for evaluating CAP Strategic Plans and providing information for monitoring and evaluation; it provides for the assessment of LEADER added value, while Article 14 and Annex VII define the composition and format of data on Local Action Groups and their activities. Commission Implementing Regulation (EU) 2021/2290, in turn, establishes methods for calculating the common output and result indicators set out in Annex I to Regulation (EU) 2021/2115, providing a harmonised basis for measuring the performance of CAP interventions, including LEADER [14; 16; 26; 31].

Thus, LEADER's evolution demonstrates a consistent transition from a pilot initiative to an institutionalised element of the EU Common Agricultural Policy and the broader community-oriented system of territorial development. At the same time, institutionalisation creates a risk of "administrative imitation", whereby outward compliance with procedures is not accompanied by an adequate level of autonomy for local partnerships, innovation, participation, and mutual learning. This requires assessing not only the absorption of funds and the number of operations implemented, but also the quality of the method itself, including the level of local stakeholder

participation, partnership development, social capital, institutional capacity, and territories' ability to pursue self-development [8; 9].

Overall, the LEADER/CLLD principles form an integrated system in which local stakeholder participation is combined with partnership, balanced representation of interests, innovation, networking, and a clear allocation of powers among governance levels. The institutional core of this system is the Local Action Group (LAG), which ensures practical implementation of these principles by developing and implementing a community-led local development strategy.

The starting point of this system is the bottom-up principle, under which local stakeholders participate directly in diagnosing territorial needs, defining priorities, preparing the community-led local development strategy, setting criteria, and selecting operations. Central and regional authorities, meanwhile, create the necessary legal, institutional, and financial framework without substituting for local choice and responsibility in setting territorial development priorities. Effective participation depends on open consultations, accessible information, effective feedback mechanisms, and transparent reporting of how proposals from local residents and stakeholders were taken into account in management decision-making [1; 11; 14].

Implementing the bottom-up approach requires a multi-sector partnership bringing together representatives of the public, private, and civil-society sectors and ensuring balanced representation of their interests in management decision-making. Under Regulation (EU) 2021/1060, no single interest group controls the selection decisions. Formal requirements alone do not eliminate conflicts of interest; they must be complemented by declarations of interest, recusal, publication of decisions, and independent audit [3; 4; 11; 15].

A balanced partnership creates an organisational environment for innovation, networking, and cross-sector cooperation. LEADER/CLLD's innovative potential can be realised through technological, social, organisational, and marketing dimensions and embodied in new forms of cooperation, collective brands, digital services, resource-sharing models, and partnerships with Agricultural Knowledge and Innovation Systems (AKIS). Interterritorial and transnational cooperation is an important complement to local initiatives, promoting the exchange of knowledge and experience, the dissemination and adaptation of successful practices, joint

promotion of local products and services, and the formation of resilient horizontal networks among territories [1; 11; 14; 15].

For these principles to function as a unified system, functions and responsibilities must be clearly allocated among governance levels. At European Union level, the regulatory framework, strategic guidelines, and performance evaluation system are defined; the national or regional managing authority organises competitive selection of community-led local development strategies, approves Local Action Groups, sets procedural requirements, and monitors programme implementation; the paying agency verifies the legality and eligibility of expenditure and makes payments; at local level, the LAG animates the territory, develops and implements the community-led local development strategy, advises potential applicants, selects operations, and conducts self-assessment, while rural development networks facilitate knowledge dissemination and the exchange of experience and good practice [2; 3; 4; 15].

This allocation of functions should ensure a balance between local autonomy and accountability: excessive centralisation risks turning LEADER into a mechanism for implementing administrative directives, while excessive autonomy without adequate oversight risks concentrating resources and influence among local elites. Institutional balance is achieved when higher governance levels establish common rules, guarantee financial discipline and performance control, while the local partnership retains genuine room to define territorial priorities and how they are to be implemented [8; 10].

The practical expression of this balance is the principle of subsidiarity, under which decisions should be taken at the lowest governance level that has sufficient powers, competencies, and resources to implement them effectively. The national or regional level should ensure consistent rules, sound financial administration, and compliance control, while the LAG should adapt support measures to the specific characteristics and needs of the territory. A clear division of competencies helps avoid duplication of functions and excessive checks, reduces the risk of shifting responsibility among institutions, and creates the necessary conditions for preserving local autonomy.

At local level, the combination of participation, partnership, autonomy, and accountability is institutionalised in the Local Action Group as the

centre of territorial interaction and implementation of the community-led local development strategy. A LAG may include representatives of local self-government bodies, farms, small and medium-sized enterprises, civil society organisations, advisory services, educational and cultural institutions, youth and women's organisations, and other representatives of the local community [3; 4; 15].

Such an institution should be formed in stages. The initial stage involves mobilising local participants, defining the functional territory, agreeing partnership rules, and establishing and legally formalising the LAG. Next, the organisational structure and LAG office are formed, staff functions are defined, the community-led local development strategy is developed, consultation and digital interaction tools are introduced, and a monitoring and self-assessment system is established. Once organisational preparations are complete, the LAG submits the community-led local development strategy and the required supporting documents to the competent authority for competitive selection. In this way, LEADER/CLLD principles acquire concrete institutional, organisational, and procedural expression in the territorial development governance system [1; 11].

2. European Experience in the Practical Implementation of LEADER/CLLD

European Union law does not contain a universal legal concept of a "LEADER region". In regulatory and conceptual contexts, it is more appropriate to use the terms "CLLD territory", "territory covered by a community-led local development strategy", or "territory of a Local Action Group". In the practice of certain EU Member States, including Germany and Austria, the term *LEADER region* refers to the territory in which the relevant Local Action Group operates and a community-led local development strategy is implemented. Such a territory should be clearly defined, functionally coherent, and have sufficient population, resources, and organisational capacity. Its boundaries, however, need not coincide with administrative-territorial boundaries [3; 4; 11; 15].

Indicative population parameters may be used in the programme design of LEADER/CLLD in EU Member States, including a range of 10,000–150,000 inhabitants, but specific limits and exceptions are determined by the relevant regulatory and programme rules. This range

should not be regarded as a universal requirement for every LEADER/CLLD implementation model. Within the relevant programme system, LAG responsibility for the community-led local development strategy and its functionally coherent implementation territory should be unambiguous, avoiding duplication or conflict between areas of responsibility [3; 11].

A LEADER/CLLD territory should be formed not only on the basis of administrative boundaries but primarily on actual economic, social, and institutional links among settlements and communities. Relevant criteria include labour mobility, logistical and economic links, shared natural and climatic conditions, historical and cultural identity, interaction among local economic actors, and existing forms of intermunicipal cooperation. The territory should be compact enough to enable regular interaction among participants while possessing the necessary resource, financial, and staffing capacity to implement the portfolio of operations set out in the community-led local development strategy. Final recognition of the LAG territory, the LAG itself, and the corresponding community-led local development strategy should be granted by the competent managing authority following a transparent competitive process involving independent experts and publication of results [1; 11; 17].

The practical implementation of LEADER/CLLD takes place as a continuous cycle of designing, implementing, monitoring, evaluating, and adjusting a community-led local development strategy. Unlike a linear planning model, this approach provides for continuous feedback between implementation results, performance evaluation, and subsequent adjustment of strategic priorities and measures. The general logic of this cycle is shown in Figure 1.

As shown in Figure 1, the LEADER/CLLD implementation cycle combines consecutive but interconnected stages – from mobilising the local partnership and diagnosing the territory to implementing the strategy, monitoring, evaluation, and adjustment of priorities. The outputs of each stage provide the informational and organisational basis for the next, while monitoring and learning generate feedback throughout the cycle.

The initial stage of the cycle is mobilisation of the local partnership, including identifying and mapping stakeholders, informing and engaging residents and organisations, forming an initiative group, and agreeing rules of representation. This creates the institutional basis for the future LAG and

ensures that stakeholders whose interests must be properly represented are included in the strategic process.

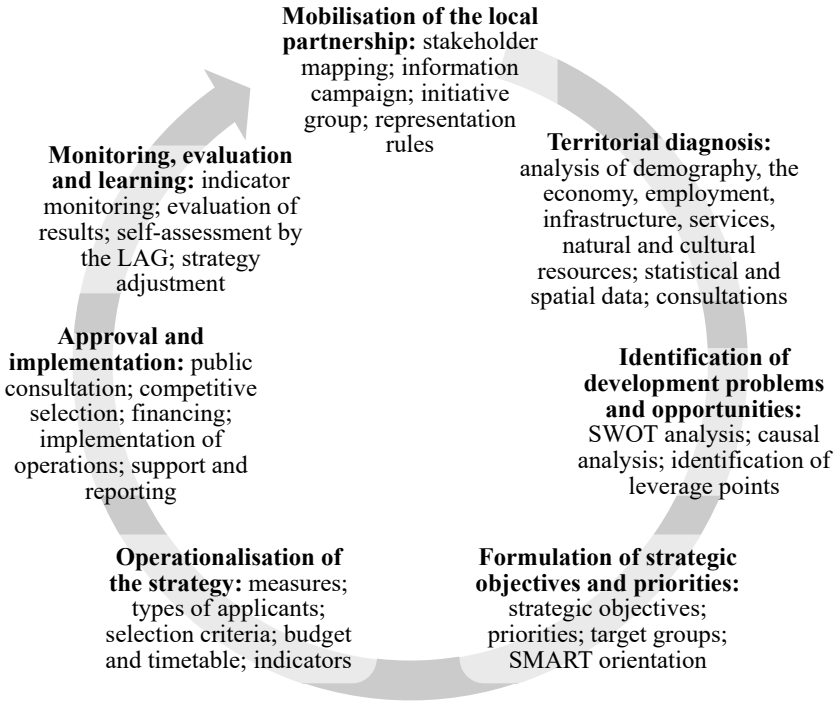


Figure 1. Cycle for Developing and Implementing a Community-Led Local Development Strategy within LEADER/CLLD

Source: compiled by the authors using sources [7; 10]

The established partnership then proceeds to territorial diagnosis, aimed at comprehensively identifying the territory's resource potential, needs, problems, and structural constraints. The analysis generally covers demographic processes, the economy and employment, infrastructure, access to services, and natural and cultural resources. Combining statistical, administrative, and spatial data with consultation results complements quantitative assessment with local knowledge.

The diagnosis results provide the basis for identifying development problems and opportunities. At this stage, SWOT analysis should not merely describe territorial characteristics but reveal causal relationships among problems, resources, and possible intervention areas, thereby helping identify key bottlenecks and points of influence.

Strategic objectives and priorities are formulated on the basis of the analysis. They should be interconnected, oriented towards specific changes, and meet the criteria of specificity, measurability, achievability, relevance, and time-boundness. The next step is to operationalise the community-led local development strategy by translating priorities into concrete measures, each with defined eligible types of operations and applicants, selection criteria, sources and volumes of financing, timelines, expected results, and indicators.

Following public consultation, the community-led local development strategy is submitted to the competent authority for evaluation, competitive selection, and approval. Its implementation encompasses launching calls, receiving and evaluating applications for operational support, selecting operations, supporting beneficiaries, monitoring implementation, and reporting.

Monitoring, evaluation, and learning are cross-cutting and accompany every stage of the cycle. The resulting data are used to determine progress, deviations, and causes of insufficient performance, to support LAG self-assessment, and to adjust the strategy. Thus, completion of one cycle of developing and implementing a community-led local development strategy within LEADER/CLLD creates the information base for the next [7; 10].

The practical implementation of LEADER/CLLD is based on combining strategic planning, territorial diagnosis, partnership interaction, financing of operations, and evaluation of achieved changes. The methodological basis for managing this process is intervention logic, which makes it possible to trace causal links between mobilised resources, activities undertaken, immediate outputs, results, and long-term impacts. A general scheme of the intervention logic in the LEADER/CLLD mechanism is shown in Figure 2.

Resources enable planned activities to be carried out, producing immediate outputs. Use of these outputs by target groups should generate the expected results, and their accumulation over the long term should produce broader territorial changes. For example, financing, staffing, and expert

knowledge are resources; advisory support and applicant training before a support decision, and implementation of operations by beneficiaries after financing is approved, are activities; consultations delivered, operations supported, facilities created, or services introduced are immediate outputs. The creation of enterprises and jobs, income growth, and wider access to services are results, while reduced population outflow, greater territorial resilience, and improved quality of life constitute long-term impacts. Distinguishing among these levels is essential for sound evaluation because the production of an output alone does not guarantee the expected results and long-term impacts [7; 10].

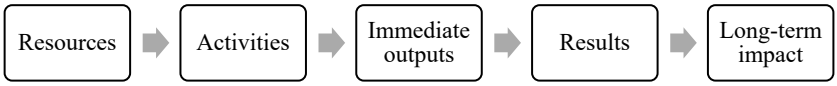


Figure 2. Intervention Logic and the Formation of Results in the LEADER/CLLD Mechanism

Source: compiled by the authors using sources [7; 10]

These considerations make it necessary to establish a monitoring and evaluation system capable of tracking not only funds absorbed and the number of supported operations, but also the results achieved, long-term impacts, and LEADER added value. Such a system should reflect the intervention logic and combine indicators of resources, immediate outputs, results, and impacts.

Resource indicators may include budget volume, number of LAG staff, co-financing volume, and expert resources mobilised. Immediate output indicators include the number of consultations held, applications for support received, operations supported, partnerships created, and services introduced. At result level, it is appropriate to track enterprises and jobs created, service users, income growth, and the participation of young people and women in governance. Impact indicators may describe changes in entrepreneurial activity, household income, access to basic services, migration dynamics, environmental resilience, and trust in local institutions.

At the same time, evaluation of LEADER added value cannot be limited to quantitative indicators. It should be complemented by interviews, surveys

of participants and non-participants, network analysis, case studies, and, where possible, counterfactual comparisons with similar territories where LEADER is not applied. LAG self-assessment should be combined with independent periodic evaluation [8; 10; 17].

Financing effectiveness also depends on the LAG's ability to form not a random collection of grants but an interconnected portfolio of operations aligned with strategic objectives. Thematic calls, preliminary requests for operation ideas, applicant-preparation mechanisms, and a reserve of funds for experimental initiatives may be used for this purpose. Under this approach, small operations can be linked by a common logic and generate a cumulative territorial effect.

The cycle for selecting and implementing operations should begin with territorial animation – theme-based meetings, consultations, partner searches, and preliminary development of operation ideas. This function distinguishes LEADER/CLLD from an ordinary grant competition: the LAG does not merely receive applications for operational support but helps shape operations aligned with the community-led local development strategy. At the same time, advice to potential applicants must be functionally separated from assessment of submitted applications [1; 10; 11].

Selection of operations may include an administrative check, assessment of alignment with the strategy, score-based evaluation, and a decision by a collegial body. The criteria, their weights, and the minimum passing score should be published before the call opens. Minutes should record voting results, recusals, and the rationale for decisions, while the appeal mechanism should address procedural compliance without replacing expert assessment.

Control should be proportionate to the amount of financing and to the complexity and risk of the operation. For small operations, simplified cost options, lump sums, or results-based financing should be provided where permitted by the regulatory rules. A risk-based approach should also prevent duplication of identical checks by the LAG, the managing authority, and the paying agency [8; 10].

Finally, a LAG's capacity to perform these functions depends on stable multiannual financing for animation, advisory support, administration, monitoring, and cooperation. At the same time, management costs should be assessed in relation to territorial coverage, the quality of animation, the performance of the operations portfolio, and the added value created, so

that the financial model does not encourage expansion of the administrative apparatus for its own sake.

Thus, LEADER/CLLD performance is determined not only by the volume of financing mobilised or the number of operations supported, but also by added value created in three interrelated dimensions: stronger social capital, improved local governance, and better results and long-term impacts from implementing the community-led local development strategy. Assessing these effects requires combining quantitative indicators with qualitative methods, conducting comparative analysis with similar territories, and accounting for the influence of other programmes, migration dynamics, economic conditions, and the security situation [8; 10; 17].

At the same time, the common LEADER/CLLD principles are implemented in EU Member States through different organisational and legal models of Local Action Groups. They differ in the legal status of the LAG, the degree of partnership autonomy, the role of public authorities, the professionalisation of management, and the method of integration into the national or regional administrative system. Despite this diversity of forms, the functional core remains common: a defined territory, a balanced partnership, a community-led local development strategy, powers to select operations, and accountability for results. The main models are summarised in Table 1 [11; 14; 15; 17; 20].

Table 1 shows that no organisational and legal model has an absolute advantage, since each embodies a particular balance among autonomy, professional capacity, institutional integration, and local stakeholder participation. The associative model offers high autonomy and openness but requires adequate professional and financial capacity. The flexible territorial-public model, based on existing intermunicipal bodies, natural parks, or development agencies, can draw on established infrastructure but increases the risk of public-sector dominance. The corporate model promotes professional management and financial discipline but may weaken direct local participation. The administratively embedded model facilitates alignment with public procedures while limiting the partnership's institutional autonomy.

Table 1

Main Organisational and Legal Models of Local Action Groups in EU Member States

Model	Examples	Organisational Basis	Advantages and Risks
Associative	Poland, Latvia, Estonia, Germany, Czechia, Slovakia, Romania, Austria, Sweden, Bulgaria	Registered non-profit organisation	High autonomy and open membership; risk of weak professional capacity in small groups
Flexible territorial-public	France, Belgium, Portugal	Association, intermunicipal body, park, or other existing structure	Use of existing capacity; risk of public-sector dominance
Corporate	Ireland, selected regions of Italy and Greece	Company without distributable shareholder profit, consortium, cooperative, or development agency	Professional management and financial discipline; risk of distancing from grassroots participation
Administratively embedded	Selected provinces of the Netherlands	Advisory committee attached to the provincial authority	Direct integration with administrative procedures; lower institutional autonomy

Source: compiled by the authors using sources [11; 14; 15]

Accordingly, Ukraine should borrow not the name of a particular legal form but the functional safeguards of LEADER/CLLD: clearly defined legal personality or a designated legal entity responsible for administrative and financial matters, autonomous partnership governance, non-dominance by any interest group, a professional secretariat, transparent selection of operations, stable financing, and proper accountability. At the initial piloting stage, preference should be given to a standardised non-profit association model, while other legal forms should be considered only after their capacity to provide these safeguards has been assessed [14; 15; 17; 20].

Comparison across EU Member States shows that the architecture of LEADER/CLLD depends substantially on the overall system of territorial governance. In more centralised models, the national authority sets rules,

organises selection of community-led local development strategies, and controls financing, ensuring procedural consistency but risking decisions being detached from territorial context. In federal and decentralised states, framework requirements are set nationally while regions conduct calls, approve community-led local development strategies, and support LAGs. This model better reflects regional characteristics but may produce procedural differences and complicate comparison of results [11; 17].

The experience of Poland, Czechia, Slovakia, Romania, and the Baltic States, which underwent administrative transformation and developed local self-government, is particularly relevant for Ukraine. It shows that building a LAG network depends not only on financing but also on preparatory support, the activity of national associations, access to methodological materials, and rule stability. At the same time, delayed calls, the precedence of administrative over functional boundaries, weak youth participation, and formal compliance with the partnership principle demonstrate that rapidly creating many legal entities is not in itself an indicator of system maturity [8; 14; 16; 17].

The experience of France, Belgium, the Netherlands, and Ireland confirms that LAG functions can be integrated into different legal structures – associations, intermunicipal entities, development agencies, or non-profit companies. Regardless of form, a separate partnership body, transparent voting rules, a professional secretariat, and safeguards against dominance by the host institution remain essential [14; 15; 17].

A combined LEADER/CLLD architecture is appropriate for Ukraine: the national level establishes uniform regulatory requirements and a data system; the regional level provides coordination and technical support; and the LAG retains autonomy in developing the community-led local development strategy and selecting operations. During piloting, a standardised non-profit association model should be used, while other legal forms should be introduced only after their ability to guarantee balanced partnership, professional capacity, transparency, and accountability has been assessed.

3. Developing a National LEADER/CLLD Model in Ukraine

The introduction of LEADER/CLLD in Ukraine should be viewed as the phased development of a multi-level local development system

combining nationwide rules, regional coordination, and the autonomy of territorial partnerships. Its core components are functionally coherent territories, institutionalised LAGs, multi-source financing, professional support, transparent selection procedures, territorial diagnosis, open data, digital monitoring, and adaptation to security and demographic challenges.

An important prerequisite for this model's effectiveness is the active role of territorial communities as the basic actors of local development. Under decentralisation, territorial communities align economic, social, and environmental development priorities, mobilise local resources, involve citizens in decision-making, and form the partnerships required to implement LEADER/CLLD. Research on the role of territorial communities in ensuring sustainable development of Ukraine's agricultural sector confirms that strengthening their institutional capacity, developing partnership interaction, and using local potential effectively are key prerequisites for sustainable rural development [33].

The Strategy for the Development of Agriculture and Rural Areas in Ukraine until 2030 and its implementation action plan create a policy window for introducing LEADER. Methodological materials, coordination measures, and pilot partnerships launched in 2025–2026 form an initial institutional foundation, but transition to scaling requires a unified national model. Such a model should take account of decentralised governance, differing community capacities, war-related risks, and future integration into the EU Common Agricultural Policy [3; 21; 30; 33].

A functional area comprising several neighbouring territorial communities may provide an optimal basis for piloting. As a preliminary working benchmark for further regulatory and methodological development, it is proposed to combine 3–15 communities with a population of 10,000–150,000, and 30,000–60,000 for most territories. Within the relevant programme system, LAG territories should be defined so that they do not overlap; specific rules for community participation in multi-fund models should be established by the conditions of the relevant programmes. A district may encompass several LAG territories, whereas a region should be regarded as a coordination or delegated-management level rather than the territory of a single LAG [3; 11; 18].

Ukraine's LEADER/CLLD model should combine common baseline rules with territorial adaptation. The typology of territories should serve an

analytical rather than prescriptive function: differences in population density, access to services and markets, employment structure, natural conditions, demographic dynamics, and security risks should influence selection criteria, indicators, and support intensity, but should not predetermine thematic priorities. Specific development directions should be determined by the local partnership on the basis of territorial diagnosis.

Depending on territorial context, community-led local development strategies may combine economic diversification, development of local value chains, improved access to services, digitalisation, intermunicipal and cross-border cooperation, use of natural and cultural potential, and support for social cohesion. Territories facing heightened security or demographic risks require more flexible instruments for preparing and implementing operations and aligning them with recovery programmes.

Determining the optimal population size should not be reduced to a formal threshold. Critical mass means a sufficient number of potential applicants and future service users, together with adequate staffing and financial capacity. A territory that is too small may lack professional capacity and competition among applications for operational support, whereas one that is too large may weaken local identity and accessibility of participation. Territorial assessment should therefore combine population size with travel time to the interaction centre, transport accessibility, digital coverage, and opportunities for remote settlements to participate.

The institutional LEADER/CLLD model should be based on a clear allocation of functions and guarantees of LAG autonomy. The national level establishes the legal, financial, and methodological framework and provides coordination, the data system, monitoring, and interaction with European institutions and donors. The regional level provides organisational and advisory support without interfering in local selection of operations. LAGs develop community-led local development strategies, mobilise partnerships, and select operations through transparent procedures without dominance by any sector or interest group [3; 4; 18; 20].

Until Ukraine gains full access to CAP instruments, the LEADER/CLLD financial model should be multi-source and medium-term, combining state and local budget funds, international technical assistance, donor programmes, and private contributions. Support should cover not only implementation of operations but also preparation of community-

led local development strategies, animation, training, administration, and cooperation; simplified and proportionate procedures should be applied to small operations [18; 19; 20].

LEADER/CLLD should be introduced sequentially: establish the regulatory, institutional, and methodological foundations; pilot the approach in different types of territories with preparatory support; independently evaluate procedures, costs, participation, and initial results; and scale only proven solutions. The digital system should enable submission and processing of applications, tracking of operations, recording of indicators, publication of decisions, and access to open data. At every stage, the national model must be compatible with CLLD requirements, the future paying agency, and the CAP monitoring system [3; 4; 6].

An agro-economic community profile could become an important information tool for strategic planning, monitoring, and evaluation of rural development. It should be regarded as a comprehensive analytical document describing the territory and its socio-demographic potential, economic operators, production, social and engineering infrastructure, employment conditions, land and resource assets, and promising directions for local economic development. Using an agro-economic profile provides a basis for systematic monitoring of economic, land-use, demographic, and logistical processes at the level of territorial communities, supports evidence-based management decisions, enables assessment of human potential and territorial resource endowment, facilitates analysis of agricultural producers, and informs sustainable local development strategies [33].

Frontline, de-occupied, and demographically weakened territories require adapted thresholds and instruments without abandoning the critical-mass principle. Priorities may include restoring local food chains, supporting veterans and internally displaced persons, social services, safe land use, local energy resilience, digital solutions, and preservation of human capital. LEADER does not replace major infrastructure programmes, but it can help ensure their local relevance and community support [13; 18; 19].

Building trust in selection procedures will be crucial in Ukraine. At the initial stage, standard LAG provisions, open matrices of selection criteria and their weights, public minutes, and external oversight of pilot calls should therefore be used. In parallel, a training system should be established for

community, business, and civil-society representatives so that participation in the partnership is not reduced to formal membership.

Within the post-war recovery system, LEADER/CLLD can serve as an intermediate mechanism between individual grants and major infrastructure programmes: coordinating local initiatives, identifying critical gaps in services and economic chains, involving residents in setting priorities, and improving the territorial relevance of investment. The approach does not replace state security and infrastructure programmes but complements them through local coordination and community support [13; 18; 19].

In de-occupied territories, strategic planning should begin with an assessment of security, demographic change, and the condition of housing, infrastructure, land, and local businesses. Pre-war plans cannot automatically form the basis for recovery because the population, labour resources, logistics, and demand have changed. A LAG can organise an updated diagnosis and consultations with local stakeholders on the sequencing of recovery.

Particular emphasis should be placed on operations supporting the economic reintegration of veterans, employment of internally displaced persons, restoration of food security, development of mobile social services, and local energy resilience. Financing should also follow the "build back better" principle by accounting for energy efficiency, accessibility, climate risks, and future maintenance costs.

For territories facing heightened security risks, community-led local development strategies should provide for resilience assessments of operations and LAG business-continuity plans. Resilience assessment should cover dependence on suppliers, budget flexibility, the energy autonomy of critical services, and the capacity to support vulnerable groups. LAG business-continuity plans should define data backup, remote governance procedures, alternative communication channels, and arrangements for adjusting schedules.

LEADER/CLLD should not create a parallel strategic-planning system. Community-led local development strategies should specify and implement national and regional policy objectives at local level while retaining autonomy in choosing how to achieve them. Alignment should be ensured with the Strategy for the Development of Agriculture and Rural Areas in Ukraine until 2030, the State Strategy for Regional Development,

the Ukraine Plan under the Ukraine Facility, regional strategies, territorial-community strategies, and recovery programmes [18].

To avoid duplication of measures, the community-led local development strategy should include an alignment matrix with higher-level documents, a list of complementary programmes, and a coordination mechanism with their managing bodies. At the same time, the strategy should remain a distinct practical instrument focused on competitive selection and financing of local operations and on measurable results [18; 20].

The pilot phase should be implemented over two to three years in four consecutive stages. The first stage establishes the regulatory, institutional, and methodological foundations: a coordinating body is designated, criteria for territories and LAGs and requirements for community-led local development strategies are approved, and rules for financing, monitoring, and managing conflicts of interest are adopted. The second stage provides for open selection of up to 20 diverse territories in at least six regions. At the third stage, LAGs are established and territorial diagnosis is conducted; at the fourth, community-led local development strategies are developed through broad consultation [19; 20; 21].

Following independent evaluation of the community-led local development strategies, the competent authority decides on their approval and formal recognition of the corresponding LAGs, after which financing agreements are concluded. The implementation stage includes local calls, advice to applicants before support decisions, support for beneficiaries after financing is approved, reporting, and regular analysis of indicators. The final evaluation should identify procedures suitable for scaling, areas for simplification, and a long-term financial model beyond 2028 [19; 20].

The sustainability of a LAG depends on a professional secretariat and access to systematic support. LAG staff should possess competencies in territorial analysis, strategy development, facilitation, financial management, monitoring, communication, and international cooperation. A common framework for training, certification, mentoring, and practical exchange with European LAGs should improve process quality without replacing partnership-based determination of local priorities [14; 19; 20].

A national framework for evaluating LEADER added value should be introduced, covering three interrelated dimensions: stronger social capital, improved local governance, and better results and long-term impacts from

implementing the community-led local development strategy. Publishing data in an open format will enable comparison among LAGs, identification of delays, and dissemination of effective solutions [7; 8; 10].

National coordination should be carried out by the central executive authority responsible for rural-development policy. Its functions should include regulation, organisation of competitions, interaction with the European Commission and donors, coordination of other authorities, monitoring, and evaluation. Regional authorities should provide information, advisory, and organisational support without interfering in local selection of operations [18; 20].

The national LEADER/CLLD network should operate as an open coordination and communication platform for LAGs, public authorities, businesses, civil society, academia, and international partners. Its tasks should include maintaining a LAG register, delivering training, disseminating good practices, providing analytical support, and supporting interterritorial and transnational cooperation. Operational work should be assigned to a dedicated support unit with clearly defined powers, stable financing, an approved annual plan, and public reporting [14; 20].

Monitoring and evaluation should combine tracking quantitative progress with analysing qualitative change. Alongside the number of established LAGs, community-led local development strategies, trained LAG staff, and partnerships, three dimensions of LEADER added value should be assessed: stronger social capital, improved local governance, and better results and long-term impacts from implementing community-led local development strategies. The combined indicators should determine whether the model is ready for further scaling [7; 8; 10; 19; 20; 21; 22].

The LEADER system should function as an environment of continuous learning. Knowledge is created not only through formal research but also through implementing operations, resolving conflicts, adapting calls, and interacting with beneficiaries. LAGs should document practical solutions, reasons for deviations from plans, and lessons that can be shared with other territories [10; 14; 15].

The national network can organise thematic communities of practice, peer reviews of community-led local development strategies, LAG staff placements, a case-study repository, and an annual forum. A peer-to-peer format, in which representatives of one LAG analyse another's processes

using an agreed methodology, is particularly useful. It strengthens trust in evaluation and accelerates the dissemination of innovation.

Cooperation with universities and advisory services should encompass applied research, data preparation, evaluation, and training. At the same time, analytical support should be understandable to practitioners and result in concrete recommendations, templates, or tools.

Small territorial communities are characterised by dense personal and business ties, so conflicts of interest are not exceptional but foreseeable governance risks. An integrity policy should require regular declarations of interests, a register of related parties, recusal procedures, quorum requirements excluding interested members, rotation of evaluators, and the possibility of external review.

Equally important is preventing the dominance of a particular interest group when that group does not formally violate voting rules but determines the agenda and competition criteria. Safeguards include broad membership, open working groups, public consultation on criteria, analysis of the distribution of funds across sectors and settlements, and regular renewal of governing bodies [8; 16].

LEADER communication should explain not only financing opportunities but also the logic of partnership itself. If residents perceive the LAG solely as another grant provider, participation is reduced to submitting applications. The communication strategy should demonstrate the links among diagnosis, priorities, criteria, decisions, and results.

Short reports in plain language should be published regularly, budgets and progress visualised, outreach meetings held in different settlements, reasons for rejecting applications explained, and both successful and problematic cases presented. Open discussion of failures strengthens institutional maturity and trust.

Scaling LEADER/CLLD in Ukraine should be gradual and cover only procedures and institutional solutions whose effectiveness has been confirmed by independent evaluation. National standards should guarantee representation, integrity, openness, monitoring, and audit while allowing territories room to define thematic priorities and animation formats. A decision to expand the programme should be based on the share of LAGs with representative partnerships, approved strategies, stable staffing, timely calls, and demonstrated territorial results [8; 10; 17; 22].

Financial scaling requires a medium-term budget framework, alignment with donor programmes, and preparation for CAP mechanisms. A unified catalogue of financing sources and rules for combining funds should be created so that a community-led local development strategy can draw on different programmes without double-financing the same costs [4; 18; 20].

Thus, developing a national LEADER/CLLD model in Ukraine requires combining functionally coherent territories, autonomous and professionally capable LAGs, multi-source financing, digital support, transparent procedures, and adaptation to security and demographic challenges. Phased piloting, independent evaluation, and scaling only proven solutions should ensure the institutional sustainability of the approach and its alignment with recovery policy and future CAP mechanisms.

CONCLUSIONS

LEADER/CLLD is a comprehensive mechanism for supporting the sustainable development of rural areas because it combines a territorial focus, local participation, multi-sector partnership, strategic planning, financing, and learning. Its advantage lies in its ability to transform fragmented local resources into a coherent portfolio of operations. The conditions for economic, social, environmental, and institutional results emerge when the seven features of the approach operate as an integrated system and the resulting changes are confirmed through monitoring and evaluation.

European experience confirms the diversity of legal forms used by LAGs while demonstrating the continuity of the common LEADER/CLLD principles: a clearly defined territory, non-dominance by any single interest group, a community-led local development strategy, transparent selection of operations, professional capacity, and accountability. Participation alone, however, does not guarantee effectiveness or efficient use of resources. The mechanism's effectiveness must be demonstrated by evidence of goal attainment and impact, while efficiency must be assessed through the relationship between results achieved and costs incurred.

For Ukraine, the model best supported by the analysis is one in which LEADER/CLLD territories comprise several neighbouring communities within a functional area, supported by a national regulatory framework, regional coordination, and an autonomous LAG [3; 18; 20; 33]. In post-war

recovery, such a mechanism can coordinate local solutions, identify gaps in services and economic chains, support the reintegration of veterans and the employment of internally displaced persons, contribute to restoring basic services, and strengthen territorial resilience.

The proposed model should ensure not only the creation of formal institutions but also the launch of a reproducible local development cycle: partnership – territorial diagnosis – community-led local development strategy – competitively selected portfolio of operations – financing – digital monitoring and evaluation – adjustment. Open data and digital support should ensure evidence-based decisions, transparency, and comparability of results. Frontline, de-occupied, and demographically weakened territories require differentiated thresholds and forms of support, resilience assessments for operations, and business continuity plans for LAGs.

Phased piloting, stable financing from a mix of sources, simplified support procedures for small-scale operations, professional staff training, independent evaluation, and integration with future CAP instruments will make it possible to use LEADER/CLLD not as a formal replication of European practice but as an effective mechanism for recovery, European integration, and the long-term viability of rural areas. Scaling should be based on tested procedures and demonstrated territorial results, since disregarding legal, financial, digital, staffing, or partnership prerequisites may reduce the approach to a formal grant scheme without the expected added value.

References:

1. European Network for Rural Development. (n.d.). *LEADER/CLLD explained*. European Commission. Available at: https://ec.europa.eu/enrd/leader-clld/leader-toolkit/leaderclld-explained_en.html

2. Bosworth, G., Annibal, I., Carroll, T., Price, L., Sellick, J., & Shepherd, J. (2016). Empowering local action through neo-endogenous development: The case of LEADER in England. *Sociologia Ruralis*, *56*(3), 427–449. DOI: https://doi.org/10.1111/soru.12089

3. Cabinet of Ministers of Ukraine. (2024, November 15). *Strategy for the development of agriculture and rural areas in Ukraine for the period until 2030* (Order No. 1163-r). Available at: https://zakon.rada.gov.ua/laws/show/1163-2024-%D1%80#Text

4. European Commission. (2006). *The LEADER approach: A basic guide*. Office for Official Publications of the European Communities. Available at:

https://www.aeidl.eu/wp-content/uploads/2025/06/Basic-Guide-to-the-LEADER-Approach.pdf

5. European Commission. (2014, March). *Community-Led Local Development: Cohesion Policy 2014–2020* [Fact sheet]. Available at: https://ec.europa.eu/regional_policy/sources/factsheet/community_en.pdf

6. European Commission. (2018, September). *Guidance for Local Actors on Community-Led Local Development* (Version 3). European Structural and Investment Funds. Available at: https://ec.europa.eu/regional_policy/sources/guidance/guidance_clld_local_actors_en.pdf

7. European Commission. (2018, September). *Guidance for Member States and programme authorities on Community-Led Local Development in European Structural and Investment Funds* (Version 4). Available at: https://ec.europa.eu/regional_policy/sources/guidance/guidance_community_local_development.pdf

8. European Commission, Directorate-General for Agriculture and Rural Development, Unit A.3. (2024). *Assessing the added value of LEADER: Guidelines*. Available at: https://eu-cap-network.ec.europa.eu/sites/default/files/publications/2024-07/eu-cap-network-leader-added-value-guidelines-report.pdf

9. European Commission, Directorate-General for Agriculture and Rural Development, Directorate B – Sustainability, Unit B.3 – Social Sustainability. (2025, October). *Guidelines for data on LEADER interventions* (Version 4). Available at: https://agriculture.ec.europa.eu/document/download/9daf0700-c38a-4946-a587-090e342e0306_en?filename=guidelines-for-data-on-leader-interventions_en.pdf

10. European Commission, Directorate-General for Agriculture and Rural Development. (2022). *Evaluation support study on the impact of LEADER on balanced territorial development*: Final report. Publications Office of the European Union. DOI: https://doi.org/10.2762/01039

11. European Court of Auditors. (2010). *Implementation of the LEADER approach for rural development* (Special Report No. 5/2010). Publications Office of the European Union. DOI: https://doi.org/10.2865/27311

12. European Court of Auditors. (2022). *LEADER and community-led local development facilitates local engagement but additional benefits still not sufficiently demonstrated* (Special Report No. 10/2022). Publications Office of the European Union. DOI: https://doi.org/10.2865/097605

13. European Network for Rural Development Contact Point. (2016, June). *LEADER local development strategies (LDS): Guidance on design and implementation*. European Commission. Available at: https://eu-cap-network.ec.europa.eu/sites/default/files/publication/2023-05/enrd-guidance_lds_0.pdf

14. European Parliament & Council of the European Union. (2013). *Regulation (EU) No 1305/2013 of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005. Official Journal of the European Union, L 347*, 487–548. Available at: http://data.europa.eu/eli/reg/2013/1305/oj

15. European Parliament & Council of the European Union. (2021). *Regulation (EU) 2021/1060 of 24 June 2021 laying down common provisions on the European*

Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, the Just Transition Fund and the European Maritime, Fisheries and Aquaculture Fund and financial rules for those and for the Asylum, Migration and Integration Fund, the Internal Security Fund and the Instrument for Financial Support for Border Management and Visa Policy. Official Journal of the European Union, L 231, 159–706. Available at: http://data.europa.eu/eli/reg/2021/1060/oj.

16. European Parliament & Council of the European Union. (2021). *Regulation (EU) 2021/2115 of 2 December 2021 establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013. Official Journal of the European Union, L 435*, 1–186. Available at: http://data.europa.eu/eli/reg/2021/2115/oj

17. Food and Agriculture Organization of the United Nations. (2026). *From theory to action: EU LEADER approach in non-EU countries in the context of sustainable transformation of local food systems: Concept note and agenda* [Technical workshop materials]. Available at: https://openknowledge.fao.org/handle/20.500.14283/cd9213en

18. Furmankiewicz, M., Janc, K., & Macken-Walsh, Á. (2021). Implementation of the EU LEADER programme at member-state level: Written and unwritten rules of local project selection in rural Poland. *Journal of Rural Studies*, 86, 357–365. DOI: https://doi.org/10.1016/j.jrurstud.2021.05.020

19. Gargano, G., & Del Prete, A. (2025). LEADER territorial cooperation in rural development: Added value, learning dynamics, and policy impacts. *Land, 14*(7), Article 1494. DOI: https://doi.org/10.3390/land14071494

20. Konečný, O. (2019). The LEADER approach across the European Union: One method of rural development, many forms of implementation. *European Countryside, 11*(1), 1–16. DOI: https://doi.org/10.2478/euco-2019-0001

21. Latvian Rural Advisory and Training Centre, & National Association of Agricultural Advisory Services of Ukraine. (2025). *Implementation the LEADER/CLLD approach in Ukraine: Guidebook and methodological recommendations*. Available at: https://dorada.org.ua/storage/pages/LEADER/LEADERmetodika_Ukrainai_tulkota_ENG.pdf

22. Organisation for Economic Co-operation and Development. (2020). *Rural well-being: Geography of opportunities*. OECD Publishing. DOI: https://doi.org/10.1787/d25cef80-en

23. Opria, A.-M., Corodescu-Roșca, E., & Roșu, L. (2024). Are LEADER principles achieved in Local Action Groups? A systematic assessment of local representatives' perception. *Eastern Journal of European Studies, 15*(1), 361–384. DOI: https://doi.org/10.47743/ejes-2024-0116

24. Pertoldi, M., Fioretti, C., Guzzo, F., Testori, G., De Bruijn, M., Ferry, M., Kah, S., Servillo, L. A., & Windisch, S. (2022). *Handbook of territorial and local development strategies*. Publications Office of the European Union. DOI: https://doi.org/10.2760/57919

25. Vávra, J., Dlouhá, J., Pospíšilová, M., Pělucha, M., Šindelářová, I., Dvořáková Líšková, Z., Hartych, M., Dlouhý, J., & Cudlínová, E. (2022). Local action groups and sustainable development agenda: Case study of regional perspectives from Czechia. *Frontiers in Sustainability*, 3, Article 846658. DOI: https://doi.org/10.3389/frsus.2022.846658

26. European Commission. (2022). *Commission Implementing Regulation (EU) 2022/1475 of 6 September 2022 laying down detailed rules for implementation of Regulation (EU) 2021/2115 of the European Parliament and of the Council as regards the evaluation of the CAP Strategic Plans and the provision of information for monitoring and evaluation. Official Journal of the European Union, L 232*, 8–36. Available at: http://data.europa.eu/eli/reg_impl/2022/1475/oj

27. EU CAP Network. (2026, February 18). From local networks to lasting impact: *How LEADER builds social capital* [Briefing]. Available at: https://eu-cap-network.ec.europa.eu/publications/local-networks-lasting-impact-how-leader-builds-social-capital_en

28. Ling, J., & Severin, A. (2026, May). *Community-led local development: A policy brief from the Policy Learning Platform for a Europe closer to citizens*. Interreg Europe Policy Learning Platform. Available at: https://www.interregeurope.eu/sites/default/files/2026-07/Policy%20brief%20on%20community-led%20local%20development.pdf

29. Muca, E., Sivric, I., Sharku, A., Gjorgievski, P., Batakovic, R., & Kocic, J. (2025). *Follow up on the implementation of EU LEADER approach defined in the LEADER road maps*. Regional Rural Development Standing Working Group in South Eastern Europe. Available at: https://seerural.org/wp-content/uploads/2025/01/Introduction-of-the-LEADER-approach.pdf

30. ALDA – European Association for Local Democracy. (2025, September 22). *Launch of the G.R.A.I.N. project: Rural governance and inclusive networks for Ukraine's recovery*. Available at: https://www.alda-europe.eu/grain-project-ukraine-rural-development/

31. European Commission. (2021). *Commission Implementing Regulation (EU) 2021/2290 of 21 December 2021 laying down rules on the methods for the calculation of the common output and result indicators set out in Annex I to Regulation (EU) 2021/2115. Official Journal of the European Union, L 458*, 486–493. Available at: http://data.europa.eu/eli/reg_impl/2021/2290/oj

32. Korinets, R. (2025, December 16). *LEADER: European lessons and opportunities for Ukraine* [Conference presentation]. National Association of Agricultural Advisory Services of Ukraine & All-Ukrainian Association of Amalgamated Territorial Communities.

33. Balanovska, T., Sotnyk, V., & Yaroshko, M. (2025). *The role of territorial communities in ensuring sustainable development of the agrarian sphere of Ukraine. Economics and Business Management, 16*(3), 129–144. DOI: https://doi.org/10.31548/economics/3.2025.129

PROJECT MANAGEMENT UNDER CONDITIONS OF DIGITAL TRANSFORMATION AND THE BANI ENVIRONMENT

Iryna Kohut[1]
Tetyana Lebid[2]

DOI: https://doi.org/10.30525/978-9934-26-715-4-6

Abstract. *The purpose* of the paper is to substantiate theoretical and methodological principles for integrating digital tools, hybrid methodologies, and human capital development, and to build a comprehensive conceptual model of the motivational determinants of project managers under conditions of digital transformation, labor market change, and the BANI environment. *Methodology of the study.* The study is based on a systematic approach to analyzing modern trends in project management, methods of comparative and structural-functional analysis, bibliometric and empirical research, the PMI Talent Triangle framework, and theories of motivation (including the Job Characteristics Model and Self-Determination Theory). The empirical base includes data from international project management institutes (PMI, IPMA), statistical indicators from the Ukrainian labor market (DOU), and the authors' own survey of project management practitioners (2026). *Results.* The findings show that modern project management is undergoing a fundamental shift from traditional utilitarian-technocratic approaches and standalone tools to integrated digital environments, hybrid methodologies, and human-centric models. The empirical analysis reveals a gap between the perceived usefulness of digital tools and the level of their actual systemic integration within organizations. The study also demonstrates that project success is determined not only by technical and strategic competencies (in line with the PMI Talent Triangle) but also by a multilevel motivational structure encompassing personal drivers, psychological safety, organizational support, and financial guarantees.

[1] Senior Lecturer, Department of Project Management,
Lviv Polytechnic National University, Ukraine
[2] Senior Lecturer, Department of Project Management,
Lviv Polytechnic National University, Ukraine

© Iryna Kohut, Tetyana Lebid

Practical implications. The proposed conceptual model of motivational potential can be used by organizations to diagnose imbalances in project managers' competency profiles and to design targeted development and retention programs covering personal, team, organizational, and financial-hygiene factors. Strategic cooperation between business and higher education – dual education, mentor-practitioner integration, and corporate bootcamps – is identified as a practical pathway for closing the competence gap and supporting sustainable project delivery in volatile environments. *Value/originality.* The originality of the study lies in the development of an author's systemic structure of determinants of motivational potential and its integration with the PMI Talent Triangle competency model, forming a unified framework that links professional competencies, motivation, and the specifics of the BANI environment. This is one of the first attempts to systematize such a framework specifically for project managers operating under the conditions of Ukraine's post-war recovery and market transformation.

INTRODUCTION

Relevance of the topic and scientific novelty. The modern paradigm of project management is undergoing large-scale transformation driven by digitalization, the spread of hybrid approaches, the integration of artificial intelligence technologies, and the growing instability of the external environment (BANI conditions). Traditional methodologies focused on adherence to the "project triangle" (Scope, Time, Cost) are losing their self-sufficiency, requiring a shift toward human-centric management models in which human and motivational potential becomes the key determinant of success. The scientific novelty of the study lies in the theoretical substantiation and practical systematization of the relationship between the digital transformation of project management tools, the structure of professional competencies (the PMI Talent Triangle model), and the multilevel system of project manager motivation under conditions of post-war recovery and market changes in Ukraine.

Purpose and objectives of the study. The purpose of the study is to develop theoretical and methodological foundations and practical recommendations for forming an integrated system of tools and developing

human potential in project management. To achieve this purpose, the following research tasks were addressed:

– to analyze the current state and key trends in the application of project management tools in Ukrainian and international companies;

– to examine sectoral and regional demand for project specialists against the background of labor market transformation;

– to systematize the competency profile of a project manager using the PMI Talent Triangle model and identify typical managerial imbalances;

– to develop an original systemic structure of determinants of motivational potential;

– to determine the specifics of realizing human potential under BANI-environment conditions and to propose strategic directions for cooperation between business and the higher education system.

Methodology and logic of the study. The study is based on a systematic approach, methods of comparative, structural-functional, and bibliometric analysis, as well as the results of the authors' own empirical surveys (2026). The logic of presentation follows the principle of moving from a general analysis of market and technological trends in project management to the micro level – the study of human potential, competency profiles, motivational determinants, and ways of improving them through educational-professional partnership.

1. Trends in the Development of Project Management

The current transformation of project management in Ukraine and worldwide is driven simultaneously by several interrelated trends: the digitalization of business processes, the spread of hybrid approaches to project delivery, the development of cloud technologies, the automation of routine managerial operations, and the integration of artificial intelligence technologies. As a result, not only the range of tools available to the project manager is changing, but also the very logic of their application – from the use of separate planning and control tools to the formation of an integrated digital project management environment.

According to the Project Management Institute (PMI), approximately 40 million project professionals are already working worldwide [24]; however, by 2035 the global economy may require up to 30 million additional specialists capable of professionally managing projects. Thus,

the development of the project economy is accompanied not only by a growing number of projects but also by the formation of a significant global shortage of professionals and competencies.

The modern project environment is characterized by increasing project complexity. According to PMI's Pulse of the Profession 2026, 97% of surveyed project managers worked on at least one complex project during the previous year, with more than half classifying such projects as significantly complex. 81% of respondents believe that project complexity has increased in recent years, and 37% report a significant increase [26]. At the same time, teams that manage complexity effectively are five times more likely to complete a project successfully.

The very concept of effective management is changing. Whereas the traditional approach in project management focused mainly on meeting schedule, budget, and scope, modern PM increasingly focuses on value creation, strategic alignment, and the management of interdependencies, stakeholders, risks, and change. According to PMI Pulse 2025, based on a survey of nearly 3,000 professionals, only 18% of respondents demonstrated a high level of business acumen, 66% a medium level, and 16% a low level. Professionals with a high level of business competence more often achieve project business goals (83% vs. 78%), stay within budget (73% vs. 68%), and meet deadlines (63% vs. 59%) [25].

In parallel, the digital transformation of project management tools is taking place. Modern PM relies less and less on standalone spreadsheets, documents, and local software, shifting instead toward cloud environments, BI analytics, workflow automation, and decision-support systems. The IPMA AI Survey 2024, conducted among 345 representatives of the international professional community, revealed considerable interest among project managers in the use of AI [17].

Russia's full-scale invasion of Ukraine in February 2022 fundamentally changed the operating conditions of Ukrainian companies and substantially transformed the role of project management in their activities. Whereas before that time project management in Ukraine had developed mainly through natural processes – via the gradual spread of international standards and professional certification of specialists – under wartime conditions the project approach has become a tool for business survival and a means of rapid adaptation under conditions of constant risk and uncertainty.

Key trends in the development of project management in Ukraine:

1. War and Recovery as a Key Driver of the Projectization of the Economy

The most distinctive condition shaping the development of project management in Ukraine is the sheer scale of recovery and reconstruction needs. According to the Rapid Damage and Needs Assessment, as of December 31, 2025, Ukraine's total recovery and reconstruction needs are estimated at almost USD 588 billion over the next ten years [36]. The scale of these needs means the formation of an extraordinarily large field of project activity in Ukraine. This is not limited to the construction or repair of physical infrastructure. Recovery encompasses energy, transport, housing, healthcare, education, water supply, digital infrastructure, entrepreneurship, municipal development, the social sphere, and institutional modernization.

Accordingly, project management is gradually acquiring the significance of infrastructure for implementing state policy and economic reconstruction.

It is particularly important that the scale of recovery requires a shift from implementing isolated projects to program-and-portfolio management. Reconstruction projects must be linked to the strategic goals of the state, regions, and territorial communities, and coordinated in terms of resources, timelines, and funding sources.

2. Institutionalization of the Project Approach in Public Administration

One of the most important trends of 2024–2026 is the spread of the project approach beyond business and the IT sector into public administration and public investment management.

In 2024, Ukraine launched the Public Investment Management (PIM) reform, which envisages the formation of a unified approach to the preparation, evaluation, prioritization, financing, and monitoring of public investment projects. The DREAM ecosystem has become the central digital element of this reform.

The scale of digitalization of this process is telling. In April 2025, it was reported that 1,280 communities were working with DREAM, and more than 11,500 active projects with a combined budget of approximately UAH 1.3 trillion had been entered into the system [16].

This example demonstrates a transition from managing individual projects to the digital management of project portfolios. Thus, the portfolio

approach is becoming not merely a methodological recommendation but an institutional requirement for the management of public resources.

3. European Integration and Harmonization of Management Practices

European integration is an important institutional factor for Ukraine. The gradual alignment of Ukrainian procedures with EU practices raises the requirements for transparency, the justification of project selection, risk management, investment performance evaluation, and reporting. European integration is shaping a new institutional environment for project management, in which professional project management becomes a necessary condition not only for an organization's internal efficiency but also for gaining access to international financing.

4. Active Digital Transformation

At the same time, the war has become a powerful catalyst for the digital transformation of management practices. The state is actively supporting the digitalization of business processes through the Diia.Business platform. According to available estimates, approximately 28% of Ukrainian companies use cloud services, and 32% apply elements of data analytics and artificial intelligence in their management activities [12]. On the one hand, these figures demonstrate positive dynamics in the digitalization of management tools; on the other hand, they indicate that most organizations are still at the early stages of digital maturity, which directly confirms the relevance of studying the conditions for forming an integrated system of project management tools.

Research by Ukrainian scholars shows that the digitalization of enterprise management, amid market instability, a shortage of financial and human resources, and the spread of remote and hybrid work, is regarded not only as a means of increasing productivity but also as a mechanism for ensuring organizational resilience. In particular, T. Omelianenko and D. Ilienkov identify Jira, Slack, Microsoft Teams, Trello, CRM systems, and other digital solutions among the relevant digital tools of Ukrainian business, while at the same time highlighting the problems of financial constraints, the cost of IT products, and an insufficient level of digital skills among personnel [19].

To study the current state of project management tool use, the authors conducted their own survey of specialists involved in project management (May–October 2026). The study involved practicing project managers

and representatives of the IT sector, the construction sector, public administration, the services sector, and other fields. Selected findings of the survey are presented below.

Despite the large number of specialized PM systems (Jira – 44%, Microsoft Project – 34%, Trello – 24%), the tool base for project management in Ukrainian organizations remains predominantly universal and weakly specialized: 76% of surveyed organizations use Excel/Google Sheets (Fig. 1). This indicates the hybrid, fragmented nature of tool support for PM processes, whereby specialized solutions coexist with general office tools rather than fully replacing them. A notable share of organizations still rely on paper documents or boards (32%), which points to incomplete digitalization of project management processes even where modern digital alternatives are available.

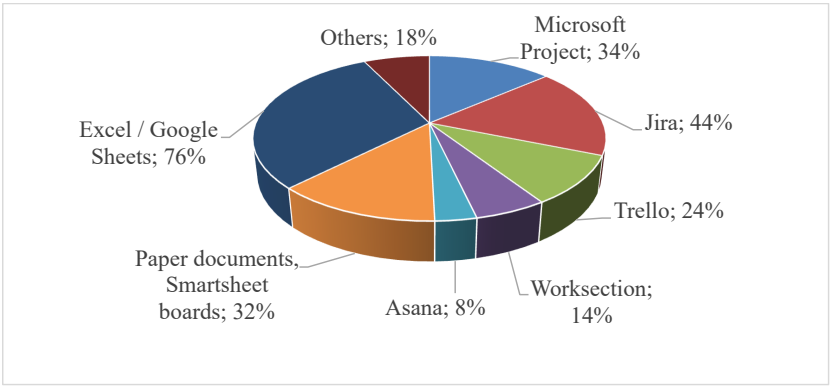


Figure 1. Distribution of respondents by use of digital project management tools

The results of the study also reveal an important feature of digital transformation. Respondents rate the usefulness of digital tools for project management fairly highly – 4.22 out of 5 – and their intention to continue using digital tools at 4.52 points. At the same time, the level of digital integration is rated at only 3.02 points. Ratings for individual areas of integration are even lower: interaction between PM systems and CRM, ERP, and financial systems – 2.92 points; automatic report generation –

2.86 points; stakeholder access to project status information through the PM system – 2.80 points.

Thus, the sample studied shows a gap between the perceived usefulness of digital tools and the level of their systemic integration. This gives grounds to argue that the next stage of digitalization of Ukrainian project management should be not simply an increase in the number of software products used, but the formation of an integrated system of tools in which individual technologies interact with one another and support a single project management cycle.

Therefore, an organization's digital maturity should be assessed not merely by the presence of modern software but, above all, by the degree of systematicity, integration, and effectiveness of its use.

5. The Transition from Using Separate Digital Tools to Integrated Management Systems

An important trend is the shift from the local use of digital tools to the digital transformation of the entire project management system.

At the same time, Ukrainian scholarly discourse shows a shift from analyzing individual software products to understanding digital tools as a component of the management system. Thus, I. Kohut and D. Horeiko examine the choice of software products for project management in small and medium-sized businesses in Ukraine, comparing Microsoft Project and Worksection and emphasizing the need for a well-grounded choice of software solution according to the organization's needs [14]. O. Pshyk-Kovalska, in a 2026 study, examines Microsoft Project, Trello, and Asana as project administration tools in consulting companies, identifying the standardization of procedures, the optimization of communications, the automation of document flow and reporting, resource management, and the flexibility of management mechanisms among the criteria for their effectiveness [27].

Researchers also note the growing role of cloud platforms, ERP and CRM systems, Business Intelligence, Big Data, electronic interaction, and AI in planning, control, resource management, and decision-making [18; 31].

In this context, the very concept of a digital tool is fundamentally changing. Whereas previously project digitalization meant mainly transferring traditional procedures into a software environment, it now involves the integration of various sources of information, automatic

data exchange, the creation of digital dashboards, real-time analytics, the automation of recurring operations, forecasting, and the use of AI to support management decisions. Such a transformation changes the very architecture of project management.

Whereas at earlier stages digital technologies were mainly used to automate individual operations – planning, task tracking, schedule formation, or report preparation – the current stage is characterized by a transition to integrated digital environments that combine planning, communication, document management, monitoring, analytics, and resource management.

6. The Transition from Traditional to Hybrid (Adaptive) Methodologies

Another trend is the spread of hybrid project management.

Research by H. Tarasiuk shows that the current development of project management is characterized by a combination of traditional and agile methodologies, with the choice between Waterfall, Agile, Scrum, Kanban, and hybrid models increasingly depending on the specifics of a particular project.

This trend is particularly relevant for Ukraine, since recovery, infrastructure, social, digital, and innovation projects differ substantially in their level of uncertainty, regulation, and complexity. This directly points to the need to form an adaptive system of project management tools.

The authors' own research confirms the spread of this practice among the surveyed project managers (Fig. 2).

40% of respondents describe their organization's approach as hybrid, combining traditional, digital, and AI tools, while another 24% predominantly use a digital Agile approach. The traditional approach remains the main one for 10% of respondents, while 26% reported the absence of a formalized approach.

At the same time, the results show that digital transformation does not mean the complete displacement of traditional tools. The average rating of the importance of traditional methods and tools is 3.64 out of 5, indicating their continued use in management practice. Thus, the modern evolution of PM is not linear, with new methods completely replacing previous ones, but convergent, whereby traditional planning, control, and documentation are combined with Agile practices, digital platforms, and AI.

The IT sector remains the flagship industry in terms of the maturity of project practices, accounting for approximately 4.4% of Ukraine's GDP and

38% of total service exports. It is in the IT sector, where agile (Agile) and hybrid approaches to project management have historically dominated, that digital PM tools are being implemented most systematically, and a specific trend of 2023–2025 has been the rapid growth of the MilTech direction, which forms a separate class of projects with heightened requirements for speed, secrecy, and adaptability of management processes [12].

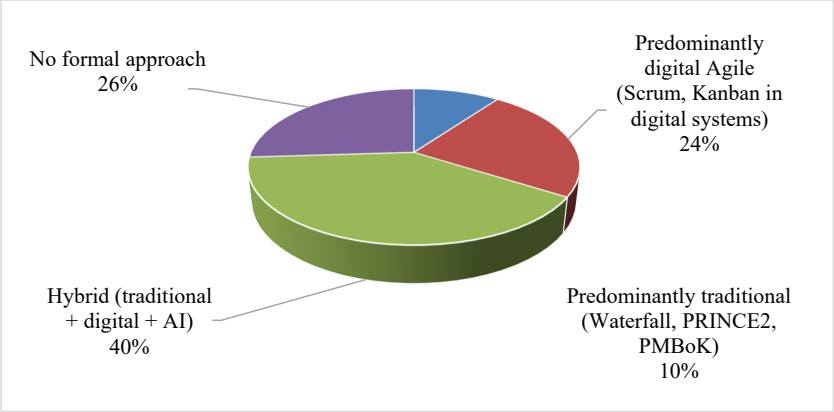


Figure 2. Distribution of respondents by project management methodology used

Another important trend relates to the field of reconstruction and infrastructure projects. As a significant share of capital investment is directed toward restoring destroyed facilities and relocating production, demand is growing for methodologically sound management of large, resource-intensive projects that are, at the same time, uncertain in terms of timelines and budgets. This increases the relevance of hybrid methodologies that combine the structuredness of traditional (waterfall) approaches – necessary for capital construction and the utilization of budgetary and donor funds – with the flexibility of adaptive practices needed to respond to constant changes in the security situation.

This makes it possible to view hybridization not only as a methodological trend but also as an important precondition for forming a system of project management tools. An organization increasingly needs not a single universal

tool but a combination of instruments capable of providing different management functions depending on the nature of the project.

7. The Growing Importance of Resilience and Adaptability

The macroeconomic conditions under which projects in Ukraine are currently implemented are characterized by high volatility. Studies of small and medium-sized business resilience show that whereas only 57% of Ukrainian SMEs continued operating in March–April 2022, this figure had already risen to 84% by 2023 and stabilized at around 85% during 2024–2025 [32]. Among the main challenges shaping the conditions of project activity, surveys from 2023–2025 consistently identify demand instability, staff shortages due to mobilization and emigration, power supply disruptions, limited access to financing, infrastructure destruction, and regulatory uncertainty. This is why project activity is increasingly carried out under conditions in which the initial assumptions may change radically even during project implementation.

These factors directly affect the planning of project timelines, budgets, and resource provision, forcing project managers to build in significantly higher reserves and revise planning horizons. Under these conditions, the classical understanding of a project plan as a stable sequence of works becomes insufficient. Adaptability, scenario planning, risk management, rapid replanning, and resource reservation come to the fore.

Studies of Ukrainian IT companies also record the growing role of Agile, Scrum, and Kanban as adaptive management models in a crisis environment [21].

This is consistent with international PMI research showing a general move by organizations toward flexible, fit-for-purpose project delivery, that is, choosing the mode of implementation according to the specific context of the project.

8. Artificial Intelligence as a New Stage of Transformation

The most dynamic trend of 2024–2026 is the integration of AI into project activity. International IPMA research shows that AI is gradually moving from experimental use to practical application for data analysis, task automation, risk management, and decision support. At the same time, organizations face a shortage of relevant competencies, confidentiality issues, and uncertainty about the economic effect.

Ukrainian studies from 2024–2026 also identify artificial intelligence as one of the key directions in the development of innovative and digital project management [29].

The future system of project management tools should be viewed as a human-machine system in which AI does not replace management but expands its analytical and operational capabilities.

The results of the authors' own research show that 34% of respondents actively use Generative AI in project work, 38% are at the stage of partial or trial use, and another 16% plan to implement it. Thus, in the sample studied, 72% of respondents already use GenAI to some extent, and the potential for further diffusion of this technology remains significant (Fig. 3).

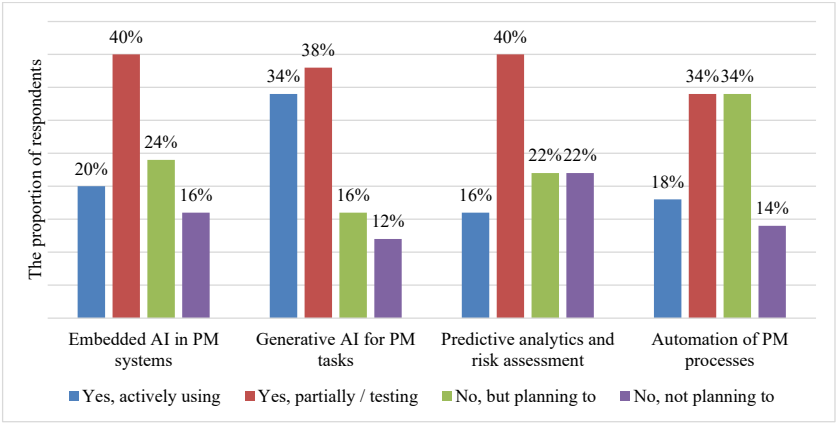


Figure 3. Degree of use of various types of AI in the surveyed organizations

At the same time, the use of more complex AI functions remains at a lower level. Predictive analytics and risk forecasting are actively used by 16% of respondents, 40% are testing relevant solutions, and 22% plan to use them. AI automation of project processes is actively used by 18%, while 34% are at the testing stage and another 34% plan its implementation.

Thus, the results obtained indicate the phased nature of the AI transformation of project management: from the experimental use of generative AI to predictive analytics, process automation, and, prospectively,

AI-integrated management systems. At the same time, AI should not be viewed as a replacement for traditional tools. It forms a new technological layer of the PM system that complements planning, monitoring, risk analysis, forecasting, and decision-making.

9. The Increasing Role of Human Potential

Technological transformation does not diminish the importance of the human factor in project management; rather, it changes the structure of the competencies required.

The changing requirements for a project manager are reflected, in particular, in the PMI Talent Triangle approach, which combines Ways of Working, Power Skills (leadership and interaction with people), and Business Acumen. Thus, the professional competence of a PM extends beyond technical proficiency in project management tools and includes the ability to link project decisions to the organization's strategic goals.

At the same time, digitalization and the spread of artificial intelligence do not diminish the importance of the human factor but change the structure of the competencies required. The automation of routine operations, data analysis, and information preparation creates the preconditions for managers to concentrate on tasks where contextual thinking, communication, leadership, ethical judgment, negotiation, and decision-making under uncertainty remain critical. IPMA research on the use of AI in project management also shows that, alongside technological opportunities, there are barriers related to a lack of knowledge and competencies, confidentiality issues, the cost of technologies, and uncertainty about their effectiveness (Momčilović et al., 2024). Human potential is therefore becoming not an alternative to technological development but a necessary precondition for it.

Summarizing the conditions and trends discussed above, several defining vectors in the development of project management in Ukraine at the current stage can be identified: first, a shift from predominantly traditional to hybrid and adaptive management approaches as a response to the high level of wartime uncertainty; second, an accelerated but uneven digitalization of project management tools, accompanied by a shortage of digital competencies; third, the emergence of new classes of projects (MilTech, relocation, and reconstruction projects) that require specific methodological support; and fourth, the persistence of a gap between the

availability of individual modern tools and their systemic integration at the organizational level.

At the same time, the cross-cutting factor determining the effectiveness of all these transformations is the human potential of project activity.

2. Human Potential and the Competency Profile of a Project Manager in the Modern Project Environment

The transformation of the paradigm of modern project management is characterized by a shift in direction from a purely utilitarian-technocratic approach toward a deep understanding of the significance of the personal dimension of managerial processes. The classical methodological concept of the so-called "project triangle" (Scope, Time, Cost), which for a long period served as the absolute criterion of project performance, is losing its self-sufficiency under conditions of a nonlinear and volatile environment. The direct success of project-oriented initiatives today is determined by the integration of a fourth core component – human potential – which transforms the resource-based management paradigm into a human-centric model.

Human potential in project activity is not simply a collection of hired labor or a mechanical set of professional skills. It is a complex, integrative system that encompasses intellectual resources, dynamic competencies, motivational factors, value orientations, adaptive flexibility, and the cognitive readiness of team members for innovation and solving atypical tasks [2;15]. While technical management tools, digital instruments, and optimization algorithms are becoming increasingly accessible and standardized, the qualitative characteristics of the human factor are gaining particular importance for ensuring the effectiveness and adaptability of project activity under conditions of change [13; 37].

The projected demand for project management specialists is being shaped primarily in sectors characterized by large-scale technological, infrastructural, and organizational transformations.

At the same time, the scale of this growth in demand is not uniform: the need for project-profile specialists varies considerably depending on sectoral specifics, the level of project activity, and the nature of the transformation processes. This is why it is important to identify the sectors of the economy in which the largest volume of new opportunities for project specialists will be formed (Table 1).

Thus, the data presented show that demand for project management specialists is shaped primarily in sectors affected by large-scale technological, infrastructural, and organizational transformations. At the same time, the sectoral dimension is only one aspect of assessing the prospects for project-related employment. Equally important is the spatial dimension, since the intensity of demand formation differs substantially between national labor markets.

Table 1

Sectoral distribution of prospective demand for project management specialists

Sectoral segment of the economy	Projected number of new jobs (million/ thousand)	Key factors shaping demand for human potential
Manufacturing and construction sector	9.7 million	Large-scale reindustrialization, infrastructure transformation, and a high rate of generational turnover and retirement of specialists.
Information technology, services, and media	5.5 million	Digitalization of business models, high environmental entropy, and the rapid scaling of cloud and mobile products.
Financial institutions and insurance	4.6 million	Regulatory compliance, FinTech transformation, and the need to integrate analytics and data protection.
Consulting and professional services	1.7 million	The need to optimize operating systems, implement change, and support clients' digital projects.
Utilities and power supply sector	279 thousand	Grid modernization, the transition to renewable energy sources, and the implementation of energy-efficiency standards.
Oil and gas industry and extraction	49 thousand	High-budget capital projects and the management of technological and environmental risks.

Source: compiled based on data from [23]

The geographical structure of demand for project specialists shows a clear concentration in economies oriented toward technological and infrastructural innovation. The main drivers of demand are China, India,

and the United States of America, which account for the largest share of the global increase in open vacancies. While global trends determine the overall scale and geographical configuration of demand, it is important, for assessing the prospects for the development of project potential, to trace how these trends manifest at the national level.

In the Ukrainian context, the high-tech sector is of particular importance, as the project-based format of activity is one of the fundamental mechanisms for implementing digital and organizational change. According to DOU, in August 2026 demand was observed on the Ukrainian labor market for specialists across various categories, including project managers. In terms of the absolute number of open vacancies (239 offers), the Project Manager specialization ranks second, behind only the quality-control segment (QA – 320 vacancies) and substantially ahead of key engineering development directions (Python, Node.js, .NET, Front End). At the same time, the competition indicator among project managers (67.0 applications per vacancy) is almost three times lower than in the Front End segment (200.3), which indicates steady employer demand for managerial potential amid a moderate level of candidate market saturation [11].

Thus, the modern labor market shows not only a quantitative increase in demand for project management specialists but also stricter requirements regarding the quality of their professional potential. The existence of demand alone does not guarantee that candidates will meet employers' expectations, which raises the question of defining the set of competencies and managerial characteristics required for the effective performance of a project role.

The steady demand for project managers identified on the labor market necessitates a more precise specification of the requirements for their professional profile. In this context, human potential management involves not only determining the quantitative need for specialists but also a detailed formalization of the competencies and managerial characteristics that determine their ability to perform project functions effectively [7; 25]. One of the most systematic approaches to structuring such requirements is the PMI Talent Triangle model, which makes it possible to group the complex of a project manager's attributes into three interrelated domains: technical project management, leadership, and strategic business thinking (Table 2).

The competency structure presented makes it possible to view a project manager's professional profile not as a set of isolated characteristics but as a balanced combination of technical, leadership, and strategic-business components. Excessive concentration on one of these, with insufficient development of the others, can produce a one-sided professional profile that limits the manager's ability to act effectively under conditions of complexity, uncertainty, and cross-functional interaction. To illustrate such imbalances, it is useful to distinguish three typical profiles.

Table 2

Structure of balanced competencies in the project manager talent model

Competency domain	Content (Hard / Soft / Strategic)	Functional impact on project effectiveness
Technical Project Management (TPM)	Proficiency in methodologies for charter development, schedule planning, budgeting, risk analysis, and quality control.	Ensures rhythm of execution, compliance with regulations, financial discipline, and the integrity of project outcomes.
Leadership Qualities (Power Skills)	Emotional intelligence, staff motivation, facilitation of conflict resolution, stress resilience, and communicative flexibility.	Builds psychological safety, consolidates the cross-functional team, and sustains high employee engagement.
Strategic and Business Management	Deep understanding of the subject domain, analysis of the competitive environment, and value orientation of project outcomes toward the company's strategy.	Ensures commercial viability, delivery of the business case, and alignment with stakeholder expectations.

Source: compiled by the author based on [23; 24; 25]

The «Graduate methodologist» profile (dominance of technical project management). Such a specialist possesses a substantial arsenal of methodologies, templates, forms, and regulations but, given insufficient practical managerial training, may have difficulty making decisions in non-standard situations, managing uncertainty, and may require constant mentoring.

The «Coach-facilitator» profile (dominance of the leadership component). Developed empathetic, communicative, and facilitation skills contribute to a favorable psychological climate in the team. At the same time, insufficient orientation toward business results, planning, and control can create risks of schedule delays and deviation from the project's key financial targets.

The «Technical performer» profile (dominance of domain expertise). Transferring a leading engineer or developer to a managerial position without a corresponding development of managerial competencies can lead to a loss of effectiveness in both specialized and managerial functions. Such a specialist may be prone to micromanagement, excessive focus on operational details, and an insufficiently systemic vision of the project.

Thus, the effectiveness of a project manager is determined not only by the structure and level of development of his or her professional and leadership competencies. Even a high level of competency readiness does not guarantee the full realization of managerial potential in the absence of internal readiness to act, sustained engagement, and result orientation. This makes it necessary to consider the motivational component as one of the key factors in the formation and realization of a project manager's potential.

3. Determinants of the Formation and Realization of a Project Manager's Motivational Potential

The motivational component is an important precondition for the formation and realization of a project manager's potential, as it determines the direction of his or her professional activity, the willingness to make efforts to achieve results, and the ability to sustain engagement under challenging conditions. This is particularly important in project-oriented organizations, where activity is characterized by the uniqueness of tasks, limited time and resource parameters, and uncertainty.

Given the specifics of project activity, traditional motivation theories require adaptation to the context of project teams. In this regard, it is useful to systematize the main theoretical approaches to motivation and assess their potential for explaining the behavior of project managers and team members (Table 3).

Table 3

Systematization of theoretical approaches to the motivation of project personnel

Theoretical approach	Main provisions	Significance for project activity
Job Characteristics Model	Skill variety, task identity, task significance, autonomy, feedback	Development of responsibility, intrinsic motivation, and engagement (Hackman & Oldham, 1975)
Self-Determination Theory	Autonomy, competence, relatedness	Sustaining stable intrinsic motivation under conditions of stress and uncertainty (Ryan & Deci, 2000)
Model of Motivational Factors of Project Managers	Identification of critical factors affecting the motivation of project managers	Substantiation of a comprehensive approach to the motivation of project managers (Henkel & Haley, 2020)
Intrinsic Motivation and Extrinsic Incentives	Interaction of intrinsic motivation and extrinsic incentives in shaping performance	Intrinsic motivation is of particular importance for complex cognitive activity, while extrinsic incentives can support quantitative outcomes (Cerasoli et al., 2014)

Source: compiled by the author based on [4; 8; 30]

The theoretical approaches presented show that employee motivation in a project environment cannot be reduced solely to a system of material incentives. It is shaped by the interaction of the content of professional activity, the level of autonomy, a sense of competence and belonging, opportunities for development, recognition of results, and the characteristics of the organizational environment.

Accordingly, assessing the motivational potential of a project manager requires taking into account individual, team, and organizational factors alike. Studies of motivation in the field of project management also demonstrate the multifactorial nature of this phenomenon and the need to take into account the specifics of the project environment [1; 9; 22; 33].

Modern empirical studies confirm the importance of non-material and intrinsic factors of professional motivation [6; 35].

In particular, the significance of the work, opportunities for professional development, autonomy, and a sense of the social usefulness of the activity are regarded as important preconditions for sustaining specialists' stable engagement [33; 34].

At the same time, the realization of motivational potential depends not only on the individual characteristics of the employee but also on the organizational environment. Petrenko's study [20] draws attention to the role of the Project Management Office (PMO) in creating conditions that support autonomy, organizational support, and continuous professional learning for specialists.

Thus, motivational potential should be viewed as the result of the interaction between personal motivational factors and the characteristics of the environment in which project activity is carried out. Intrinsic motivation, a sense of the significance of professional activity, and an orientation toward a socially useful outcome can be regarded as important factors of the resilience of managerial behavior under conditions of uncertainty. For a project manager, this is manifested, in particular, in a readiness to independently overcome cross-functional barriers, take responsibility for decision-making, and constructively resolve organizational conflicts. To systematize this process, we have developed an original systemic structure of determinants of motivational potential (Table 4).

Thus, the motivational component complements the manager's competency profile and creates preconditions for the practical realization of his or her professional potential. The comprehensive model encompasses four coordinated groups of motivational vectors.

The competency and motivational components of forming a project manager's potential discussed above take on particular importance under conditions of high uncertainty and dynamic changes in the external environment. Modern conditions for carrying out project activity are characterized not only by volatility but also by the growing fragility of systems, the anxiety of participants, the nonlinearity of cause-and-effect relationships, and the complexity of interpreting information. The BANI model – Brittle, Anxious, Non-linear, Incomprehensible – is used to conceptualize these characteristics [3].

Brittleness. The brittleness of project systems increases the risk of the rapid collapse of plans and previously formed assumptions. This necessitates a shift from an excessive focus on the long-term fixation of project parameters toward continuous adaptation, scenario planning, and the step-by-step verification of decisions.

Anxiety. A heightened level of uncertainty and external stress increases the importance of the manager's emotional resilience, psychological safety, and a culture of trust within the team. Under such conditions, leadership potential is manifested not only in the ability to coordinate activity but also in sustaining constructive interaction and team engagement.

Non-linearity. The nonlinear nature of relationships complicates the forecasting of the consequences of management decisions, since minor initial changes can produce disproportionately significant outcomes. This increases the importance of systems thinking, the ability to identify interdependencies, and the timely revision of initial management assumptions.

Incomprehensibility. The limited availability, contradictory nature, or complexity of interpreting information increases the importance of a manager's ability to work with hypotheses, test assumptions through experimentation, and quickly adapt decisions based on new data. Accordingly, the role of intellectual flexibility, critical thinking, and the ability to act under incomplete information is growing.

Thus, the BANI environment changes not only the conditions for implementing projects but also the requirements for how human potential is used. The success of a project manager is increasingly determined by the ability to combine professional knowledge with adaptability, systems thinking, emotional resilience, flexibility, and a readiness to experiment. Accordingly, developing a project manager's potential should involve not only the accumulation of competencies but also the creation of conditions for their actualization and development in line with the characteristics of a specific project environment [28].

Table 4

Systemic structure of determinants of motivational potential in project activity

Cluster of factors	Components and manifestations	Mechanism of influence on motivational potential
1. Personal factors (core of the system)	1.1. Content and social significance of the project; 1.2. Interest in non-standard tasks; 1.3. Complexity of innovation challenges; 1.4. Autonomy in decision-making; 1.5. Continuous professional development; 1.6. Aspiration for self-realization; 1.7. Congruence of personal values with goals.	Form a stable intrinsic drive, intellectual engagement, and subjective responsibility; prevent rapid burnout during a crisis.
2. Team factors (socio-psychological circuit)	2.1. Psychological safety of communication; 2.2. Mutual support and trust among colleagues; 2.3. High team cohesion; 2.4. Recognition of individual contribution; 2.5. A sense of shared ownership of successes; 2.6. Informal collegial interaction.	Reduce transactional communication barriers, minimize the fear of making innovative mistakes, and support psychological resilience.
3. Organizational factors (institutional environment)	3.1. Systemic HR programs and mentoring; 3.2. Transparent career paths; 3.3. A culture of openness and tolerance; 3.4. Transformational leadership style; 3.5. Involvement in strategic sessions; 3.6. Objective, systematic feedback.	Serve as a channel for effort and a multiplier of internal potential; create the infrastructure for stable professional growth.
4. Financial-hygiene factors (basic foundation of security)	4.1. Competitive market compensation; 4.2. Transparent project KPI bonuses; 4.3. Social insurance and guarantees; 4.4. Employment stability and security; 4.5. Schedule flexibility and remote work options.	Neutralize feelings of anxiety and unfairness; retain talent within the organization, freeing up cognitive resources for productive tasks.

Source: developed by the author

Strategic directions for cooperation between business and the higher education system, as a way of overcoming the shortage of practical competencies under BANI-environment conditions, are becoming critically important. Aligning educational training with the needs of project-oriented business should be viewed not as a one-time update of educational programs but as a system of continuous interaction among universities, employers, and the professional community. Such interaction makes it possible to combine theoretical training, practical experience, the development of professional and leadership competencies, and the formation of motivational readiness to work under conditions of uncertainty. The main directions of such partnership may include:

1. Implementation of a dual education model. Combining theoretical training at the university with the practical involvement of students in real enterprise projects makes it possible to develop not only professional competencies but also the ability to apply them in a specific organizational context.

2. Integration of practitioner-mentors into the educational process. Involving experienced project managers, certified specialists, and Agile coaches in developing and updating educational content, reviewing educational components, and conducting practical classes helps narrow the gap between academic models and project management practice.

3. Developing a culture of project work among students. Implementing interdisciplinary projects in cooperation with real enterprises creates conditions for developing teamwork, communication, leadership, responsibility, and cross-functional coordination.

4. Corporate bootcamps and retraining centers. Joint university-company programs can be used to accelerate the development of project competencies among specialists from related professions and to build a talent pool for Junior PM / PM Assistant positions.

The study confirms that in modern project-oriented organizations, human potential is not merely an additional resource but the fundamental strategic core of the success of any project initiative. Attempts to reduce project management solely to controlling time, cost, and scope without taking psychosocial and motivational factors into account lead to a systemic decline in effectiveness under conditions of high uncertainty.

Integrating the PMI competency triangle (technical tools, leadership, and strategic business vision) requires balanced professional development of specialists in order to prevent disproportion toward pure theorizing or unstructured visioning. At the same time, unlocking human potential is impossible without activating a multilevel system of motivation. The conceptual model developed by the authors, which combines personal intrinsic motivators, team psychological safety, a supportive organizational environment, and basic financial guarantees, provides a theoretical foundation for the comprehensive assessment and development of a project manager's motivational potential. Further development of this direction lies in the practical verification of the proposed determinants through large-scale empirical testing at domestic project-oriented enterprises.

CONCLUSIONS

The study confirms that in modern project-oriented organizations, human potential is not merely an additional resource but the fundamental strategic core of the success of any project initiative. Attempts to reduce project management solely to controlling time, cost, and scope of work without taking psychosocial and motivational factors into account lead to a systemic decline in effectiveness under conditions of high uncertainty. Integrating the PMI competency triangle requires balanced professional development of specialists in order to prevent disproportion toward pure theorizing or unstructured visioning. At the same time, unlocking human potential is impossible without activating a multilevel system of motivation. The conceptual model developed by the authors, which combines personal intrinsic motivators, team psychological safety, a supportive organizational environment, and basic financial guarantees, provides a theoretical foundation for the comprehensive assessment and development of a project manager's motivational potential. Modern project management is characterized by a shift from local tools to integrated digital environments and the use of artificial intelligence technologies, which requires a high degree of adaptability and the ability to work under conditions of a nonlinear BANI environment.

Further development of this direction lies in the practical verification of the proposed determinants through large-scale empirical testing at domestic project-oriented enterprises, in studying mechanisms for the deep integration

of artificial intelligence systems into decision-making processes and project portfolio management, and in developing practical recommendations for implementing dual education and partnership programs between universities and business in order to overcome the shortage of digital and professional competencies on the labor market.

References:

1. Akbar S., Rehman A. U. (2014) Impact of motivational factors on employee performance with mediating role of employee engagement. *International Journal of Management Sciences,* vol. 2, no. 4, pp. 178–192.

2. Barvinok, V. Y. (2020). Current trends and problems of the IT sector in Ukraine: Training and migration of IT professionals. *Mechanism of Economic Regulation*, (90), 90–102. DOI: https://doi.org/10.21272/mer.2020.90.07

3. Bushuiev S. D., Tikhonovych Yu., Chernysh O., Sukhonos N., Khalilov A. (2024) Kreatyvni pryntsypy upravlinnia innovatsiinymy proektamy v seredovyshchi BANI [Creative principles of innovative project management in the BANI environment]. *Upravlinnia rozvytkom skladnykh system* [Management of complex systems development], issue 57, pp. 6–11. DOI: https://doi.org/10.32347/2412-9933.2024.57.6-11

4. Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin*, *140*(4), 980–1008. DOI: https://doi.org/10.1037/a0035661

5. Development of IT outsourcing in Ukraine: A prospect of the brain drain reduction. *Economic Review: Journal of Economics and Business*, 17(2), 41–54. Available at: https://econpapers.repec.org/article/tuzjournl/v_3a17_3ay_3a2019_3ai_3a2_3ap_3a41-54.htm

6. Gagne M., Parker S. K., Griffin M. A. et al. (2022) Understanding and shaping the future of work with self-determination theory. *Nature Reviews Psychology*, no. 1, pp. 378–392. DOI: https://doi.org/10.1038/s44159-022-00056-w

7. Golubenko, I. (2020, October 9). Kto takoi project manager, skolko zarabatyvaet i kak im stat [Who is a project manager, how much do they earn, and how to become one]. *MC.today*. Available at: https://mc.today/kto-takoj-project-manager-skolko-zarabatyvaet-i-kak-im-stat/

8. Hackman J. R., Oldham G. R. (1975) Development of the Job Diagnostic Survey. *Journal of Applied Psychology*, vol. 60, no. 2, pp. 159–170. DOI: https://doi.org/10.1037/H0076546

9. Henkel, T., & Haley, G. (2020). Analyzing the critical factors motivating project managers amidst the challenges of an ever-changing modern global marketplace. *The Journal of Modern Project Management*, *8*(2). DOI: https://doi.org/10.19255/JMPM02409

10. Huemann, M., & Lechler, R. C. (2024). Motivation of young project professionals. In M. Huemann & R. Turner (Eds.), *The Handbook of Project Management*. Taylor & Francis.

11. Kilkist vakansij i vidhukiv za katehorijamy: serpien 2026 [Number of vacancies and reviews by categories: August 2026]. DOU: Spilnota rozrobnykiv [DOU: Developer Community]. Available at: https://jobs.dou.ua/trends/categories/2026-08/

12. Kniazhyna, R. (2024). Yak zminylas ukrainska tekhindustriia u 2024 rotsi: Dosiahnennia, vyklyky ta perspektyvy [How the Ukrainian tech industry changed in 2024: Achievements, challenges, and prospects]. robot_dreams. Available at: https://robotdreams.cc/uk/blog/615-how-the-ukrainian-tech-industry-has-changed-in-2024

13. Kohut I. (2022) Analiz faktoriv motyvatsii, yaki vplyvaiut na komandy v innovatsiinykh proektakh pid chas kryzy ta viiny [Analysis of motivation factors affecting teams in innovative projects during crisis and war]. *Ekonomika ta suspilstvo* [Economy and Society], no. 40. DOI: https://doi.org/10.32782/2524-0072/2022-40-16

14. Kohut, I., & Horeiko, D. (2024). Obgruntuvannia ta vybir prohramnoho produktu dlia vedennia ta upravlinnia proiektamy v malomu ta serednomu biznesi [Justification and selection of a software product for project management and administration in small and medium-sized business]. *Tavriiskyi Naukovyi Visnyk. Seriia: Ekonomika*, (21), 102–107. DOI: https://doi.org/10.32782/2708-0366/2024.21.10

15. Korablina, I. A. (2017). Current issues in the study of the IT market in Ukraine. *Efektyvna Ekonomika* [Effective economy], (12). Available at: http://www.economy.nayka.com.ua/?op=1&z=5997

16. Ministry for Development of Communities, Territories and Infrastructure of Ukraine. (n.d.). *DREAM: Pipeline of recovery and reconstruction projects*. Available at: https://dream.gov.ua/pip-pipeline

17. Momčilović, A., Wagner, R., & Vlahov, R. D. (2024). *IPMA AI SIG – Initial AI Survey 2024 report*. International Project Management Association. Available at: https://publications.ipma.world/wp-content/uploads/2025/01/Initial-AI-Survey-2024-Report.pdf

18. Oliinyk, A., Tolochii, O., & Shcherbyna, Yu. (2024). Efektyvnist proiektnoho menedzhmentu suchasnykh pidpryiemstv v umovakh dydzhytalizatsii [Effectiveness of project management of modern enterprises in the conditions of digitalization]. *Visnyk Poltavskoho Derzhavnoho Ahrarnoho Universytetu. Seriia "Ekonomika, Upravlinnia ta Finansy"*, (2), 61–66. DOI: https://doi.org/10.32782/pdau.eco.2024.2.8

19. Omelianenko, T., & Ilienkov, D. (2024). Modern digital tools of operational management. *Collection of Scientific Papers "Scientific Notes", 34* (1), 137-150. DOI: http://doi.org/10.33111/vz_kneu.34.24.01.12.082.088

20. Petrenko T. O. (2024) Faktory motyvatsii, yaki maie vrakhuvaty ofis upravlinnia proektamy [Motivation factors that the project management office should consider]. *Tsyfrova ekonomika yak faktor innovatsiy ta staloho rozvytku suspilstva* (Ternopil, November 28th–29th, 2024). Ternopil: TNTU, pp. 43–45. Available at: http://elartu.tntu.edu.ua/bitstream/lib/47078/2/TSEFISRS_2024_Petrenko_T-Motivation_factors_that_43-45.pdf

21. Petryk, M., & Harafonova, O. (2025). Upravlinnia proiektamy u sferi IT: adaptyvni modeli v kryzovykh umovakh [IT project management: Adaptive models in crisis conditions]. *Visnyk Khmelnytskoho Natsionalnoho Universytetu. Ekonomichni Nauky*, 344(4), 25–29. DOI: https://doi.org/10.31891/2307-5740-2025-344-4-3

22. Phan P. T., Pham C. P., Tran N. T. Q., Le H. T. T., Nguyen H. T. H., Nguyen Q. L. H. T. (2020) Factors Affecting the Work Motivation of the Construction Project Manager. *The Journal of Asian Finance, Economics and Business*, vol. 7, no. 12, pp. 1035–1043. DOI: https://doi.org/10.13106/jafeb.2020.vol7.no12.1035

23. Project Management Institute (PMI) (2020) *Job Growth and Talent Gap in Project Management 2020–2030.* Available at: https://www.pmi.org/-/media/pmi/documents/public/pdf/learning/job-growth-report.pdf?rev=c304efd38c2a48dc9489a945a8a07614&sc_lang_temp=en

24. Project Management Institute (2025a). *Global project management talent gap*. Available at: https://www.pmi.org/learning/thought-leadership/global-project-management-talent-gap

25. Project Management Institute (2025b). *Pulse of the Profession® 2025: Boosting business acumen*. Available at: https://www.pmi.org/learning/thought-leadership/boosting-business-acumen

26. Project Management Institute (2026). *Pulse of the Profession® 2026: Driving success in complex projects: From navigating tasks to navigating systems*. Available at: https://www.pmi.org/learning/thought-leadership/driving-success-in-complex-projects

27. Pshyk-Kovalska, O. O. (2026). Administruvannia upravlinnia proiektamy yak kliuchovyi chynnyk efektyvnosti konsaltynhovykh kompanii [Project management administration as a key factor in the effectiveness of consulting companies]. *Menedzhment ta Pidpryiemnytstvo v Ukraini: Etapy Stanovlennia ta Problemy Rozvytku*, 8(1), 463–472. DOI: https://doi.org/10.23939/smeu2026.01.463

28. Rehan A., Thorpe D., Gera A. (2024) Leadership behavioral practices of project managers: systematic literature review. *Asia Pacific Management Review*, vol. 29, no. 2, pp. 165–178. DOI: https://doi.org/10.1016/j.apmrv.2023.12.005

29. Romanchukevych, M. Y. (2026). Tsyfrova transformatsiia protsesiv upravlinnia proiektamy: instrumenty ta perspektyvy [Digital transformation of project management processes: Tools and prospects]. *Aktualni Pytannia Ekonomichnykh Nauk*, (22). DOI: https://doi.org/10.5281/zenodo.21793002

30. Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. DOI: https://doi.org/10.1037/0003-066X.55.1.68

31. Tarasiuk, H. M. (2023). Rozvytok proiektnoho menedzhmentu: osnovni metodolohii ta trendy [Development of project management: Key methodologies and trends]. *Ekonomika, Upravlinnia ta Administruvannia*, (4(106)), 26–32. DOI: https://doi.org/10.26642/ema-2023-4(106)-26-32

32. Tsymbala, A. (2025, October 29). Resilience of Ukraine's small and medium businesses amid the war: Challenges, policy, and the future. *VoxUkraine*. Available at: https://voxukraine.org/en/resilience-of-ukraine-s-small-and-medium-businesses-amid-the-war-challenges-policy-and-the-future

33. Tyulkubayeva, A. K., Nurseiytova, G. B., & Sugirova, G. S. (2023). Motivation in project management: Systematic review of the literature. *Economy: Strategy and Practice*, *18*(3), 110–124. DOI: https://doi.org/10.51176/1997-9967-2023-3-110-124

34. Tyulkubayeva, A., Nurseiytova, G., Li, S., & Koshenov, Y. (2025). Exploring project team motivation: A systematic and bibliometric analysis. *Problems and Perspectives in Management*, *23*(2), 512–530. DOI: https://doi.org/10.21511/ppm.23(2).2025.37

35. von Garrel, J., & Düben, A. (2022). Self-determination and motivation in project work – An empirical analysis of sovereign work action. *Gruppe. Interaktion. Organisation. Zeitschrift für Angewandte Organisationspsychologie (GIO)*, *53*(1), 49–61. DOI: https://doi.org/10.1007/s11612-022-00621-0

36. World Bank Group. (2026, February 23). Updated Ukraine recovery and reconstruction needs assessment released [Press release]. Available at: https://www.worldbank.org/en/news/press-release/2026/02/23/updated-ukraine-recovery-and-reconstruction-needs-assessment-released

37. Zastavniuk L. (2022) Motivatsiia personalu yak faktor pidvyshchennia konkurentospromozhnosti pidpryiemstva [Personnel motivation as a factor of enterprise competitiveness]. *Ekonomika ta suspilstvo* [Economy and Society], no. 45. DOI: https://doi.org/10.32782/2524-0072/2022-45-54

FOREIGN DIRECT INVESTMENT AS A DRIVER OF ECONOMIC GROWTH: TRENDS, CHALLENGES, AND STRATEGIC PROSPECTS FOR UKRAINE

Maryana Kohut[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-7

Abstract. *The purpose* of the study is to assess the impact of foreign direct investment (FDI) on Ukraine's economic growth under conditions of macroeconomic instability and wartime challenges. *The research methodology* is based on correlation and regression analysis as well as econometric modeling using long-term statistical data for the period 1992-2023 obtained from international databases. This approach makes it possible to identify stable relationships between FDI, trade openness, and economic growth indicators. *The empirical results* confirm a statistically significant positive impact of foreign direct investment on the growth rate of GDP per capita in Ukraine, while the effect of external trade is found to be less pronounced. At the same time, it is determined that the realization of positive FDI effects is substantially constrained by military, institutional, and financial risks, which weaken traditional investment transmission channels. *The practical significance* of the findings lies in their applicability for shaping state investment policy, improving mechanisms for attracting foreign direct investment, and defining priority areas for FDI involvement in the context of Ukraine's post-war economic recovery. Value/originality. The originality of the study lies in providing an empirical assessment of the long-term relationship between foreign direct investment, trade openness, and economic growth in Ukraine, while incorporating the specific constraints arising from wartime conditions and macroeconomic instability. Unlike approaches that primarily focus on FDI dynamics, the study combines long-term econometric evidence with the analysis of contemporary investment

[1] Candidate of Economic Sciences,
Associate Professor of the Department of Marketing,
Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies of Lviv, Ukraine
ORCID: https://orcid.org/0000-0001-8275-134X

© Maryana Kohut

risks and identifies the role of FDI as a potential driver of Ukraine's post-war economic recovery.

INTRODUCTION

Foreign direct investment has traditionally been regarded as one of the key drivers of economic growth, facilitating capital inflows, technology transfer, productivity enhancement, and the integration of national economies into global value chains. For Ukraine, the significance of FDI has become particularly pronounced in the context of the full-scale Russian invasion and the anticipated post-war reconstruction, when domestic investment resources remain limited while the need for structural economic modernization continues to intensify. In this context, FDI should be considered not only as a source of financing but also as an important instrument for restoring economic potential and ensuring long-term sustainable development.

At the same time, the current conditions of Ukraine's economic functioning generate a range of scientific and practical challenges related to the instability of investment flows, heightened security and institutional risks, as well as the transformation of the mechanisms through which FDI influences economic growth. Military actions, disruptions in logistics networks, and increasing macroeconomic uncertainty substantially alter the nature of investment activity and may constrain the realization of the traditionally positive effects of FDI. This necessitates a reconsideration of the role of foreign direct investment, taking into account the impact of wartime conditions and the degree of trade openness of the economy.

The methodological framework of the study is based on economic and statistical analysis methods, including correlation and regression analysis, as well as econometric modeling. The empirical foundation of the research is formed using official World Bank statistical data covering the period 1992-2023, which makes it possible to capture long-term trends in Ukraine's economic development and to provide an empirical assessment of the relationship between foreign direct investment and economic growth.

The aim of this study is to evaluate the impact of foreign direct investment on Ukraine's economic growth, with particular consideration of the economy's trade openness.

1. Literature Review

The impact of foreign direct investment (FDI) on economic growth has been extensively examined by both Ukrainian and international scholars, particularly in the context of heightened geopolitical risks and wartime challenges in recent years. Ukrainian researchers primarily focus on the dynamics and structural characteristics of FDI, as well as its role in ensuring macroeconomic stability and supporting economic recovery. In particular, Stavitskyi, Naumova, and Shevchuk [1] emphasize the significance of FDI for Ukraine's long-term economic growth and its role in the post-war modernization of the national economy. Similarly, Lishchynskyi and Lyzun [3] provide evidence of the positive contribution of FDI to Ukraine's GDP even under wartime conditions, confirming its role as an important external source of economic support. Comparable conclusions are presented in the studies of Khomenko, Volynets, and Shamkalo [2], which examine the institutional and structural determinants of investment attraction.

In international academic literature, FDI is widely regarded as one of the key drivers of economic growth through mechanisms such as technology transfer, productivity enhancement, and the integration of countries into global value chains. The works of John Dunning established the theoretical foundations for analyzing the motives and consequences of international investment, which continue to be actively applied in contemporary empirical research. More recent studies by international scholars, as well as analytical reports by the World Bank and UNCTAD [7], highlight that under conditions of global instability, the effectiveness of FDI depends substantially on the institutional capacity of the host country and the degree of economic openness.

At the same time, the analysis of existing academic research reveals a notable research gap regarding a comprehensive quantitative assessment of the impact of FDI on Ukraine's economic growth based on long-term time series data, with explicit consideration of the role of external trade. This justifies the relevance of the present econometric analysis, which seeks to deepen understanding of the actual contribution of foreign direct investment to Ukraine's economic dynamics under conditions of heightened uncertainty.

2. Theoretical Foundations and Mechanisms of Foreign Direct Investment Impact on Economic Growth

Foreign direct investment (FDI) is widely regarded in the academic literature as one of the key determinants of economic growth; however, the nature and magnitude of its impact depend on the theoretical perspective, the institutional environment, and the level of national economic development [2]. A synthesis of the main theoretical approaches makes it possible to systematically assess the mechanisms through which FDI affects economic growth and to explain the differences in empirical findings observed across countries and time periods.

Table 1 summarizes the key theoretical approaches to interpreting the impact of foreign direct investment on economic growth.

Thus, contemporary theoretical perspectives emphasize the multidimensional nature of FDI's influence on economic growth, which extends far beyond the simple provision of financial capital. Foreign direct investment is increasingly viewed as a complex mechanism through which host economies may gain access to advanced technologies, managerial expertise, innovation capabilities, and international production networks. However, the realization of these benefits is not automatic and depends significantly on the absorptive capacity of the host economy, including the quality of institutions, the level of human capital, the degree of economic openness, and the overall macroeconomic environment.

This issue is particularly important for transition economies, where institutional fragility, regulatory instability, and structural imbalances may significantly constrain the effectiveness of foreign investment. In such contexts, FDI may either serve as a catalyst for modernization and sustainable economic transformation or remain limited to short-term financial inflows without generating substantial long-term productivity gains. Therefore, the actual contribution of foreign direct investment to economic growth depends not only on the scale of capital inflows but also on the conditions under which these investments are attracted and utilized.

The positive effects of FDI are transmitted through a number of interconnected economic channels, which together determine the magnitude and sustainability of its impact on economic growth (Table 2). These channels include capital accumulation, technology transfer, managerial

knowledge diffusion, and integration into global value chains, each of which contributes differently depending on the structural characteristics of the host economy.

Table 1

Theoretical approaches to the analysis of FDI impact on economic growth

Theoretical approach	Key idea	Role of FDI in economic growth
1	2	3
Neoclassical approach	Capital accumulation is considered the primary driver of economic growth, while technological progress is treated as an exogenous factor.	FDI compensates for the shortage of domestic investment resources, increases capital formation, and accelerates short- to medium-term economic growth.
Endogenous growth theory	Economic growth is driven by internal factors such as innovation, knowledge accumulation, human capital development, and technological progress.	FDI contributes to technological advancement, knowledge transfer, managerial innovation, and long-term sustainable economic growth.
Spillover effect concept	Multinational enterprises generate positive externalities for host economies through technology diffusion, labor mobility, supplier linkages, and knowledge exchange.	FDI enhances the productivity and competitiveness of domestic enterprises through indirect learning and innovation spillovers.
Dunning's Eclectic Paradigm (OLI)	International investment decisions are determined by ownership advantages, location-specific benefits, and internalization incentives.	FDI is attracted when the host country offers favorable institutional, economic, and strategic conditions, thereby supporting economic modernization and integration into international markets.
Internalization theory	Firms prefer direct ownership and internal control over foreign operations rather than relying on licensing or contractual arrangements in order to reduce transaction costs and protect strategic assets.	FDI enables more efficient allocation of resources, technology transfer, and stronger long-term integration of host economies into multinational production networks.

End Table 1

1	2	3
Product life cycle theory	Firms relocate production internationally as products mature, seeking lower production costs and new market opportunities.	FDI facilitates industrial diversification, export expansion, and the integration of developing economies into global manufacturing systems.
Institutional theory	The effectiveness of investment flows depends significantly on the quality of institutions, including legal frameworks, governance quality, investor protection, and regulatory stability.	FDI contributes to economic growth only when supported by a stable and predictable institutional environment capable of ensuring efficient resource allocation.
Dependency theory (critical perspective)	Foreign investment may reinforce structural dependency, external control over key sectors, and unequal economic relationships between developed and developing economies.	FDI may generate short-term capital inflows but can also limit domestic industrial development, increase profit repatriation, and constrain long-term autonomous growth.

Source: developed by the author based on [1; 2; 4; 7]

Table 2

Main channels of FDI impact on economic growth

Channel of impact	Characteristics	Economic effect	Relevance for Ukraine
1	2	3	4
Investment capital	Increase in the volume of investment resources available to the economy	Expansion of production capacity and GDP growth	Particularly important under conditions of limited domestic investment and reconstruction needs
Technology transfer	Transfer of advanced technologies, innovation, and technical know-how	Increased labor productivity and modernization of production	Critical for upgrading industrial and high-tech sectors
Managerial practices	Dissemination of modern management methods, organizational models, and corporate governance standards	Improved enterprise efficiency and operational performance	Supports institutional modernization and business competitiveness

End Table 1

1	2	3	4
Integration into the global economy	Inclusion in global value chains and international production networks	Growth in exports, competitiveness, and market diversification	Enhances integration with European and global markets
Human capital development	Training of employees, professional skill upgrading, knowledge exchange	Improvement in workforce quality and innovation capacity	Important for long-term productivity growth
Competition effects	Increased competitive pressure on domestic firms	Encourages innovation, efficiency, restructuring	Encourages modernization of local enterprises
Infrastructure development	Investment in transport, logistics, energy, and production infrastructure	Improved business environment and reduced transaction costs	Especially relevant for Ukraine's post-war recovery
Institutional spillovers	Diffusion of governance standards, compliance practices, transparency requirements	Strengthening of institutional quality and investor confidence	Important for EU integration and reform implementation

Source: developed by the author based on [2; 3]

The relative importance of these transmission channels varies depending on the structural characteristics of the host economy and the sectoral allocation of foreign investment. For example, investments directed toward manufacturing, infrastructure, and technology-intensive industries are generally associated with stronger long-term development effects, as they promote productivity growth, industrial modernization, and integration into international production networks. By contrast, FDI concentrated in low-value-added or short-term speculative sectors may generate more limited macroeconomic benefits.

In addition, the interaction between these channels often determines the cumulative developmental impact of foreign direct investment. Technology transfer may enhance productivity only when supported by effective managerial adaptation, while participation in global value chains may create broader export opportunities when combined with sufficient

domestic production capacity. Consequently, the contribution of FDI to economic growth should be understood not as the result of a single transmission mechanism, but as the outcome of multiple interconnected economic processes.

The effectiveness of these channels determines whether FDI is transformed into sustainable economic growth or whether its impact remains limited to short-term financial effects.

Despite its potential advantages, the impact of FDI in transition economies is often constrained. The main limiting factors include an insufficient level of institutional development, weak protection of property rights, a high dependence on resource-based industries, and the limited absorptive capacity of domestic enterprises to adopt new technologies. Under such conditions, FDI may fail to generate long-term growth effects and instead remain concentrated on the short-term exploitation of resource potential.

Ukraine is characterized by a combination of significant FDI potential and substantial constraints on its effective utilization. On the one hand, foreign investment plays an important role in financing the economy and supporting external economic relations. On the other hand, structural imbalances, limited integration into high-technology segments of the global economy, and elevated investment risks constrain the full realization of the positive effects of FDI. This situation underscores the need for empirical analysis aimed at assessing the actual contribution of foreign direct investment to Ukraine's economic growth [5].

The synthesis of theoretical approaches demonstrates that the impact of foreign direct investment on economic growth is multidimensional and depends on a combination of economic, institutional, and structural factors. For Ukraine, the key challenge lies in transforming FDI from merely a source of financial inflows into an instrument of long-term economic modernization. This underscores the relevance of further econometric analysis aimed at assessing the actual contribution of foreign direct investment to the country's economic growth.

3. Dynamics and Structural Trends of Foreign Direct Investment in Ukraine

The analysis of foreign direct investment (FDI) dynamics in Ukraine over the period 1992-2023, based on World Bank data, indicates their

uneven and cyclical nature, shaped by both domestic macroeconomic transformations and external shocks. During the initial stage of market reforms, FDI inflows remained relatively limited due to a high level of economic uncertainty, weak institutional frameworks, and the absence of clear regulatory conditions for foreign investors. The gradual improvement in macroeconomic stability during the 2000s contributed to increased investment activity, which was reflected in growing FDI inflows into the financial sector, manufacturing, and services.

From a structural perspective, FDI in Ukraine has traditionally been characterized by concentration in several key sectors of economic activity. The largest volumes of foreign capital were directed toward financial services, trade, manufacturing, and real estate activities. In terms of source countries, European states consistently dominated as the primary investors, largely due to geographical proximity and Ukraine's integration into the European economic space. At the same time, a significant share of FDI consisted of reinvested earnings, indicating a limited inflow of genuinely new foreign capital during certain periods.

Given the macroeconomic and security conditions, it is appropriate to distinguish several key stages in the development of investment processes in Ukraine. The pre-war period was characterized by a gradual increase in FDI inflows amid economic growth and the expansion of external economic relations, although investment activity remained sensitive to global financial crises. The period of heightened geopolitical risks, which began after 2014, was accompanied by a sharp decline in investment flows, a reassessment of foreign investors' market presence strategies in Ukraine, and a growing role of reinvested earnings. The wartime period of 2022-2023 was marked by a substantial decrease in new FDI inflows, driven by elevated security risks, the destruction of production and transport infrastructure, and overall macroeconomic instability.

The influence of macroeconomic and security-related factors on investment activity is reflected in the high volatility of FDI and changes in its structure. Fluctuations in economic growth rates, inflationary pressures, currency depreciation expectations, and the escalation of military threats directly affect foreign investors' decisions regarding market entry or the expansion of their existing presence in Ukraine. Under such conditions, FDI increasingly serves to maintain existing economic relationships rather than acting as a source of large-scale production expansion.

Thus, the dynamics and structure of foreign direct investment in Ukraine have been shaped by a combination of economic and security-related factors, resulting in the instability of investment flows and limiting their long-term positive effects. This underscores the need for a quantitative assessment of the actual contribution of FDI to Ukraine's economic growth.

For this purpose, it is appropriate to conduct an econometric assessment of the relationship between foreign direct investment, trade openness, and GDP per capita growth based on World Bank statistical data [6] for the period 1992-2023. This time horizon makes it possible to capture long-term trends in Ukraine's economic development while accounting for the effects of crises and external shocks, including wartime events.

The study period is limited to 1992-2023 due to the need to rely on complete, comparable, and officially verified statistical data. At the time of the study, the indicators for 2024-2025 in international statistical databases remain preliminary or incomplete and may be subject to subsequent revision, which complicates their reliable use in econometric analysis. Excluding these years ensures sample stability and improves the robustness of the estimated results.

4. Econometric Analysis of the Relationship Between Foreign Direct Investment, Trade Openness, and Economic Growth in Ukraine

To quantitatively assess the impact of foreign direct investment on Ukraine's economic growth, an econometric model was developed to examine the dependence of the annual GDP per capita growth rate on net inflows of foreign direct investment and the volume of external trade. Net foreign direct investment inflows as a percentage of gross domestic product and external trade volume as a percentage of GDP were used as explanatory variables. At the first stage of the analysis, a correlation analysis was conducted to assess the relationships between the model variables (Table 3).

The obtained results indicate the presence of a statistically significant moderate correlation between foreign direct investment and the GDP per capita growth rate ($r = 0.56$; $p = 0.001$). Similarly, a statistically significant correlation was identified between external trade volume and the GDP per capita growth rate ($r = 0.48$; $p = 0.005$). At the same time, the correlation between foreign direct investment and external trade volume was weak and statistically insignificant ($p = 0.16$), indicating the absence of multicollinearity concerns in the subsequent regression analysis.

Table 3

Correlation Analysis

Sample: 1992 2023			
Included observations: 32			
Balanced sample (listwise missing value deletion)			
Correlation Probability	FDI	Trade Volume	GDP per Capita Growth Rate
FDI	1.000000 -----		
Trade Volume	0.256080 0.1572	1.000000 -----	
GDP per Capita Growth Rate	0.555904 0.0010	0.484581 0.0049	1.000000 -----

Source: calculated by the author

At the second stage of the study, the parameters of a multiple linear regression model were estimated using the ordinary least squares (OLS) method (Table 4).

Table 4

Regression equation estimation results

Dependent Variable: GDP per Capita Growth Rate				
Method: Ordinary Least Squares				
Sample (adjusted): 1992 2023				
Included observations: 32 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	1.919157	0.600007	3.198558	0.0033
Trade Volume	0.219354	0.086531	2.534962	0.0169
C	-25.74895	7.807006	-3.298185	0.0026
R-squared	0.434366	Mean dependent var		-0.372298
Adjusted R-squared	0.395357	S.D. dependent var		8.913485
S.E. of regression	6.931020	Akaike info criterion		6.798951
Sum squared resid	1393.132	Schwarz criterion		6.936364
Log likelihood	-105.7832	Hannan-Quinn criter.		6.844499
F-statistic	11.13495	Durbin-Watson statistic		1.518351
Prob(F-statistic)	0.000258			

Source: calculated by the author

The modeling results confirm the statistical significance of all explanatory variables at the 5% significance level. In particular, a 1 percentage point increase in the ratio of net foreign direct investment inflows to GDP is associated with an average 1.9 percentage point increase in the GDP per capita growth rate. At the same time, a 1 percentage point increase in external trade volume as a share of GDP contributes to an average 0.2 percentage point increase in the GDP per capita growth rate.

The obtained estimates indicate that Ukraine's economic growth is more sensitive to investment flows than to indicators of trade openness, confirming the key role of foreign direct investment as a driver of the structural modernization of the national economy. The coefficient of determination ($R^2 = 0.43$) indicates that the factors included in the model explain approximately 43% of the variation in GDP per capita growth rates, which can be considered an acceptable result for macroeconomic studies based on long-term time series data.

To verify the correctness of the model specification, the Breusch–Godfrey test was conducted to detect the presence of residual autocorrelation (Table 5).

Table 5

Residual Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.105401	Prob. F(1,28)	0.3021
Obs*R-squared	1.215335	Prob. Chi-Square(1)	0.2703

Source: calculated by the author

The obtained results did not reveal statistically significant autocorrelation ($p > 0.05$), indicating that the key assumptions of the classical linear regression model are satisfied. Accordingly, the estimated coefficients can be interpreted as best linear unbiased estimators (BLUE).

The empirical findings are generally consistent with contemporary theoretical expectations regarding the positive role of foreign direct investment in economic growth. The statistically significant coefficient of FDI confirms that foreign capital remains an important source of economic expansion in Ukraine, particularly through investment financing, technology transfer, and productivity enhancement.

At the same time, the relatively moderate explanatory power of the model suggests that economic growth is influenced by a broader set of factors beyond foreign investment and trade openness. This is especially relevant in the Ukrainian context, where wartime disruptions, institutional instability, and macroeconomic uncertainty significantly affect economic performance.

The comparatively weaker effect of trade openness may reflect the structural characteristics of Ukraine's economy, where external trade has historically been concentrated in commodity-based sectors with relatively limited value-added generation.

The results of the econometric analysis therefore indicate a stable positive impact of foreign direct investment on Ukraine's economic growth in the long term. At the same time, the empirical estimates suggest that this effect remains limited in the absence of a favorable macroeconomic and institutional environment.

5. Challenges to Attracting Foreign Direct Investment Under Wartime Conditions

Among the major constraints limiting the attraction of foreign direct investment in Ukraine, wartime-related risks remain the most critical. These include active military operations, threats to the security of production facilities, infrastructure destruction, and a high probability of physical asset losses [4]. Under such conditions, foreign investors are compelled to reassess their investment horizons, postpone the launch of new projects, or confine their activities to maintaining existing investments, which substantially limits the implementation of long-term investment projects that typically generate the most significant multiplier effects for economic growth.

No less significant are institutional risks, which include regulatory instability, challenges related to the protection of property rights, the limited effectiveness of the judicial system, and the difficulty of predicting state economic policy under martial law. Such factors undermine foreign investors' confidence and weaken the mechanisms of technology transfer and managerial practice diffusion, which, according to theoretical approaches, represent key channels through which FDI influences economic growth. As a result, foreign investment may fail to generate the expected

improvements in productivity and the structural modernization of the economy.

A separate category consists of financial risks associated with macroeconomic instability, exchange rate fluctuations, inflationary pressures, and limited access to financial resources. A high level of financial uncertainty increases the cost of capital and reduces Ukraine's investment attractiveness, directly affecting both the scale and structure of FDI. Under such conditions, foreign investment is often directed toward lower-risk or short-term sectors, which limits its contribution to sustainable economic growth.

The combination of the above-mentioned risks helps explain the results of the econometric analysis, according to which the positive impact of foreign direct investment on economic growth is statistically significant but not the dominant driver of Ukraine's economic dynamics. The relatively weaker effect of external trade and the moderate coefficient of determination of the model suggest that the effectiveness of FDI is substantially constrained by institutional and security-related limitations characteristic of an economy operating under wartime conditions.

Thus, wartime, institutional, and financial challenges create an environment in which the potential of foreign direct investment can only be partially realized. This necessitates a shift from the quantitative assessment of FDI's impact toward the development of practical approaches aimed at stimulating investment activity and minimizing associated risks, thereby shaping the logic for further consideration of the prospects for attracting foreign direct investment in the process of Ukraine's post-war reconstruction.

6. Strategic Prospects for Attracting Foreign Direct Investment in Ukraine's Post-War Recovery

The intensification of FDI inflows into Ukraine in the medium and long term is closely linked to the implementation of structural reforms, infrastructure restoration, and the creation of a favorable institutional environment. Given the scale of destruction and the substantial reconstruction needs, foreign direct investment should be regarded not only as a source of financial resources but also as an instrument for technological modernization and enhancing the competitiveness of the national economy.

In the process of post-war reconstruction, priority for attracting foreign direct investment should be given to sectors capable of generating the strongest multiplier effects on economic growth. These include renewable and conventional energy, transport and logistics infrastructure, manufacturing, the agro-industrial sector with a focus on deep processing, as well as information technologies and digital services. Investment in these sectors will contribute not only to the restoration of productive capacities but also to the structural transformation of Ukraine's economy toward increasing the share of high value-added production.

The role of multinational corporations (MNCs) deserves particular attention in the context of attracting foreign direct investment to Ukraine's post-war recovery. As major global investors, multinational enterprises possess not only substantial financial resources but also advanced technologies, managerial expertise, established international supply chains, and access to foreign markets. Their participation in Ukraine's reconstruction could significantly accelerate industrial modernization, export expansion, and the integration of the national economy into global production networks [8].

For Ukraine, attracting strategic multinational investors is especially important in sectors such as manufacturing, energy, logistics, agro-processing, digital technologies, and infrastructure development. The presence of multinational corporations may generate substantial spillover effects for domestic enterprises through supplier linkages, knowledge diffusion, workforce training, and the introduction of international corporate governance standards. In addition, cooperation with multinational enterprises can enhance investor confidence by signaling the credibility and long-term investment potential of the Ukrainian market.

However, effective engagement with multinational corporations requires a stable regulatory framework, transparent investment procedures, reliable protection of investor rights, and targeted state investment promotion policies. Under post-war reconstruction conditions, the attraction of anchor multinational investors could serve as a catalyst for broader foreign investment inflows and deeper structural transformation of the Ukrainian economy.

An important role in stimulating FDI inflows is played by international financial institutions, including the World Bank, the European Bank for

Reconstruction and Development (EBRD), and the International Monetary Fund (IMF). Their participation in financing reconstruction projects, providing loans and grants, and implementing technical assistance programs reduces the overall level of risk for private investors and strengthens confidence in the Ukrainian market. Moreover, cooperation with these institutions facilitates the adoption of international governance and transparency standards, which constitutes an important factor in investment decision-making.

A key prerequisite for intensifying FDI under heightened risk conditions is the introduction of effective mechanisms for state guarantees and investment insurance. Government support in the form of capital protection guarantees, insurance against wartime and political risks, as well as participation in risk-sharing mechanisms between the state and investors, can reduce the cost of capital and stimulate the implementation of long-term investment projects. Such instruments are particularly important for attracting investors to capital-intensive sectors, where payback periods are typically extended.

An additional strategic direction for strengthening Ukraine's investment attractiveness involves the development of specialized investment infrastructure, including industrial parks, special economic zones, innovation clusters, and public-private partnership mechanisms. Such instruments have proven effective in many transition and emerging economies by reducing administrative barriers, improving access to infrastructure, and creating favorable operating conditions for foreign investors. In the Ukrainian context, these mechanisms could play an important role in accelerating regional economic recovery, particularly in relatively secure territories with high industrial or logistical potential.

Industrial parks, in particular, may serve as effective platforms for attracting export-oriented manufacturing investment, facilitating technology transfer, and supporting the localization of international production chains. Their development could contribute to the diversification of Ukraine's economic structure and reduce dependence on commodity-based sectors, thereby strengthening long-term economic resilience [7].

Equally important is the acceleration of digital transformation and administrative modernization aimed at improving the business environment. The simplification of investment procedures, digitalization

of licensing and regulatory services, reduction of bureaucratic barriers, and increased transparency in public administration may substantially enhance investor confidence. For foreign investors, predictability and efficiency of administrative processes are often as important as direct financial incentives [6].

Public-private partnerships (PPPs) also represent a promising instrument for mobilizing foreign investment in large-scale infrastructure and reconstruction projects. Given the scale of Ukraine's post-war rebuilding needs, PPP mechanisms may facilitate risk-sharing between the public and private sectors while enabling the implementation of capital-intensive projects in transport, energy, logistics, and urban infrastructure [4].

In addition, greater engagement with international investment guarantee mechanisms, including political risk insurance programs, could significantly improve Ukraine's investment climate. Instruments designed to mitigate wartime and political risks may lower the perceived uncertainty faced by international investors and support the implementation of long-term strategic investment projects.

The prospects for increasing FDI inflows into Ukraine are closely linked to European integration processes and the harmonization of national legislation with European Union standards. Deeper integration into the single European market, the implementation of EU regulatory standards, stronger investor protection, and improvements in the quality of the institutional environment create favorable conditions for enhancing Ukraine's investment attractiveness. In this context, foreign direct investment serves not only as a financial resource but also as a mechanism for accelerating Ukraine's economic convergence with EU member states.

Therefore, the prospects for intensifying foreign direct investment in Ukraine are determined by a combination of sectoral priorities, support from international financial institutions, effective risk management mechanisms, and progress in European integration reforms. The implementation of these directions creates the conditions for transforming FDI into a key driver of long-term economic growth and sustainable development in Ukraine.

CONCLUSIONS

This study provides a comprehensive analysis of the impact of foreign direct investment on Ukraine's economic growth through the integration

of theoretical approaches, an examination of investment dynamics, and econometric modeling based on long-term statistical data covering the period 1992–2023. The results of the correlation and regression analyses confirmed the existence of a statistically significant positive relationship between foreign direct investment inflows and GDP per capita growth rates, highlighting the important role of foreign capital in shaping Ukraine's economic dynamics. At the same time, the impact of external trade on economic growth was found to be less pronounced, indicating the limited potential of extensive economic development in the absence of accompanying investment and institutional transformations.

The findings allow foreign direct investment to be regarded as one of the key drivers of Ukraine's long-term economic growth, capable not only of providing financial resources to the economy but also of creating conditions for technological modernization and productivity enhancement. At the same time, the empirical estimates demonstrate that the positive effects of FDI do not materialize automatically; rather, they depend on the quality of the macroeconomic and institutional environment, as well as the degree of the country's economic openness.

Particular attention in this study has been devoted to the constraints associated with the functioning of the economy under wartime conditions. Wartime, institutional, and financial risks significantly restrain investment activity, limit the inflow of new foreign capital, and reduce the effectiveness of the traditional channels through which FDI contributes to economic growth. This suggests that the positive impact of FDI identified in the analysis reflects its potential contribution to economic development, the realization of which requires effective risk mitigation and the creation of a stable investment environment in the course of Ukraine's post-war reconstruction.

Future research should focus on expanding the econometric analysis by accounting for structural breaks associated with wartime events, broadening the set of explanatory variables to include institutional and financial indicators, and conducting comparative analyses of the experiences of other countries that have undergone post-conflict recovery. This would contribute to a more comprehensive understanding of the conditions under which foreign direct investment can be transformed into a sustainable driver of Ukraine's economic growth.

References:

1. Stavytskyi A., Naumova O., Shevchuk A. (2025) Priami inozemni investytsii ta ekonomichne zrostannia v Ukraini: empirychnyi analiz [Foreign direct investment and economic growth in Ukraine: empirical analysis]. *Ekonomika ta suspilstvo – Economy and Society*, no. 75. DOI: https://doi.org/10.32782/2524-0072/2025-75-59

2. Khomenko I., Volynets L., Shamkalo A. (2021) Osoblyvosti nadkhodzhennia priamykh inozemnykh investytsii ta yikhnii vplyv na ekonomiku Ukrainy [Features of foreign direct investment inflows and their impact on the economy of Ukraine]. *Problemy i perspektyvy ekonomiky ta upravlinnia – Problems and Prospects of Economics and Management*, vol. 1(25), pp. 15–26.

3. Fraier E., Lishchynskyi I., Lyzun M. (2024) Vplyv mizhnarodnoi dopomohy ta priamykh inozemnykh investytsii na ekonomichne zrostannia v Ukraini [The impact of international aid and foreign direct investment on economic growth in Ukraine]. *Zhurnal yevropeiskoi ekonomiky – Journal of European Economy*, vol. 23, no. 3, pp. 397–412. Available at: https://jeej.wunu.edu.ua/index.php/ukjee/article/view/1793

4. Nasrulddin V. (2024) Prospects of Post-Conflict Foreign Direct Investments in Ukraine Through the Lens of Dunning's Eclectic Paradigm. *International Journal of Economics and Finance*, vol. 16, no. 6, p. 43. DOI: https://doi.org/10.5539/ijef.v16n6p43

5. Puzikova V. (2023) Foreign Direct Investment in Ukraine: Situation and Prospects. Econstor Working Paper, DP-706. Available at: https://www.econstor.eu/bitstream/10419/283157/1/dp-706.pdf

6. World Bank. World Bank Open Data. Available at: https://data.worldbank.org

7. UNCTAD (2023) World Investment Report 2023: Investing in Sustainable Energy for All. United Nations Conference on Trade and Development. Available at: https://unctad.org/publication/world-investment-report-2023

8. Kohut M. (2024) Vplyv transnatsionalnykh korporatsii na hlobalizatsiiu rynkiv: mozhlyvosti ta vyklyky dlia mistsevoho rozvytku [The impact of transnational corporations on market globalization: opportunities and challenges for local development]. *Ukrainskyi ekonomichnyi chasopys – Ukrainian Economic Journal*, no. 4, pp. 20–24. DOI: https://doi.org/10.32782/2786-8273/2024-4-4

RATIONAL USE AND PROTECTION OF LAND AS COMPONENTS OF STATE ENVIRONMENTAL POLICY

Iryna Kupriianchyk[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-8

Abstract. The article substantiates the theoretical, methodological and institutional foundations for considering rational land use and land protection as interrelated components of state environmental policy. It is argued that the contemporary understanding of land resources should go beyond their productive function and be based on the concepts of natural capital, ecosystem services, soil health, sustainable land management and land degradation neutrality. The current Ukrainian legal and strategic framework is analysed together with the latest European approaches to soil protection, including the EU Soil Strategy for 2030, Regulation (EU) 2024/1991 on nature restoration and Directive (EU) 2025/2360 on soil monitoring and resilience. Special attention is paid to land degradation caused by the war, explosive ordnance contamination, physical and chemical disturbance of soils and the need to combine humanitarian demining with post-clearance environmental assessment. An integrated model of environmental land policy based on the sequence "diagnosis – prevention – regulation – restoration – monitoring – adaptive management" is proposed. Priority areas for Ukraine include establishing a comprehensive soil-health monitoring system, integrating ecosystem services into spatial planning, identifying degraded and environmentally sensitive land, developing result-oriented economic incentives, restoring natural landscape elements and harmonising national soil policy with the EU acquis. It is concluded that rational land use and land protection should be regarded as a unified mechanism for managing land-based natural capital and ensuring environmentally safe, climate-resilient and economically sustainable development.

[1] Doctor of Economics,
Professor of the Land Management Department,
National University of Life and Environmental Sciences of Ukraine, Ukraine

© Iryna Kupriianchyk

INTRODUCTION

Land resources constitute a fundamental component of a country's natural capital, provide the spatial basis for socio-economic development, and simultaneously perform a broad range of ecological functions. The soil cover supports food production, water regulation, carbon sequestration, nutrient cycling, biodiversity maintenance, and landscape resilience to climatic and technogenic pressures. Accordingly, the effectiveness of land policy cannot be assessed solely through productivity or short-term economic returns from land use; it must also be evaluated in terms of its capacity to conserve natural capital and sustain ecosystem services.

The contemporary scientific paradigm reinforces this requirement by defining soil health as the capacity of soil to function as a living ecosystem that sustains plants, animals, and humans and provides a wide range of ecosystem services. Consequently, land-condition assessment should encompass not only agrochemical characteristics but also the physical, biological, hydrological, and functional parameters of soil systems [15; 16].

For Ukraine, this issue is particularly acute because of the long-term intensive agricultural development of its territory, the high share of arable land, erosion, humus losses, disruption of the natural structure of agricultural landscapes, land contamination, and the limited effectiveness of mechanisms for conserving degraded and low-productivity land. The Biodiversity Conservation Strategy of Ukraine until 2035 indicates that even before the onset of the full-scale war, degraded and low-productivity soils covered more than 6.5 million ha, while approximately 10.6 million ha of arable land, or about 32% of the total arable area, was affected by water erosion [9].

The full-scale war has created an additional set of risks, including mine and other explosive contamination, mechanical destruction of soil profiles, crater formation, compaction by heavy machinery, contamination with heavy metals and combustion products, and damage to drainage and irrigation systems, shelterbelts, and natural ecosystems. Research demonstrates that warfare causes interrelated physical, chemical, and biological changes in soils, the effects of which may persist over long periods [19]. According to RDNA5, as of 31 December 2025, recovery needs in Ukraine's agricultural sector exceeded USD 55 billion, while needs related to explosive-hazard management and debris clearance approached USD 28 billion [23].

Under these conditions, rational land use and land protection can no longer be treated as separate domains of land regulation. They should be understood as interdependent components of state environmental policy that jointly support food and environmental security, climate adaptation, territorial resilience, and environmentally sound post-war recovery.

The theoretical foundations of contemporary sustainable land-resource management have developed at the intersection of the concepts of natural capital, ecosystem services, sustainable land use, soil health, and Land Degradation Neutrality. Bünemann et al. argue for moving beyond a narrow understanding of fertility toward a multi-criteria assessment of soil quality that accounts for specific threats, soil functions, and ecosystem services [15]. Lehmann et al. conceptualise soil health as an integrative category linking soil science, agricultural production, climate policy, water management, and societal well-being [16].

Land Degradation Neutrality (LDN) is of particular methodological importance. Cowie et al. define it as a framework for maintaining or increasing land-based natural capital built around the response hierarchy Avoid – Reduce – Reverse: prevent degradation, reduce its impacts, and restore land that has already been degraded [14]. The ecosystem dimension of this logic is developed by Keesstra et al., who demonstrate that nature-based solutions can simultaneously improve soil condition, regulate surface runoff, reduce erosion, and lower drought and flood risks [17].

Ukrainian research increasingly focuses on integrating land protection with spatial planning, land management, and territorial recovery. Bavrovska substantiates the need to mainstream environmental considerations into land policy through land management, remote sensing, and information-analytical systems [20]. Saik et al. combine LDN with land-use planning, the ecosystem approach, and natural-capital conservation, stressing the need to reduce anthropogenic pressure on environmentally vulnerable land [18]. Datsenko et al. emphasise the adaptation of sustainable land-use systems to wartime and post-war recovery conditions and the strengthening of the institutional framework for land policy [21], whereas Bielska et al. examine the relationship between changes in agricultural land use and territorial-planning documents in Poland and Ukraine [22].

Despite these advances, an integrated functional model remains insufficiently developed in which rational land use and land protection are

treated not as parallel regulatory domains but as interdependent elements of a single environmental-governance cycle. This conceptual gap determines the logic of the present study.

The purpose of the study is to provide a theoretical and methodological justification for rational land use and land protection as interrelated components of state environmental policy and to identify priorities for transforming Ukraine's land-resource management system on the basis of the ecosystem approach, the principle of Land Degradation Neutrality, soil-health monitoring, and European environmental-governance standards.

To achieve this purpose, the study synthesises contemporary theoretical approaches to rational land use; analyses Ukraine's regulatory and strategic framework; systematises war-related land risks; characterises current European soil-protection policy directions; develops an integrated model linking land and environmental policy; and proposes a system of policy instruments and performance indicators.

The study draws on Ukrainian legislation and strategic documents, European Union regulatory instruments, materials produced by FAO, UNCCD, the World Bank, and the European Commission, and recent academic publications addressing sustainable land-resource management, land degradation, soil health, ecosystem services, and post-war recovery.

The methodological framework combines: a systems approach to conceptualise land use as part of a socio-ecological system; analysis and synthesis to generalise regulatory and scientific provisions; comparative analysis to contrast Ukrainian and European approaches to soil protection; institutional analysis to identify the functions of legal, economic, spatial, and information mechanisms; and a structural-functional method to develop an integrated model of state environmental policy in the land-resources domain.

1. Rational Land Use within Contemporary Environmental Policy

In contemporary interpretation, land is not merely an object of ownership and economic use but a multifunctional natural asset. Rationality in land use should therefore be assessed by relating economic and social outcomes to changes in the stock of land-based natural capital. Land use cannot be considered rational when short-term productivity gains are accompanied by long-term losses of soil organic matter, increased erosion and compaction,

contamination, biodiversity decline, deterioration of landscape water-regulation functions, or rising future restoration costs.

The Land Code of Ukraine provides the legal basis for this approach by identifying rational land use and land protection among the principles of land legislation [1]. However, the contemporary substance of the concept should extend beyond formal compliance with designated land-use categories. It should include the environmental acceptability of land-use intensity, preservation of soil functions, compatibility with landscape structure, the social interests of communities, and long-term economic efficiency.

Accordingly, rational land use is proposed to be understood as an environmentally, economically, and socially justified land-use regime under which current use does not diminish the land resource's long-term capacity to perform productive, ecological, climate-regulating, and social functions. This definition shifts the emphasis from maximising a single production outcome toward maintaining the multifunctionality of the land system.

In practical terms, this entails five interrelated transitions:

– from maximising productivity to optimising the aggregate provision of ecosystem services;

– from management at the individual-parcel level to landscape and territorial levels;

– from responding to degradation after it occurs to preventing degradation;

– from assessing primarily fertility to comprehensively assessing soil health;

– from reliance on administrative restrictions to an integrated mix of regulatory, economic, information-analytical, and spatial-planning instruments.

Within such a system, land protection ceases to be an external constraint on economic activity and becomes a condition for preserving productive capacity, reducing environmental risk, and maintaining long-term economic returns.

The Law of Ukraine «On Land Protection» defines land protection as a system of legal, organisational, economic, technological, and other measures aimed, inter alia, at rational land use, preventing unjustified conversion of agricultural land, protecting land from harmful anthropogenic impacts, and restoring and improving soil fertility [2]. The Law of Ukraine «On State

Control over Land Use and Protection» directly links state control with the rational use and reproduction of natural resources and environmental protection [3].

Rational land use and land protection are therefore connected through a two-way functional relationship. Land protection establishes environmental limits and conditions for economic activity, whereas rational land use provides the practical means through which those conditions are implemented. The State Environmental Policy Strategy of Ukraine until 2030 reinforces this logic by orienting public policy toward an ecosystem approach, balanced use of natural resources, conservation and restoration of natural ecosystems, and the use of monitoring systems, strategic environmental assessment, environmental impact assessment, and environmental audit [4].

Functionally, environmental policy in the land-resources domain can be structured into three interrelated blocks: preventive measures aimed at avoiding degradation, contamination, and excessive anthropogenic pressure; regulatory measures defining environmentally acceptable land-use regimes; and restorative measures involving reclamation, conservation, renaturalisation, and the recovery of ecosystem functions in degraded areas. This sequence reflects a damage-prevention logic and reduces reliance on costly restoration after degradation has occurred.

A key distinction of the contemporary approach is the transition from controlling isolated negative processes to systematically managing the functional condition of soils. FAO emphasises that soil is effectively non-renewable on a human timescale while simultaneously supporting food production, water regulation, biodiversity, and climate regulation [13]. Land-protection policy should therefore rely on an integrated set of physical, chemical, biological, and functional indicators (Table 1)**.**

In Ukraine, an important step in this direction was the adoption of Cabinet of Ministers Resolution No. 848 of 23 July 2024 approving a new procedure for land and soil monitoring [6]. The transition to a new monitoring model should focus not on the mechanical accumulation of parcel-level information but on developing a spatially coherent data system describing soil condition, dynamics, and functional capacity. Such an information base is essential for linking regulatory decisions to measurable environmental outcomes.

Table 1

Groups of Indicators for Assessing Soil Health and Their key characteristics

Group	Key characteristics
Physical condition	structure, bulk density, water infiltration, erosion, compaction
Chemical condition	organic carbon, pH, nutrients, salinity, contamination
Biological condition	biological activity, soil biodiversity
Functional condition	productivity, water regulation, carbon sequestration, capacity to provide ecosystem services

The land degradation neutrality concept (LDN) provides a methodological bridge between land protection, spatial planning, and restoration. Its core logic is that policy should first prevent new losses of natural capital, then reduce degradation pressures, and only thereafter compensate for residual losses through restoration [14]. The Avoid – Reduce – Reverse hierarchy therefore changes the economic logic of public intervention by shifting priority from financing damage remediation toward investing in degradation prevention.

For Ukraine, implementation of LDN should be directly linked to land management and spatial planning. Territories should be differentiated not only by land category and designated use but also by ecological resilience, degree of degradation, ecosystem-service value, risk of soil-function loss, and environmentally acceptable intensity of economic use. Research supports combining LDN with the ecosystem approach and land-use planning [18], while comparative evidence from Poland and Ukraine demonstrates the importance of aligning agricultural land-use change with territorial-planning documents [22].

In this context, land management should perform not only the function of organising rights and boundaries but also a territorial ecological-design function: identifying zones of restricted use, optimising agricultural-landscape structure, conserving natural and semi-natural elements, developing ecological networks, and spatially targeting restoration measures.

The Concept of the National Target Program for Land Use and Protection, approved in 2022, provides a systemic framework for transforming land policy [5]. Between 2024 and 2026, this framework was strengthened by several interrelated strategic decisions. The Law of

Ukraine «On the Basic Principles of State Climate Policy» formalised the linkage among climate, land, and environmental policy and envisaged, inter alia, nature-based solutions, conservation of degraded land, and incentives for environmentally oriented practices [7]. The strategy for reforming state environmental supervision creates conditions for a transition toward risk-based environmental control [8].

The Biodiversity Conservation Strategy of Ukraine until 2035 translates a number of land-policy objectives into measurable targets. These include increasing natural elements in agricultural landscapes to at least 5% of agricultural land by 2030, creating or restoring at least 15,000 km of shelterbelts and protective strips by 2027, increasing by 20% the share of agricultural land under sustainable land-use systems by 2030, and removing part of degraded, low-productivity, technogenically contaminated arable land and illegally cultivated steep slopes from intensive cultivation [9]. The concept of rational land use is thus progressively shifting from a declarative legal norm toward a framework of measurable environmental outcomes.

The European vector reinforces this transition. The EU Soil Strategy for 2030 recognises healthy soils as a foundation of food security, biodiversity, climate resilience, and societal well-being [10]. Directive (EU) 2025/2360 on soil monitoring and resilience establishes a common framework for monitoring and assessing soil health, managing contaminated sites, preventing degradation, and limiting land take and soil sealing; its long-term objective is to achieve healthy and resilient soils by 2050 [11]. Regulation (EU) 2024/1991 on nature restoration further links land policy with the restoration of agroecosystems, organic soils, biodiversity, and climate policy [12].

For Ukraine, approximation to these approaches requires harmonisation not only of formal legal requirements but also of monitoring methodologies, indicator sets, spatial monitoring units, and decision-making procedures. Policy effectiveness should be judged by verified improvements in land condition rather than merely by the completion of individual measures.

2. War as a Driver of Land and Environmental Policy Transformation

The full-scale war fundamentally changes the meaning of rational land use. A parcel may be legally designated for agriculture yet remain unsafe

because of mine contamination or environmentally unsuitable because of soil-profile destruction, compaction, chemical contamination, or disturbed water regimes. Legal availability therefore does not automatically imply ecological or functional suitability.

War-related impacts require multi-level diagnosis. Earth observation and satellite data can rapidly identify changes in land cover, craters, fires, damage to irrigation and drainage systems, and vegetation disturbance, whereas field and laboratory investigations are required to determine soil physical and chemical properties, contamination levels, and risks associated with future use. The integration of remote and ground-based information should therefore underpin the mapping of dangerous, contaminated, and degraded areas [19].

The return of war-affected land to economic use should follow a sequential pathway: safety assessment – humanitarian demining – post-demining environmental assessment – evaluation of soil condition and functional suitability – selection of a use or restoration scenario - continued monitoring. This sequence distinguishes environmentally oriented recovery from the mere physical return of a parcel to cultivation.

Ukraine's state programme compensating the costs of humanitarian demining of agricultural land illustrates the gradual expansion of areas potentially returned to use. As of July 2026, 16,410 ha of agricultural land had been returned under completed contracts, while operations were ongoing on approximately another 11.7 thousand ha [24]. However, the indicator 'cleared of explosive ordnance' is insufficient for long-term environmental safety; it must be complemented by soil-environmental assessment and determination of an appropriate subsequent land-use scenario.

Post-war land-recovery policy should combine demining, reclamation, remediation of contaminated soils, anti-erosion measures, restoration of vegetation cover and water-regulation functions, and, where appropriate, conservation or renaturalisation. Decisions on whether land should return to intensive agriculture, be used under restrictions, be conserved, or be restored as a natural ecosystem should be based on safety, ecological condition, economic feasibility, and ecosystem-service value.

Based on the analysis, state environmental policy in the land-resources domain should be conceptualised as a closed adaptive cycle (Figure 1).

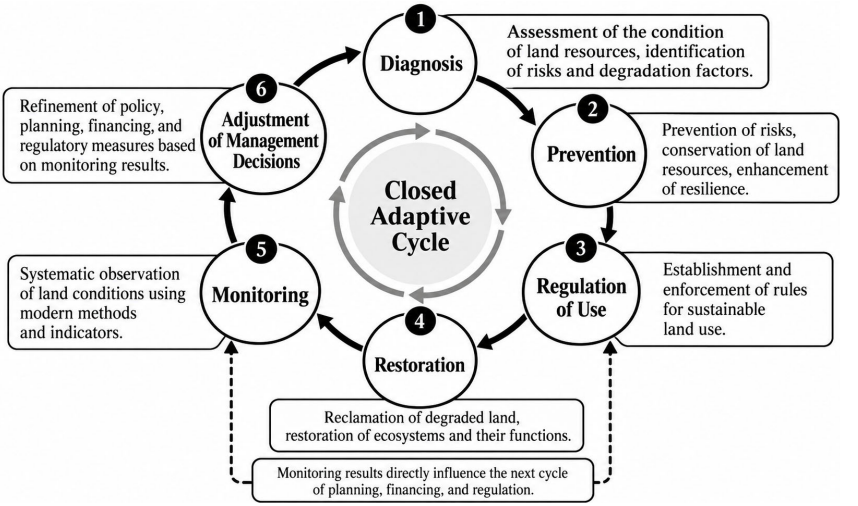


Figure 1. Conceptual Model of the Adaptive Cycle of State

Implementation of the model requires coordinated action across five interrelated governance levels (Table 2).

A defining feature of the proposed model is the shift from controlling how land is used toward managing the outcomes of land use. For example, public support for land users should be linked not only to the implementation of a particular agronomic measure but also to verified trends in soil organic carbon, erosion status, vegetation cover, biodiversity, or other relevant indicators.

Practical implementation requires a combination of four groups of instruments. Regulatory instruments include environmental standards, use regimes for valuable and vulnerable land, restrictions on ploughing slopes, floodplains, and riparian areas, and reclamation and conservation requirements. Economic instruments should create material incentives for preserving natural capital through payments or compensation for ecosystem services, support for conserving degraded land, organic production, agroforestry, soil-conservation farming, and nature-based solutions.

Table 2

Governance Levels of the Integrated Model of Rational Land Use and Land Protection

Level	Core content
Legal and regulatory	environmental standards, restrictions, norms, and liability
Spatial	zoning, land management, agricultural-landscape optimisation, ecological networks
Economic	incentives, compensation, payments for ecosystem services, green finance
Information	land and soil monitoring, Earth observation, GIS, registers of degraded and contaminated land
Ecosystem	restoration of natural functions, nature-based solutions, conservation

Spatial-planning instruments should align economic activity with the ecological carrying capacity of territories through comprehensive spatial development plans, land-management documentation, ecological networks, and regional plans for agricultural-landscape optimisation. The information-analytical component should integrate field surveys, agrochemical assessments, Earth observation, geographic information systems, cadastral data, registers of degraded and contaminated land, and risk-assessment models.

A key weakness of the current governance system is the gap between regulatory requirements and actual environmental outcomes. Policy evaluation should therefore be reoriented toward changes in land-based natural capital. A core indicator set may include:

– the share of degraded land in the total territorial area;

– the area of land showing positive, stable, and negative productivity trends;

– soil organic carbon content and trends;

– the area of eroded land and the intensity of erosion processes;

– the area of conserved, reclaimed, and restored land;

– the share of agricultural land under sustainable land-use systems;

– the share of natural and semi-natural elements within agricultural landscapes;

– the area of land contaminated or damaged by hostilities;

– the area cleared of explosive ordnance and environmentally assessed after demining;

– the area in which key ecosystem functions have been restored.

This indicator system enables a transition from counting completed measures to evaluating changes in the quality and functional capacity of land resources. It therefore provides a basis for results-based financing and adaptive management.

The transition from conventional land protection towards adaptive environmental governance requires not only a revision of regulatory principles but also a fundamentally different information architecture. In the conceptual model proposed in this study, land policy is understood as a closed adaptive cycle comprising diagnosis, prevention, regulation of use, restoration, monitoring, and adjustment of management decisions. The effectiveness of this cycle depends on whether reliable information on the actual condition of land and soils can be systematically collected, spatially integrated, interpreted and transformed into management decisions. Digitalisation should therefore be understood not merely as technical modernisation of land administration, but as an institutional mechanism through which environmental objectives can be translated into measurable land-management outcomes.

This issue is particularly important for Ukraine, where land-resource governance must simultaneously address long-term soil degradation, climate-related risks, biodiversity loss, changes in agricultural land use and the unprecedented environmental consequences of the war. The existing system consequently faces a dual transformation: it must move from fragmented inventories and predominantly administrative records towards continuous spatial monitoring of land and soil functions, while progressively aligning national information systems with European approaches to soil health and environmental monitoring.

Directive (EU) 2025/2360 on soil monitoring and resilience provides an important regulatory benchmark. It establishes a common framework for monitoring and assessing soil health, strengthening soil resilience and managing contaminated sites, with the long-term objective of achieving

healthy soils by 2050 [11]. For Ukraine, approximation to this model implies a gradual transition from recording individual violations or land-use characteristics towards evaluating the environmental condition, dynamics and functional capacity of soils.

In a linear model of environmental regulation, information is primarily used to establish compliance with predefined legal requirements. In an adaptive model, by contrast, information becomes an integral component of each management stage. Diagnosis establishes the initial ecological condition; prevention relies on predictive information about degradation risks; regulation differentiates permissible land-use intensity according to environmental capacity; restoration requires evidence for selecting interventions; monitoring evaluates whether the desired environmental result has been achieved; and the resulting evidence becomes the basis for adjusting the next cycle of planning, financing and regulation.

Accordingly, the information component of land policy should perform four interrelated functions: diagnostic, predictive, evaluative and corrective. The diagnostic function identifies the condition and spatial distribution of degradation processes; the predictive function anticipates where environmental deterioration is likely to occur; the evaluative function determines whether programmes and incentives generate measurable improvements; and the corrective function ensures that monitoring results influence subsequent decisions. Such a model is consistent with the Land Degradation Neutrality hierarchy Avoid – Reduce – Reverse, which gives priority to preventing degradation before reducing impacts and restoring already degraded land [14].

This shift also changes the criteria used to assess policy effectiveness. The amount of financing allocated, number of projects implemented or hectares formally covered by a programme should be complemented by outcome indicators reflecting changes in soil health, erosion intensity, vegetation condition, ecosystem connectivity and other functions of land natural capital [25; 26]. Monitoring is therefore not the final stage of the policy cycle but the informational starting point of the next management iteration.

No single data source can adequately characterise the ecological state of land. Soil systems are spatially heterogeneous, dynamically respond

to management and climate, and perform multiple functions that cannot be represented by one indicator. Adaptive governance should therefore integrate field observations, laboratory measurements, Earth Observation data, cadastral and administrative information, spatial planning data, climatic information and predictive models.

Field soil surveys remain indispensable because soil organic carbon, pH, nutrient status, bulk density, contamination and many biological properties require direct measurements or laboratory analyses. Their value increases when sampling programmes are embedded in a geospatial framework and combined with remote sensing and digital soil mapping [26; 28]. Digital soil mapping provides a methodological bridge between point observations and continuous spatial information. SoilGrids 2.0, for example, integrates soil observations and environmental covariates using machine-learning methods and provides global predictions of major soil properties together with spatially explicit uncertainty [28].

For Ukraine, digital transformation should involve not only the creation of new datasets but also harmonisation, georeferencing and quality assessment of existing soil, agrochemical, cadastral and environmental information. Data produced by different institutions are difficult to combine when they use incompatible coordinate systems, sampling schemes, classifications or analytical procedures. The resulting information architecture should therefore be interoperable by design and should distinguish data origin, quality, spatial resolution and methodological limitations.

The proposed multi-source structure is summarised in Table 3, which links legal, environmental, spatial, climatic, war-impact and socio-economic information with specific management applications.

As shown in Table 3, such integration allows land to be analysed simultaneously as a legal object, productive resource, component of natural capital and spatially embedded ecosystem. A productive agricultural field may also be highly erosion-prone, ecologically fragmented or strategically important for food security; adaptive governance must therefore balance these dimensions rather than maximise a single indicator.

Table 3

Proposed information architecture for adaptive land-resource governance

Information layer	Principal data	Main analytical function	Management application
Land administration	Parcels, rights, restrictions, designated use	Identification of management units and legal regimes	Regulation, control, responsibility
Soil condition	SOC, pH, nutrients, density, erosion, salinity, contamination, biological indicators	Assessment of soil health and degradation	Conservation, restoration, sustainable-use requirements
Earth Observation	Vegetation, land cover, bare soil, moisture, land-use change, surface disturbance	Continuous observation and anomaly detection	Early warning and targeting of field surveys
Landscape/ ecosystem data	Wetlands, forests, shelterbelts, water bodies, protected areas, connectivity	Assessment of ecosystem functions and landscape resilience	Spatial planning, agro-landscape optimisation
Climate/ hazard data	Precipitation, temperature, drought, flood and fire risks	Assessment of pressures and future risks	Adaptation and preventive regulation
War-impact data	Explosive contamination, craters, disturbed soils, damaged systems, hotspots	Safety and ecological risk assessment	Demining priorities, post-clearance assessment, restoration
Socio-economic data	Production, land value, employment, infrastructure, accessibility	Assessment of socio-economic consequences	Prioritisation of investments and incentives
Policy-performance data	Interventions, expenditures, environmental outcomes	Assessment of policy effectiveness	Adaptive adjustment of financing and regulation

3. Soil-health Monitoring as the Core of Environmental Performance Assessment

A major limitation of traditional land monitoring is its concentration on land-use categories, quantitative accounting and visible degradation processes. The concept of soil health broadens this framework by focusing

on the capacity of soils to function as living systems and provide multiple ecosystem services [16]. A scientifically robust monitoring system should combine physical, chemical and biological groups of indicators rather than rely exclusively on agrochemical fertility parameters [25; 26].

Physical indicators may include bulk density, aggregate stability, infiltration, erosion and compaction; chemical indicators include soil organic carbon, pH, nutrients, salinity and contamination; biological indicators reflect soil biota and biological activity. Soil organic carbon is particularly important because it is linked to fertility, structure, water retention, biological activity and climate regulation [16]. Nevertheless, the policy meaning of any single value depends on soil type, climate, land use and management history.

The transition to soil-health monitoring therefore requires reference conditions, thresholds and trajectories. Indicators become operationally useful only when values can be interpreted relative to acceptable ranges or desired trends. The European Environment Agency has proposed common indicators and risk-based thresholds for soil organic carbon, nutrients, acidification, pollution, biodiversity, erosion, compaction and sealing [25]. This approach is directly relevant to Ukraine's European integration and to the design of a nationally harmonised soil-health monitoring framework.

Field monitoring alone cannot provide the temporal frequency and spatial coverage required for adaptive management at national, regional and community levels. Earth Observation allows repeated analysis of land-cover change, vegetation condition, soil exposure, crop dynamics, moisture patterns, fire effects, flooding and other environmental processes [27]. Its principal value lies not in replacing field investigations but in identifying spatial patterns, detecting change and prioritising targeted inspection and sampling.

The Copernicus Land Monitoring Service provides harmonised information on land cover and land-use change, ground motion, vegetation state, water-cycle variables and other land-surface characteristics [27]. For Ukraine, systematic use of these products can support methodological compatibility with EU monitoring. Time-series analysis is particularly important because trajectories reveal persistent changes that may be invisible in static maps, including loss of shelterbelts, expansion of bare-soil periods, wetland degradation or declining vegetation productivity.

Hyperspectral data and UAV imagery can add higher thematic or spatial detail. Hyperspectral sensors may support estimation of selected soil and crop characteristics but require robust calibration and careful processing because of their high dimensionality [32]. UAVs can document erosion features, local restoration sites, drainage systems, damaged soil surfaces and shelterbelts at very high resolution. Their use should, however, follow common requirements for georeferencing, metadata and quality control.

GIS provides the analytical environment in which these datasets can be integrated. Degradation processes do not follow cadastral boundaries: erosion follows topography and land cover, flooding follows hydrological systems, and ecological connectivity is a landscape-scale property. Therefore, adaptive policy should operate through a multi-scale hierarchy that links cadastral parcels and agricultural fields with landscapes, river basins, communities, regions and the national territory.

Because public institutions cannot conduct equally intensive field monitoring everywhere, observation systems should be risk-based. For agricultural land, relevant variables may include slope, soil erodibility, tillage intensity, duration of bare-soil exposure, drought frequency, irrigation conditions, salinity, organic-carbon decline and proximity to vulnerable water bodies. For war-affected territories, explosive hazards, mechanical disturbance and possible chemical contamination must also be considered [19].

A generalised land-risk index may be expressed as $R_i = f(H_i, E_i, V_i, C_i)$, where H_i denotes hazard intensity, E_i exposure, V_i ecological vulnerability and C_i potential consequences for spatial unit i. The index is not intended to replace specialised sectoral methods; rather, it supports allocation of monitoring resources. High-risk areas require more frequent remote analysis, field inspection and sampling, whereas lower-risk territories may be monitored through baseline observation and change-triggered verification.

Predictive models are particularly valuable in erosion management. Research demonstrates that land-use and climate change can substantially alter soil erosion risk over time [30]. Consequently, modelling can identify areas where current land use may become environmentally unsustainable before severe degradation is visible. Machine-learning methods such as Random Forest and Support Vector Machines further expand possibilities

for classification and prediction, but their performance depends on training data, parameterisation and the specific analytical task [31].

Uncertainty must therefore be an explicit component of environmental governance. SoilGrids 2.0 demonstrates good practice by providing both predicted soil properties and spatially explicit uncertainty [28]. Public decision-support systems should distinguish measured conditions, modelled conditions and areas of insufficient information. Where uncertainty is high and management consequences are substantial, additional field evidence should be collected before restrictive or costly decisions are taken.

War-affected land requires an extended monitoring framework because a single parcel may simultaneously be exposed to explosive hazards, physical soil disturbance, contamination, infrastructure damage and disruption of ecosystem functions [19]. Consequently, the return of land to productive use should follow the sequence: hazard assessment – humanitarian demining – post-clearance environmental assessment – evaluation of soil condition and functional suitability – selection of a land-use or restoration scenario – subsequent monitoring.

Digital technologies can support each stage. Satellite and UAV data, together with official mine-action information and historical evidence of military activity, can assist in spatial prioritisation. Remote sensing cannot certify that an area is free of explosive hazards, but it can reveal craters, disturbed surfaces, infrastructure damage and persistent vegetation anomalies that indicate where detailed surveys are most urgently required.

After clearance, environmental assessment should determine whether physical safety is accompanied by ecological suitability. Research on Ukraine confirms that armed conflict may cause simultaneous physical, chemical and biological changes in soils [19]. A released parcel may therefore still require conservation, remediation, restoration or conversion to a different use. Digital systems should explicitly distinguish safety status, environmental status and functional-use status rather than treating them as equivalent.

A spatial decision-support system for war-affected land should integrate mine-action data, soil contamination, physical disturbance, pre-war land characteristics, agricultural value, ecosystem importance, infrastructure accessibility and socio-economic factors. The scale of national recovery needs documented by RDNA5 makes transparent prioritisation indispensable

[23]. Multi-criteria decision analysis can support this task by combining safety, ecological, agricultural and socio-economic criteria while making weights and assumptions explicit.

Restoration programmes are frequently evaluated through output indicators: hectares treated, trees planted, kilometres of shelterbelts established, funds spent or number of interventions completed. These indicators demonstrate implementation effort but do not necessarily show environmental effectiveness. Adaptive governance requires outcome indicators such as reduced erosion, increased vegetation persistence, improved infiltration, higher soil organic carbon, restored connectivity, reduced contamination or increased biological activity [25; 26].

Remote sensing can provide cost-effective long-term monitoring of vegetation recovery and land-cover stability, while field sampling is required to verify changes in soil properties [26; 27]. Public support can therefore be progressively linked not only to the implementation of measures but also to verified environmental results, provided that baselines and safeguards account for climatic variability and other factors beyond the land user's control.

This outcome-oriented logic is central to the proposed adaptive cycle: interventions are followed by monitoring; monitoring generates evidence; and evidence modifies the subsequent design of regulation, financing and restoration measures.

European integration requires compatibility not only of legislation but also of monitoring concepts, data models and assessment methods. Directive (EU) 2025/2360 provides a reference framework for soil-health monitoring and contaminated-site management [11]. Interoperability must therefore be developed at semantic, methodological, spatial, institutional, technological and policy levels. Common definitions, sampling procedures, coordinate systems, metadata standards and responsibilities for data validation are as important as technical database connections.

Copernicus products can support this process by providing common Earth Observation datasets, but national field observations and locally calibrated models remain indispensable [27]. The optimal architecture is a nested system in which European and global products provide harmonised reference information, national monitoring provides systematic country-wide coverage, regional and community systems provide higher-resolution

planning information, and site-specific surveys support individual restoration or regulatory decisions.

Data governance is equally important. Numerous institutions generate land and soil information, including cadastral authorities, environmental and agricultural bodies, regional administrations, territorial communities, research institutions, laboratories and mine-action operators. A national architecture should follow the principle collect once – use many times, while assigning each dataset clear metadata, quality status, responsible institution and access conditions. Open-data principles can strengthen research and accountability, although sensitive information concerning explosive hazards or critical infrastructure may require differentiated access.

The final stage of digital transformation is the development of Spatial Decision Support Systems (SDSS) that connect information with management alternatives. A database answers what information is available; a monitoring system shows how conditions are changing; an SDSS additionally asks what should be done, where, in what sequence and under which constraints. Its role is not to replace administrative judgement but to structure evidence and compare scenarios.

A land-resource SDSS should contain five interrelated modules: diagnosis; risk and forecasting; scenario analysis; spatial prioritisation; and monitoring with feedback.

The digital transformation of land-resource governance in Ukraine can be organised through five overlapping stages. Stage 1 is data inventory and harmonisation: existing soil, cadastral, environmental, agricultural, Earth Observation and war-impact datasets should be inventoried, georeferenced and assessed for quality, duplication and gaps. Common metadata and interoperability standards should be established.

Stage 2 is development of a national baseline of land and soil condition by combining existing field data, targeted new sampling, remote sensing and digital soil mapping. The baseline should distinguish measured from modelled information and explicitly represent uncertainty [28]. Stage 3 is risk-based spatial monitoring, in which permanent observation networks are complemented by targeted sampling in hotspots identified through remote sensing and predictive modelling.

Stage 4 is integration with spatial planning, economic instruments and restoration. Monitoring results must become administratively relevant:

soil-health and land-condition indicators should inform plans, conservation programmes, environmental restrictions, incentives and post-war recovery. Stage 5 is adaptive evaluation and policy correction, under which observed outcomes are compared with baselines and targets and policy instruments are revised where expected improvements do not occur.

The proposed framework has several policy implications. Modernisation of land monitoring should be treated as part of environmental policy rather than a narrowly technical task. Integration is more important than the simple accumulation of data, and soil-health indicators should progressively complement conventional land accounting. Earth Observation should become a permanent tool for early warning, change detection and targeting of field monitoring [25; 27]. Predictive analytics should be accompanied by transparent methods, validation and explicit uncertainty [28; 31].

Post-war recovery additionally requires the integration of safety and environmental information: humanitarian demining is necessary but not sufficient for sustainable return to production, and post-clearance ecological assessment should become part of the recovery pathway [19; 23]. European integration provides an opportunity to establish compatible monitoring standards from the outset, using Directive (EU) 2025/2360 as an important reference point [11].

The broader international context reinforces this need. The 2026 edition of FAO's Status of the World's Soil Resources concludes that, despite significant progress in knowledge and available management solutions, sustainable soil management is not yet being adopted at the scale and pace required globally [33]. The challenge is therefore not only to generate scientific knowledge but to create institutions capable of converting knowledge into routine, spatially targeted and adaptive management.

For Ukraine, the strategic objective should be the formation of a national adaptive land-information and decision-support system in which monitoring results directly influence spatial planning, economic incentives, regulatory measures and restoration programmes. Such a system would support a transition from reactive control of individual land-use violations towards proactive management of land natural capital, thereby strengthening ecological security, climate resilience, agricultural sustainability and the long-term effectiveness of post-war recovery.

CONCLUSIONS

Rational land use and land protection constitute a single functional subsystem of state environmental policy. The distinction between them is primarily instrumental: rational land use defines an environmentally acceptable model of economic behaviour, whereas land protection provides the legal, organisational, economic, technological, and information conditions required to maintain and restore land-based natural capital.

A contemporary understanding of rational land use should be based not only on economic efficiency and the preservation of fertility but also on maintaining the multifunctionality of soils and land ecosystems. Performance assessment should therefore include indicators of soil health, soil organic carbon, erosion resistance, biodiversity, water-regulation functions, and other ecosystem services.

Legislative and strategic changes adopted in 2024–2026 indicate Ukraine's gradual transition toward an integrated ecosystem-based model of land policy. Further development of this model requires closing the gap between strategic objectives, information provision, and practical economic implementation mechanisms. Measurable changes in land condition, rather than mere procedural compliance, should become the principal criterion of policy effectiveness.

European integration provides an additional regulatory and methodological reference point. Alignment with European approaches will require harmonisation of indicators, data-collection and processing methods, spatial monitoring units, procedures for assessing contaminated sites, and decision-making mechanisms.

For war-affected land, physical clearance of explosive ordnance must not be equated with complete recovery. Returning land to economic use should include post-demining environmental assessment, determination of functional suitability, and selection of an environmentally and economically justified subsequent land-use scenario.

A strategic direction for public policy should therefore be the establishment of an adaptive land-resource management system based on the sequence «prevent - reduce - restore - monitor – adjust». Such a model reconciles economic productivity with the conservation of natural capital and creates institutional prerequisites for Ukraine's environmentally safe, climate-resilient, and competitive development.

References:

1. Bavrovska, N. (2022). Environmental aspects of rational use and protection of lands. *Land Management, Cadastre and Land Monitoring*, 4, 82–88. DOI: https://doi.org/10.31548/zemleustriy2022.04.08

2. Bielska, A., Kuryltsiv, R., Sobolewska-Mikulska, K., & Sajnóg, N. (2026). Challenges and problems of agricultural land use changes according to territorial planning documents: Case of Poland and Ukraine. *Economics and Environment*, 97(2), 1–21. DOI: https://doi.org/10.34659/eis.2026.97.2.1130

3. Bünemann, E. K., Bongiorno, G., Bai, Z., Creamer, R. E., De Deyn, G., de Goede, R., Fleskens, L., Geissen, V., Kuyper, T. W., Mäder, P., Pulleman, M., Sukkel, W., van Groenigen, J. W., & Brussaard, L. (2018). Soil quality – A critical review. *Soil Biology and Biochemistry*, 120, 105–125. DOI: https://doi.org/10.1016/j.soilbio.2018.01.030

4. Cabinet of Ministers of Ukraine. (2022). On approval of the Concept of the National Target Program for Land Use and Protection (Order No. 70-r, January 19, 2022). Available at: https://zakon.rada.gov.ua/laws/show/70-2022-%D1%80

5. Cabinet of Ministers of Ukraine. (2024). On approval of the Procedure for monitoring land and soils (Resolution No. 848, July 23, 2024). Available at: https://zakon.rada.gov.ua/laws/show/848-2024-%D0%BF

6. Cabinet of Ministers of Ukraine. (2025). On approval of the Strategy for reforming the state supervision (control) system in the field of environmental protection, rational use, reproduction and protection of natural resources for the period up to 2029 (Order No. 625-r, June 25, 2025). Available at: https://zakon.rada.gov.ua/laws/show/625-2025-%D1%80

7. Cabinet of Ministers of Ukraine. (2026). On approval of the Strategy for Biodiversity Conservation of Ukraine until 2035 and the operational action plan for its implementation in 2026–2028 (Order No. 708-r, June 10, 2026). Available at: https://zakon.rada.gov.ua/laws/show/708-2026-%D1%80

8. Cowie, A. L., Orr, B. J., Castillo Sanchez, V. M., Chasek, P., Crossman, N. D., Erlewein, A., Louwagie, G., Maron, M., Metternicht, G. I., Minelli, S., Tengberg, A. E., Walter, S., & Welton, S. (2018). Land in balance: The scientific conceptual framework for Land Degradation Neutrality. *Environmental Science & Policy*, 79, 25–35. DOI: https://doi.org/10.1016/j.envsci.2017.10.011

9. Datsenko, L., Titova, S., & Dubnytska, M. (2026). Regulation of sustainable land use issues in the Ukrainian context. *Acta Scientiarum Polonorum Administratio Locorum,* 25(1), 35–49. DOI: https://doi.org/10.31648/aspal.11502

10. European Commission. (2021). EU Soil Strategy for 2030: Reaping the benefits of healthy soils for people, food, nature and climate. Available at: https://environment.ec.europa.eu/topics/soil-health/soil-strategy-2030_en

11. European Parliament & Council of the European Union. (2024). Regulation (EU) 2024/1991 of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869. *Official Journal of the European Union.* Available at: https://eur-lex.europa.eu/eli/reg/2024/1991/oj

12. European Parliament & Council of the European Union. (2025). Directive (EU) 2025/2360 of 12 November 2025 on soil monitoring and resilience

(Soil Monitoring Law). *Official Journal of the European Union*. Available at: https://eur-lex.europa.eu/eli/dir/2025/2360/oj

13. Food and Agriculture Organization of the United Nations. (2017). Voluntary guidelines for sustainable soil management. FAO. Available at: https://www.fao.org/3/bl813e/bl813e.pdf

14. Keesstra, S., Nunes, J., Novara, A., Finger, D., Avelar, D., Kalantari, Z., & Cerdà, A. (2018). The superior effect of nature-based solutions in land management for enhancing ecosystem services. *Science of the Total Environment,* 610–611, 997–1009. DOI: https://doi.org/10.1016/j.scitotenv.2017.08.077

15. Lehmann, J., Bossio, D. A., Kögel-Knabner, I., & Rillig, M. C. (2020). The concept and future prospects of soil health. *Nature Reviews Earth & Environment,* 1, 544–553. DOI: https://doi.org/10.1038/s43017-020-0080-8

16. Ministry of Economy and Environment of Ukraine. (2026, August 5). Results of humanitarian demining in July. Available at: https://www.me.gov.ua/News/Detail/abc367e0-9e9a-47e8-8a95-22722070129d

17. Saik, P., Koshkalda, I., Bezuhla, L., Stoiko, N., & Riasnianska, A. (2024). Achieving land degradation neutrality: Land-use planning and ecosystem approach. *Frontiers in Environmental Science*, 12, 1446056. DOI: https://doi.org/10.3389/fenvs.2024.1446056

18. Solokha, M., Demyanyuk, O., Symochko, L., Mazur, S., Vynokurova, N., Sementsova, K., & Mariychuk, R. (2024). Soil degradation and contamination due to armed conflict in Ukraine. *Land*, 13(10), 1614. DOI: https://doi.org/10.3390/land13101614

19. Verkhovna Rada of Ukraine. (2001). Land Code of Ukraine (Law No. 2768-III, October 25, 2001). Available at: https://zakon.rada.gov.ua/laws/show/2768-14

20. Verkhovna Rada of Ukraine. (2003a). On land protection (Law No. 962-IV, June 19, 2003). Available at: https://zakon.rada.gov.ua/laws/show/962-15

21. Verkhovna Rada of Ukraine. (2003b). On state control over land use and protection (Law No. 963-IV, June 19, 2003). Available at: https://zakon.rada.gov.ua/laws/show/963-15

22. Verkhovna Rada of Ukraine. (2019). On the Basic Principles (Strategy) of the State Environmental Policy of Ukraine for the period up to 2030 (Law No. 2697-VIII, February 28, 2019). Available at: https://zakon.rada.gov.ua/laws/show/2697-19

23. Verkhovna Rada of Ukraine. (2024). On the basic principles of state climate policy (Law No. 3991-IX, October 8, 2024). Available at: https://zakon.rada.gov.ua/laws/show/3991-20

24. World Bank, Government of Ukraine, European Commission, & United Nations. (2026). Ukraine – Fifth Rapid Damage and Needs Assessment (RDNA5): February 2022–December 2025. World Bank. Available at: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099022026094036395

25. European Environment Agency. (2023). Soil monitoring in Europe – Indicators and thresholds for soil health assessments. EEA Report No. 08/2022. Publications Office of the European Union. DOI: https://doi.org/10.2800/956606

26. FAO-ITPS. (2020). Protocol for the assessment of Sustainable Soil Management. Rome: Food and Agriculture Organization of the United Nations.

27. Copernicus Land Monitoring Service. (2026). Copernicus Land Monitoring Service. European Union. Available at: https://land.copernicus.eu/

28. Poggio, L., de Sousa, L. M., Batjes, N. H., Heuvelink, G. B. M., Kempen, B., Ribeiro, E., & Rossiter, D. (2021). SoilGrids 2.0: Producing soil information for the globe with quantified spatial uncertainty. *SOIL*, 7, 217–240. DOI: https://doi.org/10.5194/soil-7-217-2021

29. Amani, M., Ghorbanian, A., Ahmadi, S. A., Kakooei, M., Moghimi, A., Mirmazloumi, S. M., Moghaddam, S. H. A., Mahdavi, S., Ghahremanloo, M., Parsian, S., Wu, Q., & Brisco, B. (2020). Google Earth Engine Cloud Computing Platform for Remote Sensing Big Data Applications: A Comprehensive Review. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 13, 5326–5350. DOI: https://doi.org/10.1109/JSTARS.2020.3021052

30. Borrelli, P., Robinson, D. A., Panagos, P., Lugato, E., Yang, J. E., Alewell, C., Wuepper, D., Montanarella, L., & Ballabio, C. (2020). Land use and climate change impacts on global soil erosion by water (2015–2070). *Proceedings of the National Academy of Sciences,* 117(36), 21994–22001. DOI: https://doi.org/10.1073/pnas.2001403117

31. Sheykhmousa, M., Mahdianpari, M., Ghanbari, H., Mohammadimanesh, F., Ghamisi, P., & Homayouni, S. (2020). Support Vector Machine versus Random Forest for remote sensing image classification: A meta-analysis and systematic review. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 13, 6308–6325. DOI: https://doi.org/10.1109/JSTARS.2020.3026724

32. Lu, B., Dao, P. D., Liu, J., He, Y., & Shang, J. (2020). Recent advances of hyperspectral imaging technology and applications in agriculture. *Remote Sensing*, 12(16), 2659. DOI: https://doi.org/10.3390/rs12162659

33. Food and Agriculture Organization of the United Nations, Global Soil Partnership, & Intergovernmental Technical Panel on Soils. (2026). Status of the World's Soil Resources 2026. Rome: FAO.

ENTERPRISE POTENTIAL FOR SUSTAINABLE GROWTH: INNOVATION CAPACITY, INVESTMENT RESOURCES, AND STRATEGIC RESILIENCE

Viacheslav Makedon[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-9

Abstract. Enterprise potential determines the ability of firms to transform available resources into sustainable economic growth under technological, financial, and market uncertainty. *The purpose* of the paper is to develop an integrated model for enterprise potential formation and realization through innovation capacity, investment resources, and strategic resilience. *Methodology* combines nonlinear normalization, adaptive weighting, multiplicative aggregation, bottleneck diagnostics, structural imbalance measurement, risk adjustment, and scenario analysis. The proposed assessment architecture differentiates resource availability from the efficiency of its economic conversion. *Results* demonstrate that enterprise potential cannot be adequately evaluated through isolated financial, technological, or innovation indicators. The developed model integrates innovation commercialization, technological renewal, knowledge absorption, financing capacity, investment productivity, operational continuity, resource adaptability, and recovery capacity. Risk-adjusted enterprise potential reflects complementarity among its three dimensions and penalizes excessive structural imbalance. Potential realization efficiency connects accumulated capabilities with economic value creation, operating cash flow, innovation output, and productivity growth. *Practical implications* concern the identification of development constraints, allocation of investment resources, selection of innovation projects, and adjustment of strategic responses under disturbances. *Value/originality* consists in combining potential assessment with its subsequent realization and renewal within a continuous management cycle supporting sustainable enterprise growth.

[1] Doctor of Economic Sciences, Professor,
Professor at the Department of Marketing and Logistics,
Oles Honchar Dnipro National University, Ukraine

© Viacheslav Makedon

INTRODUCTION

Enterprise potential has acquired a broader economic meaning as firms face technological shifts, unstable investment conditions, shorter innovation cycles, and increasing requirements for organizational adaptability. Sustainable growth now depends not only on the volume of resources accumulated by an enterprise but also on its capacity to combine, mobilize, and reconfigure them. Financial resources, production assets, technological competencies, knowledge, human capital, and managerial capabilities generate sustainable effects only when they are integrated into a coherent development system. This perspective shifts attention from the static availability of resources toward the capacity of an enterprise to transform available opportunities into measurable economic outcomes (Giraldi & Rossi, 2026).

The relevance of the research is determined by the increasing complexity of enterprise development under digital transformation and persistent environmental uncertainty. Technological modernization expands opportunities for productivity growth, process redesign, and business model innovation. However, access to technology alone does not ensure sustainable development. Enterprises also require sufficient investment resources, innovation capacity, organizational flexibility, and mechanisms for maintaining operational and strategic continuity. The growing interdependence of these components creates a need to reconsider enterprise potential as an integrated economic category that reflects both available resources and the ability to convert them into sustainable growth (Fahziar, 2026).

The research problem arises from the fragmented treatment of enterprise potential in contemporary research. Innovation capability, digital maturity, technological readiness, financial resources, dynamic capabilities, and organizational resilience are commonly examined through separate analytical frameworks. This separation provides valuable evidence about individual development factors but does not fully explain how they interact when enterprises make investment and strategic decisions. A firm may demonstrate substantial technological capability while lacking resources for commercialization. Conversely, strong financial capacity may coexist with weak innovation mechanisms or insufficient adaptability. An integrated approach is therefore required to identify how resource, innovation, and

resilience dimensions jointly determine the capacity for sustainable enterprise growth.

Recent academic studies increasingly interpret enterprise development through combinations of capabilities rather than individual resource indicators. Garrido-Moreno et al. (2024) examined the relationship between innovation, organizational resilience, and business performance. Their study demonstrated that innovation and resilience operate as interconnected organizational mechanisms supporting performance improvement. The findings are particularly relevant for understanding why innovation resources alone cannot adequately characterize enterprise potential when the organization lacks the capacity to respond to disruptions. Gudz et al. (2024) investigated directions for developing enterprise innovation potential in the context of digital transformation. Their research emphasizes the changing composition of innovation potential as digital technologies modify internal processes and development opportunities. Wang et al. (2024), studying strategic emerging enterprises, examined configuration paths leading to innovation performance. Their results indicate that innovation outcomes depend on combinations of organizational conditions. Nevertheless, these studies primarily concentrate on innovation outcomes, while the investment resource base supporting the realization and scaling of innovation receives less integrated consideration.

Jie et al. (2025) explored the relationships among digital maturity, dynamic capabilities, and innovation performance in high-tech SMEs. The study shows that technological advancement produces stronger outcomes when supported by organizational capabilities that enable enterprises to recognize changes and reconfigure resources. Gkika et al. (2025) also analyzed the drivers of digital maturity within a business ecosystem. Their contribution clarifies the organizational prerequisites of digital transformation. However, digital maturity remains only one dimension of enterprise potential and cannot independently represent the capacity to finance, implement, and sustain strategic development.

This discussion is extended by contemporary research on technology-driven transformation. Duarte & Dong (2026) conceptualized Industry 4.0 technologies as drivers of strategic and business model innovation. Their work demonstrates that technological implementation can influence both operational architecture and value creation mechanisms.

Eicke et al. (2026) investigated strategic AI orientation and technological innovation using managerial insights and panel data. The study connects managerial orientation toward artificial intelligence with technological innovation and indicates that strategic direction influences how technological opportunities are converted into innovation activity.

The capability perspective is further developed by Nuryakin & Qamari (2026). Their research examines absorptive capacity in conjunction with innovation and technological capabilities and relates these mechanisms to SME performance. The results support an interpretation of enterprise potential in which knowledge acquisition must be complemented by mechanisms for assimilation, transformation, and commercial application. Li et al. (2026) investigated factors determining technological innovation capability in the technology industry, providing additional evidence that innovation capacity emerges from several mutually dependent organizational conditions rather than a single technological resource.

Martell-Chávez et al. (2026) considered innovation and technology management strategies associated with Industry 4.0 adoption in SMEs in developing countries. Their study draws attention to the managerial and resource constraints accompanying technological transformation. These constraints are especially important for enterprise potential assessment because the existence of technological opportunities does not imply that an enterprise possesses sufficient financial, organizational, and managerial resources for their implementation.

Njah et al. (2026) proposed a digital maturity model for manufacturing SMEs, contributing a structured approach to assessing readiness for digital transformation. Tan et al. (2026) examined digital maturity and its determinants in relation to business performance. Both studies provide evidence for treating maturity as an organizational capacity rather than simply a level of technology acquisition. Tsiavos & Kitsios (2026) further showed the importance of digital transformation strategy in converting digital ambitions into digital maturity. Taken together, these studies indicate that strategic alignment determines whether technological resources become productive organizational capabilities.

Despite substantial progress, several issues remain unresolved. Contemporary research provides detailed approaches to innovation capability, digital maturity, technological readiness, and organizational

resilience, but these categories are rarely integrated with the investment resource dimension of enterprise potential. The ability to generate an innovation idea, absorb new knowledge, or identify a digital opportunity differs from the ability to finance, implement, scale, and sustain the corresponding transformation. Likewise, resilience cannot be reduced to resistance against external shocks because sustainable growth requires enterprises to preserve development capacity while reallocating resources and renewing their business activities.

The fragmentation of these research streams creates a methodological gap between resource assessment and capability assessment. Available resources describe what an enterprise possesses, while organizational capabilities determine what it can accomplish with those resources. Strategic resilience characterizes whether these capabilities can remain functional or be reconfigured when operating conditions change. These dimensions should therefore be examined jointly rather than as autonomous characteristics.

This research addresses that gap by considering enterprise potential for sustainable growth as an integrated combination of innovation capacity, investment resources, and strategic resilience. Such an approach provides a basis for linking the availability of enterprise resources with their productive transformation, strategic allocation, and adaptive use. It also creates the analytical foundation for developing an integrated assessment system capable of identifying both existing development capacity and internal constraints that prevent enterprises from converting potential into sustainable economic growth.

Research objective – to develop an integrated approach for assessing and realizing enterprise potential for sustainable growth through innovation capacity, investment resources, and strategic resilience.

1. Formation and Assessment of Enterprise Potential for Sustainable Growth

Enterprise potential reflects more than accumulated resources available at a particular reporting date. Its economic content emerges through the capacity to combine resources, convert them into development capabilities, and preserve this conversion under changing operating conditions. Financial reserves, technologies, knowledge, production assets, and managerial

competencies therefore represent only the initial layer of potential (Lee et al., 2024). Their productive combination determines whether the enterprise can finance innovation, scale successful solutions, withstand disturbances, and maintain sustainable growth. This interpretation changes the assessment logic. A high level of individual resources does not necessarily indicate strong development potential. An enterprise can possess modern equipment but lack financing for technological renewal. Another firm may maintain substantial liquidity while demonstrating weak innovation conversion. A third enterprise can generate innovative products but remain highly vulnerable to supply disruptions or demand shocks. The assessment should capture these structural differences rather than conceal them inside one arithmetic average (Orošnjak et al., 2025).

For this study, enterprise potential is structured around three interdependent dimensions: innovation capacity, investment resources, and strategic resilience. Innovation capacity describes the ability to create, absorb, implement, and commercialize new solutions. Investment resources characterize the financial space available for development without excessive deterioration of liquidity, leverage, or cash-flow stability. Strategic resilience measures the capacity to preserve critical functions, redistribute resources, and restore the planned development trajectory after disturbances (European Bank for Reconstruction and Development, 2026; Makedon et al., 2025 b).

The first analytical task concerns the selection of indicators. Their composition should reflect not only resource availability but also conversion efficiency and development constraints. For this reason, each diagnostic block combines a stock indicator, a flow indicator, an efficiency measure, and a risk-sensitive characteristic. The resulting architecture is presented in Table 1 (Table 1).

The structure in Table 1 separates the possession of resources from their economic conversion. This distinction is central to further calculations. For example, R&D expenditure measures commitment to innovation, whereas the innovation conversion ratio captures the market productivity of that expenditure. A similar distinction applies to investment resources: available financing describes capacity, while risk-adjusted return reflects the quality of capital allocation (Stef et al., 2026).

Table 1

Multilevel metric architecture for risk-adjusted assessment of enterprise growth potential

No.	Assessment block	Primary metric	Calculation basis	Normalization benchmark	Weight w_j	Risk correction	Economic interpretation
1	Innovation financing capacity	R&D investment intensity, RDI	R&D expenditure / revenue	Strategic target and sector median	0.11	R&D budget volatility	Financial commitment to innovation renewal
2	Innovation commercia-lization	Innovation conversion ratio, ICR	Revenue from new products / innovation expenditure	Three-year enterprise target	0.14	Commercia-lization failure rate	Ability to transform inno-vation spending into market returns
3	Technology renewal	Technology renewal index, TRI	Value of renewed technological assets / technological asset base	Technology-cycle benchmark	0.09	Technology obsolescence rate	Speed of productive asset modernization
4	Knowledge absorption	Absorptive capacity ratio, ACR	Implemented external solutions / acquired solutions	Best internal historical result	0.08	Knowledge loss coefficient	Capacity to internalize external knowledge
5	Internal investment capacity	Reinvestment coverage, RIC	Retained earnings + depreciation / development CAPEX	Planned investment requirement	0.12	Operating cash-flow volatility	Ability to finance development internally
6	External financing capacity	Capital accessibility index, CAI	Available funding / required external funding	Full financing requirement	0.10	WACC and leverage adjustment	Feasibility of mobilizing external investment
7	Investment efficiency	Risk-adjusted investment return, RAIR	Expected NPV / invested capital	Required return adjusted for risk	0.11	Project downside deviation	Quality of investment allocation
8	Operational resilience	Continuity capacity ratio, CCR	Protected critical capacity / required critical capacity	Minimum continuity threshold	0.09	Supply and production disru-ption exposure	Ability to preserve core operations
9	Financial resilience	Liquidity recovery capacity, LRC	Liquid reserve / stressed cash requirement	Stress-scenario requirement	0.08	Cash-flow-at-risk	Capacity to absorb financial disturbances
10	Strategic adaptability	Resource reconfiguration index, RRI	Reallocated productive resources / resources requiring reallocation	Scenario-specific requirement	0.08	Reconfi-guration time penalty	Speed of strategic resource redistribution

Source: developed by the author

Raw values cannot be aggregated directly because the indicators use different measurement scales. Their distributions also differ considerably. Linear min-max normalization remains sensitive to extreme observations and changing sector boundaries. A bounded nonlinear transformation is more suitable for heterogeneous enterprise data. For stimulant indicators, the normalized value is calculated as:

$$N_{ijt}^{+} = \left[1 + \exp\left(-a_{ij} \frac{X_{ijt} - B_{ij,t}}{\sigma_{ij,t} + \varepsilon} \right) \right]^{-1} \quad (1)$$

where:

N_{ijt}^{+} – normalized stimulant indicator j for component i in period t;
X_{ijt} – actual value of the indicator;
$B_{ij,t}$ – target or economically justified benchmark;
$\sigma_{ij,t}$ – rolling standard deviation of the indicator;
a_{ij} – sensitivity parameter determining transformation steepness;
ε – stabilizing constant.

Equation (1) assigns greater analytical weight to deviations occurring near the target zone. Extremely high values no longer increase the integral assessment indefinitely. This property matters for liquidity, innovation expenditure, and investment intensity because excessive values can indicate inefficient resource accumulation. Destimulants require an inverse specification:

$$N_{ijt}^{-} = \left[1 + \exp\left(a_{ij} \frac{X_{ijt} - B_{ij,t}}{\sigma_{ij,t} + \varepsilon} \right) \right]^{-1} \quad (2)$$

where:

N_{ijt}^{-} – normalized destimulant indicator;
X_{ijt} – observed value of the risk or cost characteristic;
$B_{ij,t}$ – admissible benchmark;
$\sigma_{ij,t}$ – rolling volatility measure;
a_{ij} – response sensitivity coefficient;
ε – numerical stabilization parameter.

The next stage concerns aggregation inside each potential dimension. A conventional weighted mean can hide critical deficits. High innovation intensity, for example, can mathematically compensate for poor commercialization. Economically, such substitution is questionable

(Thornhill, 2006). The model therefore combines weighted geometric aggregation with a bottleneck penalty:

$$C_{it} = \left(\prod_{j=1}^{m_i} N_{ijt}^{w_{ij}} \right) \left[1 - \lambda_i \left(1 - \min_j N_{ijt} \right)^{\kappa_i} \right], \sum_{j=1}^{m_i} w_{ij} = 1 \quad (3)$$

where:

C_{it} – composite value of potential dimension i;

N_{ijt} – normalized value of indicator j;

W_{ij} – weight assigned to the corresponding indicator;

m_i – number of indicators within dimension i;

λ_i – bottleneck penalty intensity;

κ_i– nonlinear sensitivity to the weakest indicator.

This construction captures a practical management problem. Potential cannot expand indefinitely when one critical capability remains underdeveloped. The weakest indicator therefore produces a nonlinear penalty rather than disappearing among stronger variables.

At this stage, three composite values are obtained: IC_t for innovation capacity, IR_t for investment resources, and SR_t for strategic resilience. Their values should be interpreted jointly. The same integral score can conceal entirely different configurations, which require different managerial responses. Table 2 connects quantitative states with identifiable resource gaps and investment decisions (Table 2).

Table 2 gives the integral assessment an applied managerial interpretation. For instance, configurations 2 and 4 may produce similar average potential values, although their economic problems differ. The first requires financing instruments. The second requires resilience investment, supply diversification, and recovery capacity. Treating them as one category would lead to different, and often inefficient, capital allocation decisions. The interaction among the three dimensions should also enter the calculation explicitly. Innovation capacity becomes economically productive when investment resources support implementation. Both dimensions lose part of their value when strategic resilience remains weak (Makedon et al., 2025a). For this reason, enterprise potential is calculated through a synergy-adjusted multiplicative function:

Table 2

Scenario matrix for diagnosing structural configurations of enterprise potential

No.	Configuration	IC_t	IR_t	SR_t	Dominant economic constraint	Priority allocation decision	Monitoring trigger
1	Synchronized growth	≥0.75	≥0.75	≥0.75	No critical internal bottleneck	Scale innovation and market expansion	Decline of any component below 0,70
2	Innovation without capital	≥0.75	<0.50	≥0.60	Financing deficit	Refinance project portfolio and attract long-term capital	Funding gap exceeds planned CAPEX reserve
3	Capital accumulation trap	<0.50	≥0.75	≥0.60	Weak innovation conversion	Shift capital toward R&D and commercialization	Innovation revenue remains below target
4	Fragile innovation expansion	≥0.70	≥0.60	<0.50	Exposure to disruption	Build liquidity, supply, and capacity reserves	Recovery horizon exceeds target
5	Resilient technological lag	<0.50	≥0.55	≥0.75	Technology and knowledge deficit	Accelerate technology renewal and capability acquisition	Technology gap exceeds one renewal cycle
6	Investment overextension	≥0.55	<0.50	<0.50	Debt and liquidity pressure	Suspend marginal projects and restore cash buffers	CFAR breaches liquidity reserve
7	Unbalanced transition	≥0.65	≥0.65	0.50–0.65	Slow organizational adaptation	Redirect part of CAPEX toward process flexibility	Reconfiguration time rises
8	Latent growth potential	0.50–0.65	≥0.65	≥0.65	Weak resource conversion	Improve commercialization and project selection	Potential realization ratio declines
9	Structural potential erosion	<0.50	<0.50	<0.50	Simultaneous capability deficit	Stabilize cash flow before development expansion	Two consecutive periods below 0,50

Source: developed by the author

$$EP_t = IC_t^{\alpha} IR_t^{\beta} SR_t^{\gamma} \begin{bmatrix} 1 + \theta_1 IC_t IR_t + \theta_2 IC_t SR_t + \\ + \theta_3 IR_t SR_t + \theta_4 IC_t IR_t SR_t \end{bmatrix} e^{-(\mu R_t + \nu V_t + \xi G_t)} \quad (4)$$

where:

EP_t – integrated enterprise potential;

IC_t – innovation capacity index;

IR_t – investment resources index;

SR_t – strategic resilience index;

α, β, γ – structural weights, where $\alpha+\beta+\gamma=1$;

$\theta_1, \theta_2, \theta_3$ – pairwise synergy parameters;

θ_4 – three-dimensional complementarity parameter;

R_t – aggregated strategic risk exposure;

V_t – volatility of the internal indicator system;

G_t – structural imbalance coefficient;

μ, ν, ξ – risk sensitivity parameters.

The G_t parameter requires a separate calculation because dispersion among components affects development feasibility. A firm with values of 0.90, 0.85, and 0.25 has a different strategic position from a firm with three values near 0.67, even if their arithmetic averages are similar. The imbalance coefficient is specified as:

$$G_t = \frac{\sqrt{\frac{1}{3}\left[(IC_t - \bar{P}_t)^2 + (IR_t - \bar{P}_t)^2 + (SR_t - \bar{P}_t)^2 \right]}}{\bar{P}_t + \varepsilon}, \bar{P}_t = \frac{IC_t + IR_t + SR_t}{3} \quad (5)$$

where:

G_t – relative structural imbalance coefficient;

$\bar{P}_t$ – average level of the three potential dimensions;

IC_t – innovation capacity;

IR_t – investment resources;

SR_t – strategic resilience;

ε – stabilizing constant.

The relative form of *Gt* is preferable to absolute dispersion because enterprises can occupy different stages of development. The coefficient captures proportional asymmetry rather than scale alone. A growing value signals that one component is advancing faster than the others, creating a potential bottleneck.

Still, accumulated potential and realized growth are not identical categories. This distinction deserves a separate calculation. An enterprise can maintain strong capabilities while generating weak economic returns from them. The potential realization rate therefore connects the preceding-period resource configuration with current growth outcomes:

$$PRE_t = \frac{\omega_1 \Delta EVA_t + \omega_2 \Delta OCF_t + \omega_3 \Delta NPS_t + \omega_4 \Delta PROD_t + \omega_5 \Delta MS_t}{EP_{t-1} + \varepsilon} \cdot e^{-\rho T_{rec,t}} \cdot (1 - DL_t) \quad (6)$$

where:

PRE_t – potential realization efficiency;

ΔEVA_t – normalized increase in economic value added;

ΔOCF_t – normalized operating cash-flow growth;

$\Delta NPSt$ – increase in the share of new products in sales;

$\Delta PROD_t$ – productivity growth;

ΔMS_t – change in the enterprise's target market position;

$\omega_1, \ldots, \omega_5$ – outcome significance coefficients;

EP_{t-1} – enterprise potential accumulated in the previous period;

$T_{rec,t}$ – normalized recovery time after a disturbance;

DL_t – development loss caused by interrupted or postponed projects;

ρ – sensitivity coefficient for recovery duration.

Equation (6) separates resource accumulation from its productive utilization. This separation is necessary because sustainable growth depends on both processes. A high EP_t combined with a low PRE_t identifies unused or poorly configured potential. In contrast, persistently high realization with declining EP_t can indicate excessive exploitation of existing resources and insufficient renewal. The dynamic condition of sustainable potential development can finally be expressed through a trajectory criterion:

$$SGP_t = EP_t \left(1 + \eta PRE_t\right) \left[1 - \frac{\sigma(EP_{t-h:t})}{\bar{EP}_{t-h:t} + \varepsilon}\right] \left[1 - \psi \max(0, G_t - G^*)\right] \quad (7)$$

where:

SGP_t – sustainable growth potential index;

EP_t – current integrated enterprise potential;

PRE_t – potential realization efficiency;

η – conversion contribution coefficient;

$\sigma(EP_{t-h:t})$ – volatility of potential over monitoring horizon h;

$\overline{EP}_{t-h:t}$ – average potential over that horizon;
G_t – current structural imbalance;
G^* – admissible imbalance threshold;
ψ – penalty intensity for excessive imbalance.

This formulation changes the final diagnostic emphasis. Sustainable enterprise potential is not identified merely by a high current score. It requires sufficient capacity, productive realization, controlled volatility, and acceptable balance among innovation, investment, and resilience. A temporary expansion financed through excessive leverage would therefore receive a weaker assessment than balanced capability growth supported by stable financing.

2. Strategic Resilience and Realization of Enterprise Potential

Enterprise potential becomes economically relevant when accumulated resources can be converted into innovation, investment activity, and sustainable growth. The assessment therefore cannot remain limited to liquidity, asset structure, profitability, or technological expenditure. These indicators describe separate characteristics of an enterprise, but they do not explain its capacity to combine resources under changing market conditions. The proposed approach links three dimensions: innovation capacity, investment resources, and strategic resilience.

Innovation capacity reflects the ability to generate, absorb, implement, and commercialize new technological and organizational solutions. Investment resources characterize the financing space available for development without excessive deterioration of liquidity and financial stability. Strategic resilience captures the capacity to preserve development projects, redistribute resources, and recover productive activity after disturbances. Their combination forms enterprise potential for sustainable growth. The assessment system should distinguish resource availability from resource conversion. High R&D expenditure does not guarantee innovation performance, while access to capital does not ensure productive investment. For this reason, the diagnostic architecture combines input, conversion, efficiency, and risk indicators. Their applied configuration is presented in Table 3.

Table 3

Integrated metric architecture for diagnosing enterprise potential for sustainable growth

No.	Diagnostic block	Applied indicator	Calculation basis	Risk correction	Analytical function
1	Innovation financing	Innovation investment intensity	R&D and technology investment / revenue	Financing volatility	Measures resource commitment to renewal
2	Commercialization	Innovation conversion ratio	New-product revenue / innovation expenditure	Project failure rate	Measures market conversion of innovation
3	Technology renewal	Technology renewal capacity	Renewed technology value / exposed asset base	Obsolescence rate	Identifies technological development capacity
4	Knowledge absorption	Knowledge implementation ratio	Applied external knowledge / acquired knowledge	Competency loss	Measures absorptive capability
5	Internal investment resources	Investment coverage ratio	Free cash flow / strategic investment requirement	Cash-flow-at-risk	Measures internal financing capacity
6	External financing	Capital accessibility ratio	Available external capital / financing gap	WACC and leverage	Measures financing flexibility
7	Investment productivity	Risk-adjusted investment return	Expected value creation / committed capital	Downside deviation	Measures allocation quality
8	Operational resilience	Continuity capacity	Protected output / minimum viable output	Disruption exposure	Measures operational survivability
9	Resource adaptability	Reconfiguration capacity	Reallocated resources / required reallocation	Switching time and cost	Measures adaptive flexibility
10	Recovery capacity	Growth recovery ratio	Restored value added / value lost	Recovery duration	Measures post-shock restoration

Source: developed by the author

The metrics in Table 1 have different scales and economic directions. Direct aggregation would therefore distort their contribution. Fixed min-max normalization is also problematic because extreme observations change the resulting scores. An adaptive nonlinear transformation provides a more stable solution. For stimulant indicators, normalization takes the following form:

$$N_{ijt}^{+} = \left[1 + \exp\left(-a_{ij} \frac{X_{ijt} - B_{ij,t}}{\sqrt{\sigma_{ij,t}^2 + \tau_{ij,t}^2} + \varepsilon} \right) \right]^{-1} \quad (8)$$

where:

N_{ijt}^{+} – normalized stimulant indicator;

X_{ijt} – actual indicator value;

$B_{ij,t}$ – dynamic target benchmark;

$\sigma_{ij,t}$ – historical indicator volatility;

$\tau_{ij,t}$ – cross-sectional dispersion;

a_{ij} – normalization sensitivity coefficient;

ε – numerical stabilization parameter.

For debt pressure, recovery duration, concentration, project failure, and other destimulants, the sign inside the exponential function is reversed. This approach evaluates deviation from an economically justified benchmark rather than mechanical proximity to historical maxima. Weights should also respond to the information contained in individual indicators (Makedon et al., 2025 c). Their values can combine expert significance, statistical differentiation, and sensitivity of the final assessment:

$$w_{ij,t} = \frac{E_{ij}^{\alpha} D_{ij,t}^{\beta} S_{ij,t}^{\gamma}}{\sum_{j=1}^{m_i} E_{ij}^{\alpha} D_{ij,t}^{\beta} S_{ij,t}^{\gamma}}, \alpha + \beta + \gamma = 1 \quad (9)$$

where:

$w_{ij,t}$ – adaptive indicator weight;

E_{ij} – expert assessment of economic significance;

$D_{ij,t}$ – information differentiation coefficient;

$S_{ij,t}$ – sensitivity of enterprise potential to the indicator;

α, β, γ – contributions of the three weighting criteria;

m_i – number of indicators within component i.

The next stage produces separate estimates of innovation capacity IC_t, investment resources IR_t, and strategic resilience SR_t. A weighted arithmetic mean would permit strong indicators to conceal critical deficiencies. A multiplicative function with a bottleneck penalty reduces this problem:

$$C_{i,t} = \left(\prod_{j=1}^{m_i} N_{ij,t}^{w_{ij,t}} \right) \left[1 - \lambda_i \left(1 - \min_j N_{ij,t} \right)^{\kappa_i} \right] \quad (10)$$

where:

$C_{i,t}$ – composite value of dimension i;

$N_{ij,t}$ – normalized diagnostic indicator;

$w_{ij,t}$ – adaptive indicator weight;

λ_i – bottleneck penalty coefficient;

κ_i – sensitivity to the weakest indicator.

Accordingly, $C_{1,t}=IC_t$, $C_{2,t}=IR_t$, and $C_{3,t}=SR_t$. This separation matters because similar aggregate values can conceal completely different development constraints. Their practical interpretation is specified in Table 4.

The configurations in Table 2 show why a single arithmetic score is insufficient. The integrated model must penalize structural imbalance while recognizing complementarity among the three dimensions. Innovation creates stronger development effects when financing supports commercialization and resilience protects implementation. The resulting risk-adjusted enterprise potential is calculated as:

$$EP_t^{RA} = IC_t^{\alpha_t} IR_t^{\beta_t} SR_t^{\gamma_t} \begin{bmatrix} 1 + \theta_{12} IC_t IR_t + \theta_{13} IC_t SR_t + \\ + \theta_{23} IR_t SR_t + \theta_{123} IC_t IR_t SR_t \end{bmatrix} e^{-(\mu R_t + \nu G_t)} \quad (11)$$

where:

EP_{tRA} – risk-adjusted enterprise potential;

IC_t – innovation capacity;

IR_t – investment resources;

SR_t – strategic resilience;

α_t, β_t, γ – component weights, whose sum equals one;

θ_{12}, θ_{13}, θ_{23} – pairwise synergy coefficients;

θ_{123} – three-component complementarity coefficient;

R_t – aggregated enterprise risk exposure;

G_t – structural imbalance coefficient;

μ, ν – risk and imbalance sensitivity parameters.

Table 4

Diagnostic configurations of enterprise potential and corresponding strategic responses

No.	Potential configuration	Quantitative condition	Dominant restriction	Investment response	Innovation response	Resilience response
1	Balanced expansion	All components ≥0.75	No binding restriction	Scale efficient projects	Expand validated innovations	Maintain adaptive reserves
2	Innovation financing gap	*IC*≥0.75; *IR*<0.50	Capital shortage	Mobilize staged financing	Prioritize commercialization	Protect project continuity
3	Capital accumulation	*IR*≥0.75; *IC*<0.50	Weak innovation pipeline	Redirect available capital	Develop technology portfolio	Maintain financial flexibility
4	Fragile innovation growth	*IC*≥0.70; *SR*<0.50	High disruption exposure	Finance continuity capacity	Protect priority projects	Diversify critical resources
5	Resilient technological lag	*SR*≥0.75; *IC*<0.50	Technology deficit	Fund modernization	Increase knowledge absorption	Preserve flexibility
6	Investment overextension	*IR*<0.50; *SR*<0.50	Liquidity pressure	Reduce marginal CAPEX	Suspend weak projects	Restore reserves
7	Commercialization bottleneck	High R&D, low conversion	Weak market realization	Finance market-ready projects	Redesign commercialization	Protect viable pipeline
8	Structural imbalance	Component dispersion ≥0.30	Uneven capability formation	Redirect capital	Strengthen deficient component	Increase adaptability
9	Potential erosion	All components <0.50	Systemic deterioration	Stabilize financing	Retain innovation core	Protect critical operations

Source: developed by the author

Structural imbalance is calculated separately:

$$G_t = \frac{\sqrt{\left[(IC_t - \bar{P}_t)^2 + (IR_t - \bar{P}_t)^2 + (SR_t - \bar{P}_t)^2\right]/3}}{\bar{P}_t + \varepsilon}, \bar{P}_t = \frac{IC_t + IR_t + SR_t}{3} \quad (12)$$

where:

G_t – relative structural imbalance;

$\bar{P}_t$ – average component value;

IC_t – innovation capacity;

IR_t – investment resources;

SR_t – strategic resilience;

ε – stabilizing parameter.

A low Gt indicates coordinated development, but, more precisely, it does not automatically indicate strong potential. Three simultaneously weak components can also produce low dispersion. The level and balance of potential must therefore be evaluated jointly. At this point, the calculations form a complete diagnostic sequence. The algorithm should visually connect data preparation with the final management decision (Fig. 1).

Figure 1 should therefore appear immediately after formula (12). This position separates potential measurement from the subsequent assessment of its economic realization. Accumulated potential has limited strategic value when the enterprise fails to transform it into economic results. Realization efficiency should connect previous-period potential with current value creation, innovation output, productivity, and cash generation:

$$PRE_t = \frac{\omega_1 \Delta EVA_t + \omega_2 \Delta OCF_t + \omega_3 \Delta NPS_t + \omega_4 \Delta PROD_t}{EP_{t-1}^{RA} + \varepsilon} e^{-\rho TREC_t} (1 - DL_t) \quad (13)$$

where:

PRE_t – potential realization efficiency;

ΔEVA_t – normalized growth of economic value added;

ΔOCF_t – operating cash-flow growth;

ΔNPS_t – increase in revenue share from new products;

$\Delta PROD_t$ – productivity growth;

$\omega_1, \ldots, \omega_4$ – outcome weights;

$TREC_t$ – recovery duration after disturbance;

DL_t – development losses from interrupted projects;

ρ – recovery-time penalty.

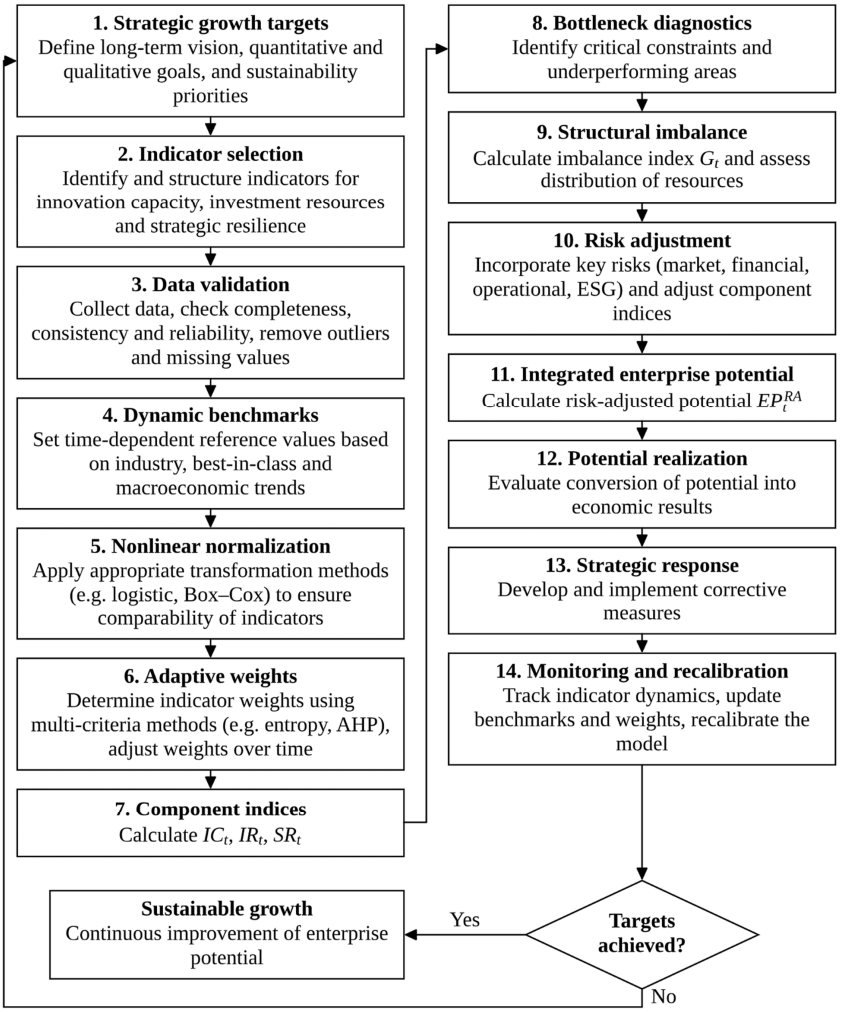


Figure 1. Integrated algorithm for assessing enterprise potential for sustainable growth

Source: developed by the author

Table 5

Management control map for converting assessed enterprise potential into sustainable growth

No.	Control signal	Diagnostic combination	Economic interpretation	Immediate management action	Medium-term intervention	Monitoring metric
1	Strong conversion	High *EPRA*, high *PRE*	Potential produces measurable growth	Continue validated projects	Scale development portfolio	*EVA* and new-product revenue
2	Latent potential	High *EPRA*, low PRE	Resources remain underutilized	Diagnose conversion barriers	Redesign commercialization	*PREt*
3	Resource exhaustion	Falling *EPRA*, high *PRE*	Current growth consumes future capacity	Limit excessive exploitation	Increase renewal investment	Potential renewal rate
4	Innovation deficit	Low *IC*	Development pipeline is insufficient	Review technology portfolio	Build absorptive capability	*ICt*
5	Financing deficit	Low *IR*	Projects exceed financing capacity	Reprioritize CAPEX	Diversify capital sources	Investment coverage
6	Resilience deficit	Low *SR*	Growth remains disruption-sensitive	Protect critical processes	Increase reconfiguration capacity	SRt
7	Structural divergence	High *Gt*	Components develop asynchronously	Redirect resources	Rebalance capabilities	*Gt*
8	Recovery delay	High *TRECC*	Disturbance creates persistent losses	Activate recovery protocol	Redesign continuity system	Recovery duration
9	Systemic deterioration	Low *EPRA*, low *PRE*	Potential and conversion weaken jointly	Stabilize core operations	Rebuild development capacity	Combined trend of EPRA and PRE

Source: developed by the author

The final diagnostic stage should connect potential, realization, and resilience under stress. Table 5 provides such an interpretation.

The proposed assessment architecture therefore shifts attention from the quantity of enterprise resources toward their economic configuration. Innovation capacity determines the ability to renew products, technologies, and processes. Investment resources determine the feasible scale and timing of development. Strategic resilience preserves these capabilities when operating assumptions change. Their interaction forms risk-adjusted enterprise potential, while PRE_t shows how effectively that potential becomes observable economic growth (Frankowska et. al., 2025).

Enterprise potential is realized through interconnected resource flows extending from suppliers, technology providers, financial institutions, and knowledge sources to production processes and final markets. Their coordination determines how accumulated innovation capacity and investment resources become sustainable economic results. Fragmented management weakens this conversion because local optimization can improve individual operations while reducing the productivity of the enterprise system. End-to-end management, by contrast, connects resource acquisition, innovation development, investment allocation, production, commercialization, and recovery mechanisms within a single strategic trajectory.

For this reason, realization of enterprise potential should satisfy five conditions: strategic consistency of projects, sufficient innovation capacity, accessible investment resources, acceptable residual risk, and preservation of minimum resilience. These conditions transform project selection into a constrained optimization problem rather than a conventional maximization of current profit. The economic component can be formalized through a risk-adjusted portfolio objective:

$$\max_{\mathbf{x}} Z_t = \sum_{p=1}^{P} x_{p,t}\left(NPV_{p,t} + ROV_{p,t} + SCV_{p,t}\right) - \lambda\sqrt{\mathbf{x}_t^T \acute{O}_t \mathbf{x}_t} - \mu\sum_{p=1}^{P} x_{p,t} EL_{p,t} \quad (14)$$

where:

Z_t – total risk-adjusted value created by the development portfolio;

$x_{p,t}$ – share of resources allocated to project p;

$NPV_{p,t}$ – expected net present value of project p;

$ROV_{p,t}$ – real-option value of managerial flexibility;

$SCV_{p,t}$ – strategic capability value generated by the project;
Σt – covariance matrix of project outcomes;
$EL_{p,t}$ – expected economic loss associated with project risk;
λ – sensitivity to portfolio volatility;
μ – sensitivity to expected losses;
P – number of development projects.

This objective differs from conventional profit maximization because innovation projects can create reusable technological knowledge, digital capabilities, market access, or organizational flexibility. Their strategic value can therefore exceed direct discounted cash flows. At the same time, correlated projects increase portfolio vulnerability and receive an explicit risk penalty. Investment decisions remain subject to financial and resilience constraints:

$$\sum_{p=1}^{P} x_{p,t} I_{p,t} \le IR_t^{AV}, CFaR_t^{0.95} + \sum_{p=1}^{P} x_{p,t} LQ_{p,t} \le LQ_t^{RES}, SR_{t+1}(\mathbf{x}) \ge SR^{MIN} \quad (15)$$

where:

$I_{p,t}$ – investment requirement of project pp;
IR_t^{AV} – investment resources available for development;
$CFaR_t^{0.95}$ – cash-flow-at-risk at the 95% confidence level;
$LQ_{p,t}$ – additional liquidity requirement of project p;
LQ_t^{RES} – liquidity available after maintaining operating reserves;
SR_{t+1} – expected strategic resilience after portfolio implementation;
SR^{MIN} – minimum admissible resilience level.

The quantitative aspect concerns the scale at which accumulated potential reaches the market. Sales growth alone gives an incomplete result because expansion can be achieved through aggressive pricing or excessive capital consumption. Market realization should therefore be related to innovation output, contribution margin, and accessible demand:

$$MRI_t = \sum_{i=1}^{n} \omega_i \left(\frac{Q_{i,t}}{D_{i,t}^A} \right) \left(\frac{CM_{i,t}}{CM_{i,t}^T} \right) \left(1 - \rho_i^D \right) \quad (16)$$

where:

MRI_t – market realization index;
$Q_{i,t}$ – realized sales of product i;
$D_{i,t}^A$ – economically accessible market demand;
$CM_{i,t}$ – actual contribution margin;

$CM_{i,t}$ – target contribution margin;
ρ_i^D – demand-risk coefficient;
ω_i – strategic weight of product i;
n – number of products or market offers.

The qualitative dimension concerns whether growth renews the enterprise rather than only expanding existing operations. Product quality, technological novelty, customer value, digital integration, knowledge accumulation, and scalability should therefore enter project evaluation. Here the connection with innovation capacity becomes direct: development expenditure creates sustainable potential only when new knowledge and technologies become economically usable capabilities.

Strategic resilience completes this mechanism. Projects should be evaluated against alternative scenarios involving demand contraction, financing-cost growth, supply disruption, technology failure, or delayed commercialization. The residual potential after scenario ss can be expressed as:

$$REP_{s,t} = EP_t^{RA}\left[1 - \sum_{q=1}^{Q} d_{q,s,t} v_{q,t} (1 - r_{q,t})\right] + RC_{s,t} \quad (17)$$

where:
$REP_{s,t}$ – residual enterprise potential under scenario ss;
EP_t^{RA} – initial risk-adjusted enterprise potential;
$d_{q,s,t}$ – intensity of disturbance q;
$v_{q,t}$ – enterprise vulnerability to the disturbance;
$r_{q,t}$ – effectiveness of existing protection mechanisms;
$RC_{s,t}$ – potential restored through resource reconfiguration;
Q – number of risk channels.

The realization model therefore connects innovation strategy with investment decisions and resilience requirements. Its information inputs include market demand, expected prices, customer requirements, financing conditions, technology alternatives, supplier constraints, project risks, and available competencies. These data form the analytical basis for selecting development projects and determining the sequence of their implementation (Fig. 2).

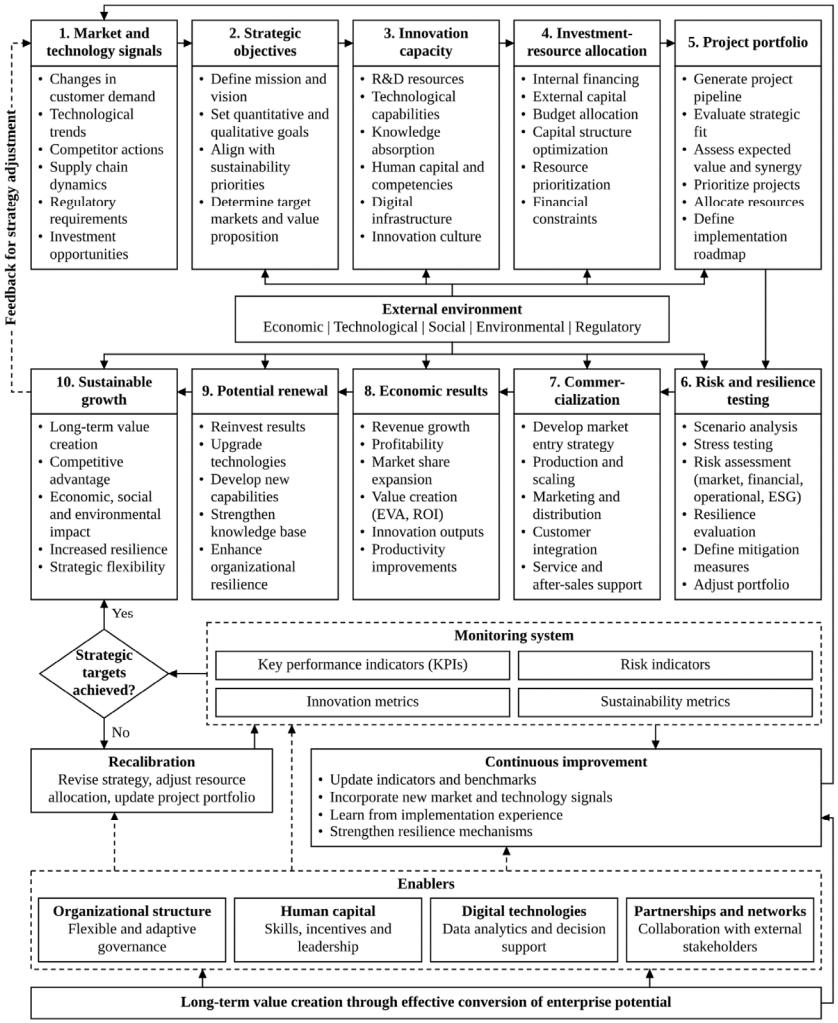


Figure 2. Strategic model for converting enterprise potential into sustainable growth

This architecture establishes a feedback relationship between potential formation and realization. Economic results replenish investment resources, successful innovations expand technological and knowledge capacity, while resilience mechanisms preserve development continuity. Sustainable growth therefore emerges when the enterprise continuously renews its potential while keeping investment intensity, innovation conversion, and exposure to disruption within economically justified boundaries.

CONCLUSIONS

1. The study substantiated enterprise potential for susta inable growth as an integrated configuration of innovation capacity, investment resources, and strategic resilience rather than a static stock of available assets. The proposed structure links technological renewal, knowledge absorption, commercialization, financing capacity, investment efficiency, operational continuity, and resource reconfiguration. This approach separates resource availability from the enterprise's capacity to convert resources into economic outcomes. Sustainable growth is therefore associated with coordinated development of all three dimensions, since a deficit in one component can constrain the productive realization of otherwise strong organizational capabilities.

2. The developed assessment model provides a multistage procedure for measuring enterprise potential under heterogeneous indicators and changing operating conditions. Nonlinear normalization reduces distortions caused by extreme observations, while adaptive weighting incorporates economic significance, information differentiation, and indicator sensitivity. Multiplicative aggregation introduces a bottleneck penalty that prevents strong parameters from mechanically compensating for critical deficiencies. The integrated assessment additionally incorporates component synergies, strategic risk exposure, volatility, and structural imbalance. This construction identifies not only the current potential level but also internal disproportions capable of restricting subsequent enterprise development.

3. The proposed distinction between accumulated potential and its realization expands the analytical value of enterprise diagnostics. The potential realization efficiency indicator connects previously accumulated capabilities with changes in economic value added, operating cash flow, innovation sales, and productivity. Its joint interpretation with risk-

adjusted enterprise potential reveals fundamentally different development states. High potential accompanied by weak realization indicates unused capabilities, whereas intensive realization combined with declining potential signals resource exhaustion and insufficient renewal. The resulting diagnostic logic supports targeted allocation of investment resources instead of decisions based solely on aggregate financial performance.

4. The strategic model links potential formation, investment allocation, innovation implementation, commercialization, economic results, and subsequent capability renewal within a continuous management cycle. Project selection incorporates expected financial value, strategic capability effects, portfolio risk, liquidity constraints, and minimum resilience requirements. Scenario assessment additionally measures residual enterprise potential after demand, financing, supply, or technological disturbances. Sustainable growth is achieved when economic results replenish investment resources, successful innovations expand technological and knowledge capacity, and resilience mechanisms preserve development continuity. The model therefore provides an applied basis for recurrent monitoring, resource reconfiguration, and strategic recalibration.

References:

1. Duarte, N., & Dong, R. K. (2026). Industry 4.0 technologies as drivers of strategic and business model innovation: A conceptual framework. *Systems,* 14(1), 4. DOI: https://doi.org/10.3390/systems14010004

2. Eicke, A.-K., Sabel, C. A., & Nüesch, S. (2026). Strategic AI orientation and technological innovation: Evidence from managerial insights and panel data. *Journal of Product Innovation Management,* 43(2), 262–289. DOI: https://doi.org/10.1111/jpim.70001

3. European Bank for Reconstruction and Development. (2026). *Digital approach 2026–30.* Available at*:* https://www.ebrd.com/content/dam/ebrd_dxp/assets/pdfs/digitalisation/EBRD-digital-approach-2026-2030.pdf

4. Fahziar, R. I. (2026). Innovation in strategic management for sustainable business transformation. *Journal of Studies in Academic, Humanities, Research, and Innovation,* 3(1), 229–237. DOI: https://doi.org/10.71305/sahri.v3i1.1393

5. Frankowska, M., Cheba, K., Anityasari, M., & Karningsih, P. D. (2025). Digital maturity of enterprises in terms of cooperation in supply chains & networks – Intelligent management perspective. In K. Beyer, M. Łatuszyńska, K. Nermend, & M. Piwowarski (Eds.), *Intelligent management and artificial intelligence: Trends, challenges, and opportunities: Vol. 1. Proceedings on 28th European Conference on Artificial Intelligence ECAI 2025 – InMan Workshop. University of Szczecin*. DOI: https://doi.org/10.18276/978-83-8419-028-9-19

6. Garrido-Moreno, A., Martín-Rojas, R., & García-Morales, V. J. (2024). The key role of innovation and organizational resilience in improving business performance: A mixed-methods approach. *International Journal of Information Management*, 77, 102777. DOI: https://doi.org/10.1016/j.ijinfomgt.2024.102777

7. Giraldi, L., & Rossi, L. (2026). Strategic entrepreneurship in the space economy: A START framework for assessing innovative firms. *Journal of Industrial and Business Economics.* DOI: https://doi.org/10.1007/s40812-026-00389-0

8. Gkika, E. C., Kargas, A., Salmon, I., & Drosos, D. (2025). Unveiling digital maturity: Key drivers of digital transformation in the Greek business ecosystem. *Administrative Sciences,* 15(3), 96. DOI: https://doi.org/10.3390/admsci15030096

9. Gudz, O., Yevtushenko, N., & Hlushenkova, A. (2024). Directions for the development of the innovation potential of enterprises in the context of digital transformations. *Baltic Journal of Economic Studies,* 10(1), 44–53. DOI: https://doi.org/10.30525/2256-0742/2024-10-1-44-53

10. Jie, H., Gooi, L. M., & Lou, Y. (2025). Digital maturity, dynamic capabilities and innovation performance in high-tech SMEs. *International Review of Economics & Finance*, 99, 103971. DOI: https://doi.org/10.1016/j.iref.2025.103971

11. Lee, K., Song, Y., Park, M., & Yoon, B. (2024). Development of digital transformation maturity assessment model for collaborative factory involving multiple companies. *Sustainability*, 16(18), 8087. DOI: https://doi.org/10.3390/su16188087

12. Li, J., Huang, C.-K., & Wu, C.-H. (2026). Determining factors of technological innovation capability in the technology industry. *In Proceedings of the 8th International Conference on Finance, Economics, Management and IT Business* (FEMIB 2026) (pp. 48–59). SCITEPRESS. DOI: https://doi.org/10.5220/0014968500004045

13. Makedon, V., Myachin, V., Kuriacha, N., Chaika, Yu., & Koptilyi, D. (2025a). Development of strategic management of a corporation through the implementation of scenario analysis. *Scientific Bulletin of Mukachevo State University. Series "Economics"*, 12(2), 135–146. DOI: https://doi.org/10.52566/msu-econ2.2025.135

14. Makedon, V., Myachin, V., Aloshyna, T., Cherniavska, I., & Karavan, N. (2025b). Improving the readiness of enterprises to develop sustainable innovation strategies through fuzzy logic models. *Economic Studies (Ikonomicheski Izsledvania),* 34(5), 165–179. Available at: https://archive.econ-studies.iki.bas.bg/2025/2025_05/2025_05_09.pdf

15. Makedon, V., & Koptilyi, D. (2025c). Digital transformation and artificial intelligence as factors in the economic recovery of enterprises following armed conflicts. *Economics, Entrepreneurship, Management,* 12(1), 33–48. DOI: https://doi.org/10.56318/eem2025.01.033

16. Martell-Chávez, F., López-Téllez, J. M., May-Arrioja, D. A., Valenzuela-González, R., & Ortiz-Morales, M. (2026). Innovation and technology management strategies for Industry 4.0 adoption in small and medium-sized enterprises in developing countries. *Journal of Open Innovation: Technology, Market, and Complexity*, 12(2), 100769. DOI: https://doi.org/10.1016/j.joitmc.2026.100769

17. Njah, S., Danjou, C., Armellini, F., Beaudry, C., & Mosconi, E. (2026). A digital maturity model for assessing SMEs in the manufacturing sector. *Digital Engineering,* 9, 100084. DOI: https://doi.org/10.1016/j.dte.2025.100084

18. Nuryakin, & Qamari, I. N. (2026). The mediating role of innovation capability and technological capability in the relationship between absorptive capacity and SMEs' business performance. *International Journal of Innovation Studies,* 10(1), 65–79. DOI: https://doi.org/10.1016/j.ijis.2025.09.004

19. Orošnjak, M., Kedziora, S., & Desloges, M. (2025). Digital maturity of SMEs in the EU: Leaders and laggards of Luxembourg's manufacturing ecosystem. *Technologies,* 13(12), 541. DOI: https://doi.org/10.3390/technologies13120541

20. Stef, A. L., Crisan, E. L., & Vararean-Cochisa, D. (2026). Digital maturity and digital transformation maturity models: A systematic literature review. *Information Systems and e-Business Management.* DOI: https://doi.org/10.1007/s10257-026-00741-w

21. Tan, A. S. I., Sia, B. C., Yeong, W. M., & Falahat, M. (2026). Digital transformation: The role of digital maturity and its determinants on business performance. *Journal of Asia Business Studies,* 20(2), 541–564. DOI: https://doi.org/10.1108/JABS-08-2024-0480

22. Thornhill, S. (2006). Knowledge, innovation and firm performance in high- and low-technology regimes. *Journal of Business Venturing*, 21(5), 687–703. DOI: https://doi.org/10.1016/j.jbusvent.2005.06.001

23. Tsiavos, V., & Kitsios, F. C. (2026). Turning digital ambitions into digital maturity: The role of a digital transformation strategy. *IEEE Access,* 14, 40469–40477. DOI: https://doi.org/10.1109/ACCESS.2026.3673955

24. Wang, J., Cao, R., Wang, G., & Peng, X. (2024). Research on the configuration path of innovation performance of strategic emerging enterprises. *Sustainability,* 16(21), 9260. DOI: https://doi.org/10.3390/su16219260

COGNITIVE RISK-ORIENTED CONTROL OF TRADE RECEIVABLES UNDER THE DIGITAL TRANSFORMATION OF ACCOUNTING

Viktoriya Onyshchenko[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-10

Abstract. The digital transformation of the economy is changing the role of accounting. Traditional methods of recording trade receivables remain largely retrospective and no longer provide timely support for credit-risk management. This chapter examines the methodological foundations of accounting for and control of trade receivables under conditions of digital transformation. The subject of the research is the development of cognitive risk-oriented control of trade receivables. The study focuses on the integration of formal accounting standards with continuous monitoring, predictive analytics and artificial intelligence tools. *The purpose* of the paper is to develop the concept of cognitive risk-oriented control and to propose a model of a dynamic accounting–management continuum. This continuum links regulatory accounting procedures with continuous monitoring and predictive analytics within a single information environment. The concept treats accounting data not only as a basis for retrospective reporting but also as a continuously updated information base for forward-looking credit-risk assessment and managerial decision-making. *The methodology* of the study combines theoretical and empirical approaches. It draws on contemporary accounting theory, the principles of risk-oriented management, the requirements of Ukrainian Accounting Standard 10 and IFRS 9, and current research on the digital transformation of accounting. Systems analysis, comparative analysis, synthesis and modelling techniques are used to structure the concept and the continuum model. The empirical component is based on the financial and operational

[1] Candidate of Technical Sciences, Associate Professor,
Associate Professor of the Department of Real Estate Development, Finance, Accounting and Marketing,
Educational and Scientific Institute «Prydniprovsk State Academy of Construction and Architecture» of the Ukrainian State University of Science and Technology, Ukraine

© Viktoriya Onyshchenko

data of the Ukrainian wholesale trading enterprise ATIF LLC for the period 2021–2025. A six-month pilot implementation of the proposed two-layer model was conducted. Economic assessment employs standard investment-appraisal indicators, including return on investment, net present value and payback period. Scenario modelling tests the resilience of the results under different assumptions. Elements of machine learning support the estimation of default probabilities and early-warning indicators. *The results* show that the proposed concept and model do not contradict existing accounting standards. They extend the functional capabilities of accounting by enabling continuous monitoring, adaptive forecasting of credit risk and the generation of managerial recommendations. The pilot at ATIF LLC demonstrated measurable improvements: the average overdue period shortened, the share of overdue receivables declined, and forecast accuracy reached 84.2 per cent. Economic assessment indicated a positive net cash effect arising mainly from faster working-capital turnover. Scenario modelling confirmed that the net present value remained positive under optimistic, baseline and pessimistic conditions. The two-layer model preserves the regulatory reliability and auditability of formal accounting while adding predictive capability. The conservative accounting layer ensures compliance with standards. The cognitive analytical layer generates early signals and ranked recommendations. Final decisions remain with managers. The approach reduces the information gap between financial reporting and operational credit-risk management. *Practical implications* include the possibility of earlier identification of rising credit risk, more efficient use of working capital and better alignment between accounting, finance and sales functions. The value of the research lies in the systematic integration of regulatory accounting requirements with continuous digital analytics and artificial intelligence tools. The proposed model offers a coherent methodological basis for the further development of accounting under conditions of digital transformation. Limitations related to data quality, model explainability and the single-enterprise pilot setting are acknowledged and point to directions for future multi-enterprise and longitudinal studies.

INTRODUCTION

The digital transformation of the economy is changing both the technologies used in business operations and the ways accounting information is generated, processed and applied. Artificial intelligence, big data analytics, cloud services and integrated ERP/CRM systems allow enterprises to analyse processes in near real time. As a result, accounting is gradually moving from a predominantly retrospective recording function towards continuous information support for managerial decision-making [1, p. 12–18; 2, p. 92–95].

Trade receivables occupy a sensitive position in this shift. They represent an asset, a sales-stimulation instrument and a major source of credit risk. Extending trade credit supports revenue growth. At the same time it exposes firms to payment delays, defaults, liquidity pressure and weakened financial stability. Under conditions of high economic volatility, geopolitical risks and unstable supply chains, traditional accounting procedures no longer supply management with sufficiently timely analytical support. They cannot identify changes in credit risk quickly enough or help adjust credit decisions in good time [3, p. 35–38; 4, p. 75–82].

Ukrainian Accounting Standard 10 «Accounts Receivable» was developed in an environment of predominantly documentary record-keeping and relative economic stability [5]. It rests on the prudence principle, documentary substantiation, periodic control and largely retrospective assessment of non-recovery risk. International practice has advanced further. IFRS 9 Financial Instruments replaced the incurred-loss model with an expected credit loss (ECL) approach. This approach incorporates historical experience, current conditions and forward-looking information [6]. Even the ECL model, however, remains oriented primarily towards the faithful representation of information in the financial statements. It is not designed for continuous, operational credit-risk management in a digital environment.

Ukrainian research has examined the organisational and methodological foundations of receivables accounting under Standard 10. It has addressed recognition and measurement criteria, allowance formation and internal-control procedures [7, p. 2–5; 8, p. 56]. Comparative studies have highlighted differences between Standard 10 and IFRS 9 in the timing and measurement of impairment [7, p. 3–4]. Parallel work has considered the organisation

of accounts-receivable accounting within risk-management systems [3, p. 35–41] and the impact of automation on accounting and analytical support [9, p. 92–97]. International literature has focused on the transition from the incurred-loss model to the ECL model, the construction of provision matrices and the incorporation of forward-looking information. A separate stream has developed continuous auditing and continuous monitoring. These studies show how artificial intelligence, machine learning and anomaly-detection techniques can move assurance from periodic sampling to ongoing assessment of entire transaction populations [10; 11]. Research on the digital transformation of accounting documents the influence of big data, robotic process automation and artificial intelligence on processes and on the accountant's role. It also identifies persistent challenges of algorithmic transparency, explainability and data security [1, p. 15–25; 2, p. 93–96]. Predictive-analytics studies demonstrate that combinations of historical transaction data, behavioural indicators and macroeconomic variables can generate earlier warnings of payment deterioration than traditional ageing analysis [4, p. 80–88].

Despite these advances, the systematic integration of the regulatory framework for trade receivables with cognitive technologies remains underdeveloped. Existing approaches tend either to stay within the boundaries of financial-reporting requirements or to treat digital tools as separate managerial instruments. The resulting separation produces information duplication, higher processing costs and persistent gaps between the accounting function and operational credit-risk control.

This study therefore develops the methodological foundations of accounting for and control of trade receivables. It does so by substantiating the concept of cognitive risk-oriented control. Cognitive risk-oriented control is understood as an integrated system. It combines the reliability and auditability requirements of formal accounting standards with continuous monitoring, predictive analytics and risk-oriented decision-support tools. It treats accounting data not only as a basis for retrospective reporting. It also treats them as a continuously updated information substrate for forward-looking credit-risk assessment and managerial action.

The aim of the work is to develop this concept and to propose a model of a dynamic accounting–management continuum. The continuum

links regulatory accounting procedures with continuous monitoring and predictive analytics.

To achieve the aim the following objectives are pursued:

– to examine the conceptual contradictions between the traditional system of accounting for trade receivables and the requirements of risk-oriented management;

– to analyse the potential of digital technologies for enhancing accounting and credit-risk management systems;

– to develop the concept of cognitive risk-oriented control of trade receivables;

– to propose a model of a dynamic accounting–management continuum;

– to test the proposed model empirically and assess its practical and economic effectiveness.

The theoretical and methodological basis comprises contemporary accounting theory, the concept of risk-oriented management, the provisions of IFRS 9, the requirements of Ukrainian Accounting Standard 10, and current approaches to the digital transformation of accounting systems. Systems analysis, analysis and synthesis, comparative method and modelling techniques were employed. Economic analysis, scenario modelling and standard investment-appraisal techniques (ROI, NPV, payback period) were used to assess practical applicability. Elements of machine learning were applied for credit-risk forecasting.

The empirical component draws on the operational data of the Ukrainian trading enterprise ATIF LLC. These data serve to test the proposed concept and continuum model under real business conditions. They also help evaluate their potential impact on the effectiveness of trade-receivables management. In this way the theoretical construction is linked directly to observable operational outcomes.

1. Conceptual Contradictions in Receivables Accounting

The digital economy is changing the information requirements of enterprise management. Accounting has traditionally focused on the reliable recording of past transactions. Contemporary conditions, however, demand information that can also forecast financial risks and support decisions in real time [1, p. 12–18; 2, p. 92–95].

This tension is especially visible in the accounting for trade receivables. Receivables are a major current asset that supports sales through the extension of trade credit. At the same time they constitute a significant source of financial risk linked to non-recovery, reduced liquidity, higher working-capital needs and cash-flow gaps [3, p. 35–38; 4, p. 75–82].

The existing methodology was formed in an environment of slower information flows, geographically limited markets and paper-based documentation. Its core principles therefore remain documentary substantiation, periodic control, regulatory measurement rules and a predominantly retrospective analytical orientation.

Under Ukrainian Accounting Standard 10, credit risk is assessed either by individual analysis of specific debtors or by applying a doubtful-debt coefficient derived from historical data [5]. The same logic underlies most internal-control practices, which continue to rely on inventory results, reconciliation statements and ageing analyses of overdue amounts. This approach is consistent with the prudence principle. Yet it has clear limitations in a highly volatile environment: risk assessments are made largely after indicators of problematic receivables have already appeared. Accounting thus tends to document realised losses rather than to prevent them.

The acceleration of business processes intensifies the problem. Large enterprises process thousands of counterparty transactions daily and operate through electronic document management, digital payment systems, automated warehouses, CRM platforms and integrated ERP systems. Under these conditions selective, periodic control loses effectiveness because it cannot detect changes in the payment behaviour of individual debtors in a timely manner [9, p. 92–97; 10].

The nature of credit risk itself has also changed. Non-recovery is no longer driven primarily by the financial difficulties of individual counterparties. Macroeconomic instability, war-related risks, cyber threats, supply-chain disruptions, exchange-rate volatility and behavioural factors now play a larger role. A substantial share of these factors lies outside the scope of conventional accounting systems [4, p. 80–88].

A fundamental methodological contradiction therefore arises. Accounting measures assets on the basis of already substantiated events and transactions, in accordance with the principles of reliable representation and

prudence. Contemporary risk-oriented management, by contrast, requires timely information about probable future events. Even the expected-credit-loss model introduced by IFRS 9, while incorporating forward-looking information for financial-reporting purposes, remains oriented primarily towards the faithful presentation of the financial statements rather than towards continuous operational credit-risk control [6; 7, p. 3–4].

The result is the coexistence of two parallel information environments: the regulatory accounting system and autonomous management-analytics systems. This fragmentation produces duplication of functions, conflicting risk assessments, longer decision cycles and reduced managerial responsiveness. Integration of accounting, internal control and digital analytical tools is therefore becoming a central direction in the development of contemporary accounting methodology.

2. Empirical Analysis of ATIF LLC

To provide empirical support for the theoretical argument, the financial position and receivables management practices of ATIF LLC were examined. ATIF LLC is a Ukrainian wholesale trader in metals and metal ores (NACE 46.72; registration number 37070162). The analysis covers the period 2021–2025 and draws on the enterprise's financial statements, source documents, subsidiary ledgers, internal management reports, and questionnaires completed by 15 employees from the accounting, finance and sales functions.

Financial position and the role of trade receivables. The enterprise maintained modest but stable profitability. Net profit margins ranged between 0.34 % and 1.19 %. Total assets grew 3.1-fold over the five years. Current assets consistently accounted for 97–98 % of total assets.

Trade receivables formed the dominant and most risk-sensitive element of current assets. Their carrying amount rose from UAH 928.7 thousand in 2021 to a peak of UAH 6,373.2 thousand in 2024 (a 6.86-fold increase), before falling by 59.1 % to UAH 2,604.1 thousand in 2025. As a share of current assets, receivables stood at 84.8–88.8 % during 2022–2024 and declined to 52.0 % only in 2025. This pattern indicates a high degree of capital immobilisation in customer settlements.

Receivables turnover deteriorated sharply. The collection period lengthened from approximately 10 days in 2021 to 82 days in 2025 –

an 8.2-fold increase. The slowdown tied up substantial working capital and weakened liquidity.

In 2025 the current ratio stood at 2.01 and the quick ratio at 1.05. Both met conventional benchmarks. However, the still-elevated share of receivables (52 %) and the prolonged collection period reduced the quality of those liquidity ratios. During 2022–2024 the financial-risk ratio rose from 2.91 to 9.12, while the equity ratio fell to 0.10 in 2024.

Overall, the data show rapid growth in the scale of operations accompanied by a persistent and severe deterioration in receivables management.

The tension between accounting conservatism (anchored in the prudence principle) and managerial proactivity (driven by the need for timely risk foresight) is clearly visible in ATIF LLC's practices. The principal manifestations are summarised in Table 1 and elaborated below.

Table 1

Manifestations of the contradiction in the measurement and assessment of trade receivables at ATIF LLC

Manifestation	Accounting approach (conservatism)	Managerial requirement (proactivity)	Observable consequence at ATIF LLC
Temporal orientation	Retrospective, based on historical data	Forward-looking risk assessment	Collection period lengthened from 10 to 82 days
Basis for allowance	Historical default rates or ageing	Expected credit losses incorporating forecasts	Peak receivables of UAH 6,373.2 thousand in 2024
Frequency of information	Discrete (reporting dates)	Continuous monitoring	Continued extension of credit during 2022–2024 without early-warning signals
Effect on decision-relevant metrics	Prudent understatement of net receivables	Realistic appraisal of liquidity and risk	Quick ratio of 1.05 masks weaker effective liquidity

Source: compiled by the author from enterprise data.

Manifestation 1 – Retrospective allowance recognition. Under Ukrainian Accounting Standard 10 the allowance for doubtful debts is determined from historical non-payment experience or individual ageing analysis [5].

At ATIF LLC the allowance is formed largely after receivables have already become overdue. The sharp lengthening of the collection period suggests that actual credit risk exceeded the historically based provision, particularly in 2024 when receivables reached their peak. The resulting net receivables figure therefore understated the risk exposure relevant to operational decisions.

Manifestation 2 – Information lag. Accounting captures receivables primarily at reporting dates. Management, by contrast, requires continuous visibility of changing payment behaviour. In the absence of daily monitoring or behavioural early-warning indicators, the enterprise continued to grant payment deferrals throughout 2022–2024. The subsequent peak in receivables and the forced reduction in 2025 illustrate the cost of this lag.

Manifestation 3 – Distortion of liquidity indicators. Conservative measurement produces a lower net receivables balance, which can improve reported liquidity ratios. In 2025 the current and quick ratios appeared satisfactory, yet the low quality of the underlying receivables reduced true liquidity. The divergence between the accounting numbers and the economic reality delayed corrective action on collections.

Manifestation 4 – Fragmented internal control. Financial accounting focuses on regulatory compliance and prudence. The sales function prioritises volume growth through credit extension. Without a shared risk-assessment framework, control procedures remain fragmented. This contributed to the rise in the receivables-to-assets ratio to 84.8 % in 2024 and to the overall deterioration in the enterprise's financial-risk profile.

The evidence from ATIF LLC confirms that the existing accounting and control system remains predominantly retrospective. It constrains timely managerial response, reduces the efficiency of working-capital use, and elevates the probability of financial loss. These empirical findings reinforce the need for an integrated approach that retains the reliability of formal accounting while incorporating continuous, forward-looking credit-risk monitoring.

3. Concept of Cognitive Risk-Oriented Control

Digital technologies are changing the role of accounting within the enterprise information system. Accounting is no longer confined to the accumulation of source documents. It is evolving into a platform that

integrates accounting, financial, operational, logistics and commercial data flows [1, p. 15–25; 2, p. 93–96].

In international practice the related concepts of continuous accounting, continuous monitoring and continuous auditing have gained prominence. These approaches shift control from periodic reviews to the ongoing analysis of transactions through automated analytics [10; 11]. Their primary focus, however, remains either the automation of accounting procedures or the strengthening of assurance. They address only partially the integration of accounting with the strategic management of credit risk.

Contemporary literature on continuous auditing (CA) and continuous monitoring (CM) has significantly influenced the evolution of digital assurance and control practices. Continuous auditing is generally understood as a process that enables auditors to provide assurance on a subject matter in near real time, or shortly after the occurrence of events, by means of automated analytical procedures applied to entire populations of transactions rather than samples. Continuous monitoring, by contrast, is typically performed by management itself and focuses on the ongoing evaluation of internal controls and operational processes. Although the two concepts are closely related, they differ in purpose and ownership: CA is primarily an assurance activity, while CM is a management control activity [10; 11].

The theoretical foundations of continuous auditing were largely established in the late 1990s and early 2000s by researchers associated with the Rutgers Accounting Research Centre. Seminal contributions emphasised the shift from periodic, sample-based auditing to automated, full-population testing enabled by enterprise resource planning systems and advanced data analytics. Subsequent work expanded the conceptual model to include a continuum of assurance frequencies ranging from traditional periodic audits to fully continuous assurance. More recent studies have incorporated artificial intelligence, machine learning and anomaly-detection techniques, demonstrating their potential to identify unusual patterns that conventional rule-based controls might overlook.

The literature highlights several important strengths of CA and CM approaches. First, they allow the examination of entire transaction populations rather than statistical samples, thereby increasing the likelihood of detecting both material misstatements and operational anomalies.

Second, the near real-time nature of the analysis shortens the detection-to-correction cycle and supports more timely managerial intervention. Third, automated analytics can reduce the cost of routine testing over time and free professional judgement for higher-value tasks. Empirical studies and pilot implementations have reported improvements in control effectiveness, reductions in the time required for period-end procedures, and earlier identification of fraud or error indicators.

Nevertheless, a critical reading of the literature reveals several persistent limitations and unresolved tensions. Many published studies remain predominantly conceptual or laboratory-based. Large-scale, longitudinal implementations in complex organisational settings are still relatively scarce, and the external validity of reported benefits is therefore limited. Data quality and systems integration continue to pose significant practical challenges. Incomplete, inconsistent or poorly structured data can generate high rates of false positives, undermining user confidence and creating alert fatigue. The "black-box" nature of certain machine-learning algorithms raises further concerns regarding explainability and auditability – issues that are particularly acute when assurance conclusions must be defended before regulators or external auditors.

Another critical gap concerns the organisational and human dimensions of continuous approaches. Successful implementation requires not only technological infrastructure but also changes in skills, processes and organisational culture. Auditors and accountants need new competencies in data analytics and model interpretation, while management must be prepared to act on continuous signals. Resistance to change, unclear accountability for responding to alerts, and the risk of over-reliance on automated outputs are frequently under-examined in the technical literature. Moreover, most CA and CM research remains oriented towards assurance and internal-control testing rather than towards the operational management of specific financial risks, such as credit risk embedded in trade receivables.

A further limitation is the relatively weak integration of continuous techniques with formal financial-reporting requirements. While CA and CM can generate valuable risk signals, they do not automatically translate those signals into accounting estimates that satisfy the prudence, reliability and auditability criteria of standards such as Ukrainian Accounting Standard 10 or IFRS 9. The literature tends to treat continuous analytics

and regulatory accounting as parallel rather than tightly coupled systems. This separation reproduces, at a technological level, the very information gap between accounting and risk management that the present study seeks to address.

In summary, research on continuous auditing and continuous monitoring has established an important conceptual and technological foundation for moving beyond periodic, retrospective control. At the same time, the field still faces material challenges related to data quality, model transparency, organisational readiness and the limited linkage with formal accounting measurement. The cognitive risk-oriented control model developed in this chapter builds upon the strengths of CA and CM – continuous data processing, full-population analysis and predictive capability – while deliberately embedding these capabilities within a two-layer architecture that preserves regulatory compliance and professional accountability. In doing so, it attempts to narrow the gap between continuous digital assurance techniques and the practical requirements of credit-risk management and financial reporting.

Against this background the present study proposes the concept of cognitive risk-oriented control of trade receivables. The concept treats accounting not as the final stage of transaction recording but as a core component of an intelligent decision-support system.

Cognitive capability is defined here as the capacity of an information system to:

– process large volumes of structured and unstructured data;

– identify patterns and anomalies that are not visible through conventional ageing analysis;

– generate probabilistic forecasts of default and recovery;

– produce transparent, auditable recommendations for credit-policy decisions while preserving the possibility of professional judgement.

In this framework accounting retains its regulatory function and continues to satisfy the requirements of Ukrainian Accounting Standard 10 and IFRS 9 [5; 6]. At the same time it is supplemented by forward-looking analytical tools operating within a single information environment.

The system draws on several interconnected data flows:

– internal accounting records, source documents and trial balances;

– management data on credit limits, settlement history and sales policy;

– behavioural data from CRM systems;

– operational data from ERP platforms (logistics, contract performance);

– external sources (state registers, court decisions, tax data, credit ratings and macroeconomic indicators).

Integration of these flows enables a shift from the assessment of existing receivables to the forecasting of their future quality.

The change in analytical logic is fundamental. Conventional accounting answers the question «What has already happened?». Cognitive risk-oriented control addresses a wider set of managerial questions:

– which counterparties currently exhibit the highest probability of default;

– how the risk profile of the receivables portfolio is likely to evolve in the near term;

– what impact expected macroeconomic changes may have on portfolio quality;

– how credit terms and limits should be adjusted to limit potential losses;

– which transactions display anomalous patterns that warrant investigation.

Accounting information therefore ceases to be the final output of the recording process and becomes the primary input for an intelligent decision-support system.

Contribution of the proposed concept. The concept contributes to the literature by systematically combining three elements that are usually treated separately:

the regulatory reliability and auditability required by accounting standards;

continuous digital monitoring of transactions and counterparty behaviour;

predictive analytics capable of generating forward-looking credit-risk signals.

By embedding these elements within a single architecture, the approach reduces the information gap between formal accounting and operational credit-risk management while preserving compliance with existing financial-reporting requirements.

4. Dynamic Accounting – Management Continuum

Digital transformation requires accounting to move beyond the accumulation of historical data. Accounting must become an integral part of a single enterprise management information environment that combines business analytics, risk management, machine learning and digital decision-support platforms [1, p. 15–25; 2, p. 93–96].

Most current models of digital transformation still treat accounting and management as separate functional blocks linked mainly by periodic information exchange. Information therefore passes through several processing stages and loses operational value before it reaches decision-makers. This separation reproduces the very contradictions observed at ATIF LLC: retrospective allowance recognition, information lag, distorted liquidity signals and fragmented internal control.

To overcome the separation, a dynamic accounting–management continuum is proposed. In this continuum accounting, internal control, risk management and digital analytics function as one adaptive system. Information flows continuously and in both directions. Analytical outputs directly shape accounting estimates and control procedures, while accounting data are continuously enriched by internal and external digital sources.

Core principles and their realisation. The continuum rests on five interrelated principles.

Continuity. Data on invoices, payments, credit-limit utilisation and customer behaviour are captured and processed in near real time. There is no need to wait for the end of a reporting period before risk signals become available. At ATIF LLC this would have allowed the lengthening collection period (from 10 to 82 days) to be detected months earlier than the annual or quarterly statements revealed it.

Integration. Accounting records, ERP operational data, CRM behavioural data and external sources (registers, court decisions, credit ratings) reside in a unified data environment. Reconciliation between financial and managerial figures becomes automatic rather than manual. The fragmentation between the accounting and sales functions observed at ATIF LLC is thereby reduced.

Adaptability. Credit-risk models are recalibrated automatically when new payment patterns or macroeconomic indicators appear. Historical

loss rates used for the allowance under Standard 10 are supplemented by updated probability-of-default estimates. The conservative, backwards-looking allowance that failed to reflect rising risk in 2022–2024 would be adjusted dynamically.

Predictive capability. Forward-looking models generate estimates of expected credit losses and early-warning indicators. Management receives probabilities of default and projected cash-collection profiles rather than only ageing schedules. This directly addresses the information lag that permitted continued credit extension at ATIF LLC until the 2024 peak.

Cognitive capability. The system accumulates experience from each new transaction cycle, improves pattern recognition and produces auditable recommendations. Professional judgement is retained: the accountant can accept, modify or override model outputs. The system therefore supports, rather than replaces, the regulatory requirements of Standard 10 and IFRS 9 [5; 6].

How the continuum resolves the contradictions identified in ATIF LLC is shown in Table 2.

By converting the linear sequence «transaction → accounting → statements → decision» into a continuous loop, the continuum reduces the temporal and organisational gaps that produced the problems documented at ATIF LLC.

Table 2

Resolution of the contradictions identified at ATIF LLC through the dynamic accounting–management continuum

Contradiction observed at ATIF LLC	Mechanism within the continuum	Expected effect
Retrospective allowance recognition	Continuous updating of probability-of-default estimates	Allowance reflects current and forward-looking risk
Information lag (discrete reporting)	Real-time monitoring of payment behaviour and limit utilisation	Earlier detection of deteriorating receivables
Distorted liquidity indicators	Parallel calculation of regulatory and risk-adjusted net receivables	More realistic appraisal of effective liquidity
Fragmented internal control	Shared risk scores visible to accounting, finance and sales	Aligned objectives and coordinated credit decisions

Source: compiled by the author

The dynamic accounting–management continuum therefore supplies the methodological foundation for the two-layer risk-oriented control system presented in the following section. It preserves the reliability and auditability of formal accounting while embedding the forward-looking and adaptive capabilities required for effective credit-risk management.

5. Two-Layer Model of Cognitive Control

Building on the dynamic accounting–management continuum, a two-layer model of cognitive risk-oriented control is proposed. The model keeps the regulatory integrity of financial accounting while adding continuous digital analytics and forward-looking risk management [5; 6].

A central design feature is the clear separation of functions combined with continuous information integration. The conservative accounting layer produces auditable, standards-compliant figures. The cognitive analytical layer generates predictive signals and recommendations. The two layers exchange data in real time but remain distinct in purpose and accountability.

First layer – the conservative accounting layer. This layer ensures full compliance with Ukrainian Accounting Standard 10 and IFRS 9. Its core functions are:

– documentary substantiation of transactions;
– recognition and classification of trade receivables;
– measurement at net realisable value;
– calculation of the allowance for doubtful debts (or expected credit losses);
– preparation of financial-statement disclosures;
– maintenance of data reliability and auditability.

The layer performs the traditional role of producing legally substantiated financial information. It does not itself forecast future credit losses or generate operational recommendations.

Second layer – the cognitive analytical layer. This layer operates in parallel as an intelligent decision-support system. Its purpose is to identify rising credit risk before receivables become overdue. It draws on a wider information set than formal accounting:

– accounting records and trial balances;
– ERP operational data;
– CRM behavioural data;

– settlement history and payment patterns;
– counterparties' financial statements;
– state registers, court decisions and tax data;
– credit ratings and macroeconomic indicators.

The proposed model comprises five interconnected functional blocks.

Data integration block. Data are extracted automatically from accounting software, ERP, CRM, banking interfaces and external registers. Standard cleansing, validation and reconciliation routines are applied so that both layers work from a consistent data foundation.

Cognitive analytics block. Machine-learning models process the integrated data to estimate:

– probability of default (PD);
– likelihood and expected timing of overdue payment;
– behavioural risk scores;
– expected credit loss (ECL) amounts;
– indicators of anomalous or potentially fraudulent activity.

Models are retrained periodically as new outcomes become available, allowing adaptation to changing economic conditions [10; 11].

Risk assessment block. Outputs from the analytics block are converted into an operational credit profile for each counterparty. The profile includes risk category, recommended credit limit, suggested payment terms, expected collection period and a forward-looking loss allowance. Risk assessment therefore becomes continuous rather than periodic.

Managerial decision-support block. The system produces concrete, auditable recommendations, for example:

– adjustment of credit limits;
– shortening of payment terms;
– requirement of partial prepayment;
– intensification of collection activity;
– transfer to factoring.

Final decisions remain with designated managers; the system supplies evidence and ranked options rather than autonomous actions.

Self-adaptation block. After each completed collection cycle the system compares earlier forecasts with actual outcomes. Model parameters are updated automatically. This continuous learning loop is what gives the layer its cognitive character while still leaving professional judgement intact.

Interaction between the two layers. Predictive signals from the cognitive layer do not override accounting entries. Instead they trigger review procedures within the conservative layer. When the analytical layer indicates a material change in risk, the accountant reassesses the allowance under Standard 10 or IFRS 9, documents the rationale, and records any adjustment. In this way forward-looking information informs accounting estimates without compromising the prudence principle or auditability. The way the two-layer model addresses the specific contradictions identified at ATIF LLC is summarised in Table 3.

Table 3

Resolution of the contradictions identified at ATIF LLC through the two-layer model of cognitive risk-oriented control

Contradiction at ATIF LLC	Mechanism in the two-layer model	Expected improvement
Retrospective allowance recognition	Cognitive layer supplies updated PD and ECL estimates for review	Allowance reflects current and forward-looking risk
Information lag	Continuous monitoring of payment behaviour and limit utilisation	Earlier detection of deteriorating receivables
Distorted liquidity indicators	Parallel production of regulatory and risk-adjusted figures	More realistic view of effective liquidity
Fragmented internal control	Shared risk profiles visible to accounting, finance and sales	Coordinated credit decisions and aligned objectives

Source: compiled by the author

Unlike conventional credit-scoring or pure machine-learning applications, the two-layer model does not replace accounting. It extends accounting's functional scope by embedding predictive capability inside a structure that preserves regulatory reliability and professional accountability. The result is a coherent system in which formal financial information and operational risk intelligence reinforce rather than contradict each other.

6. Practical Validation of the Model

To test the practical applicability of the proposed concept, a six-month pilot of the cognitive risk-oriented control model was conducted

at ATIF LLC (October 2025 – March 2026). The enterprise is characterised by a high share of trade credit, concentrated receivables and elevated non-payment risk. These features make it a suitable case for evaluating the model.

During the pilot a two-layer system operated. The conservative accounting layer continued to maintain records in full compliance with Ukrainian Accounting Standard 10, IFRS 9 and the Tax Code of Ukraine [5; 6; 12]. Recognition, measurement and presentation procedures remained unchanged, preserving the regulatory reliability of the financial information.

The cognitive layer was connected to the existing ERP system through an API. Data from account 36 «Settlements with customers» were transferred daily, cleansed and standardised. The analytical module estimated the probability of payment delay, produced an integrated credit-risk rating for each counterparty and generated recommendations for credit-policy adjustments. Final decisions stayed with the enterprise's managers.

The pilot therefore examined both forecasting performance and the feasibility of integrating the cognitive module without breaching accounting standards. The results of the two-layer system are presented in Table 4.

Table 4

Comparison of trade-receivables indicators before and after the pilot implementation

Indicator	Before implementation	After implementation	Absolute change
Trade receivables, UAH thousand	2,604.1	2,604.1	–
Allowance for doubtful debts, UAH thousand	487 (18.7 %)	312 (12.0 %)	–175
Net trade receivables, UAH thousand	2,117	2,292	+175
Average overdue period, days	82	52	–30
Share of overdue receivables, %	28.0	17.5	–10.5 p.p.
Receivables turnover period, days	82	51	–31
Accuracy of non-payment forecasts, %	–	84.2	–

Source: calculated by the author from enterprise data and pilot results.

The overall volume of trade receivables remained stable. Their qualitative composition, however, improved. The allowance fell from UAH 487 thousand (18.7 %) to UAH 312 thousand (12.0 %). The reduction is interpreted as the result of earlier identification of higher-risk counterparties and more timely adjustments to credit terms, rather than a relaxation of prudence.

Net receivables increased by UAH 175 thousand, reflecting both the lower allowance and greater predictability of cash inflows.

Operational metrics showed clearer gains. The average overdue period shortened from 82 to 52 days and the turnover period from 82 to 51 days. The share of overdue receivables declined by 10.5 percentage points. These movements suggest that the system enabled faster managerial responses once early-warning signals appeared.

Forecast accuracy reached 84.2 %. Accuracy was measured as the proportion of counterparties for which the model correctly predicted a payment delay of more than 30 days within a 90-day horizon, using an out-of-time validation sample. While this figure indicates useful predictive power, it should be read with caution given the relatively short pilot window and the single-enterprise setting.

There are some limitations. The pilot covered only six months and one wholesale-trading firm. External factors (changes in customer mix, market conditions or collection effort) may have contributed to the observed improvements. No formal control group was established. Consequently the results demonstrate practical feasibility and directional benefits rather than definitive causal proof.

Within the limits of the pilot, the two-layer model proved compatible with existing accounting procedures and produced measurable improvements in the quality and turnover of trade receivables. The findings support the view that cognitive risk-oriented control can shift receivables management from a predominantly reactive stance toward a more proactive one, while still satisfying regulatory requirements.

The successful introduction of the two-layer cognitive risk-oriented control model in a medium-sized enterprise requires a structured, staged approach. The following sequence has been derived from the pilot experience at ATIF LLC and from the broader requirements of integrating predictive analytics with formal accounting systems.

1. Preparatory stage. Top management defines the strategic objectives of the project (for example, reduction of overdue receivables or improvement of working-capital turnover). A cross-functional working group is formed, typically including representatives of accounting, finance, sales and information technology. The current credit policy, existing data sources and key risk indicators are reviewed. Clear success metrics and a realistic timeline are established.

2. Data integration. Accounting records (especially the customers' settlements account), ERP operational data, CRM behavioural data and selected external sources are mapped and connected through secure interfaces or an API. Data-cleansing and validation rules are defined so that both the conservative accounting layer and the cognitive analytical layer operate on a consistent information base. Particular attention is paid to data completeness, accuracy and timeliness.

3. Staff training. Accountants, credit controllers and sales managers receive targeted training. The programme covers the logic of the two-layer model, the interpretation of risk scores and recommendations, and the continued importance of professional judgement. Emphasis is placed on the fact that the system supports, rather than replaces, human decision-making. Short practical workshops using the enterprise's own data prove especially effective.

4. Pilot implementation. The model is first applied to a limited portfolio of counterparties or to one business unit for a defined period (commonly three to six months). During the pilot the conservative accounting layer continues to function in full compliance with regulatory requirements, while the cognitive layer generates signals and recommendations. Results are monitored weekly, model parameters are adjusted, and user feedback is collected systematically.

5. Scaling and continuous improvement. After a successful pilot the system is extended to the full receivables portfolio. Credit-policy rules are updated to incorporate the new risk signals. Ongoing model performance is reviewed at regular intervals, and the self-adaptation mechanisms are allowed to refine forecasts on the basis of actual outcomes. Periodic post-implementation reviews ensure that the model remains aligned with changing business conditions and regulatory expectations.

When these stages are followed in sequence, the organisation can introduce cognitive risk-oriented control with manageable risk, preserve the integrity of financial reporting, and gradually embed predictive analytics into everyday credit-management practice.

7. Economic Assessment of Implementation

A structured economic assessment of the six-month pilot was performed. The main quantitative results are summarised in Table 5.

Two distinct effects must be separated. The first is an accounting effect. The reduction in the allowance by UAH 175 thousand increased reported profit. This figure improves the financial statements but does not automatically generate an equivalent cash inflow in the same period.

Table 5

Economic assessment of the two-layer system at ATIF LLC (six-month pilot)

Indicator, UAH thousand	Before implementation	After implementation	Absolute change
Allowance for doubtful debts	487	312	–175
Accounting effect (increase in reported profit)	–	+175	+175
Estimated additional cash flow from faster turnover	–	+680	+680
Implementation costs (development and integration)	–	185	–
Indicative six-month operating costs	–	45	–
Net cash effect (cash flow – total costs)	–	+450	–

Source: calculated by the author from enterprise data and pilot results.

The second is a cash-flow effect. Faster collection of receivables released working capital. The additional cash flow of approximately UAH 680 thousand was estimated from the observed reduction in the turnover period (from 82 to 51 days) applied to the average daily sales on credit during the pilot. The calculation is necessarily approximate because daily sales volumes fluctuated and no formal control group existed.

Implementation costs totalled UAH 185 thousand. Indicative operating costs for the six-month period (model maintenance, data updates and limited staff time) were estimated at UAH 45 thousand. After deducting both categories of cost, the net cash effect for the pilot period stands at roughly UAH 450 thousand.

On the basis of the pilot figures the following indicators were calculated:

Simple ROI for the six-month period: approximately 243 % (net cash effect divided by total costs).

Payback period: approximately 2.1 months.

Indicative NPV over a three-year horizon: UAH 3.1 million (discount rate 18 %, assumption of gradually declining incremental cash flows, and inclusion of ongoing annual operating costs of UAH 90 thousand).

These figures are sensitive to the assumptions used. In particular, the cash-flow benefit may not remain constant, and operating costs could prove higher once the system is fully embedded.

There are some limitations. The assessment rests on a single six-month pilot in one wholesale enterprise. External factors may have contributed to the observed improvement in turnover. The separation of the pure model effect from other influences remains imperfect. Consequently the results demonstrate economic feasibility and a favourable direction of change rather than a precise, generalisable return.

Within the limits of the available data, the pilot generated a positive net cash effect and attractive short-term investment metrics. The economic benefit arises mainly from improved working-capital utilisation, supported by a secondary accounting gain from a lower allowance. Longer-term value will depend on the stability of the cash-flow improvement and on the actual cost of maintaining the cognitive layer.

8. Scenario Modelling of Model Resilience

Scenario modelling was used to test the robustness of the economic results. Three scenarios were constructed for a three-year horizon: optimistic, baseline and pessimistic. The key assumptions underlying each scenario are set out below (Table 6).

Table 6

Scenario results over a three-year period at ATIF LLC (UAH thousand)

Scenario	Cumulative net cash effect	Approximate ROI over three years	NPV at 18 %	Indicative payback (months)
Optimistic	4,850	1,180 %	3,720	1.8
Baseline	3,150	760 %	2,410	2.4
Pessimistic	1,680	390 %	1,050	3.9

Source: calculated by the author on the basis of pilot results and the stated assumptions.

Baseline scenario. Incremental cash flows remain close to the levels observed in the pilot, declining modestly after the first year as the most obvious collection gains are realised. Annual operating costs stay at approximately UAH 90 thousand. The discount rate is set at 18 %.

Optimistic scenario. The improvement in receivables turnover is sustained and slightly extended through wider use of the model's recommendations. Operating costs rise only marginally. The same 18 % discount rate is applied.

Pessimistic scenario. The cash-flow benefit halves after the first year because of weaker customer compliance or less consistent managerial follow-up. Operating costs increase to UAH 120 thousand per year. The discount rate remains 18 %.

Under all three scenarios the net present value remains positive. Even in the pessimistic case the project recovers its costs and generates a modest surplus. This suggests that the model retains economic viability across a reasonable range of operating conditions.

The optimistic scenario indicates scope for a larger effect if the enterprise applies the system's recommendations more consistently. The pessimistic scenario shows that the results are sensitive to the durability of the cash-flow improvement and to operating costs.

There are some limitations. The scenarios rest on simplified assumptions and on data from a single six-month pilot. They do not capture every possible external shock. The figures should therefore be read as indicative of directional resilience rather than as precise forecasts.

Overall, the scenario analysis supports the conclusion that the two-layer model can remain economically positive under both favourable and adverse conditions, provided that the core improvement in working-capital turnover is at least partially sustained.

9. Discussion of Research Results

The results indicate that the proposed cognitive model of risk-oriented control does not contradict existing accounting principles. It extends their functional scope under the digital transformation of the economy. Traditional accounting primarily records the consequences of realised credit risk. The proposed model supports earlier identification of risk and supplies an information basis for preventive management.

The findings align with broader trends in digital accounting. They differ from prior approaches by integrating financial reporting requirements with cognitive analytics tools inside a single information environment. The model represents one promising direction for the further development of accounting methodology amid the wider adoption of artificial intelligence, machine learning and digital enterprise management platforms.

The comparative analysis in Table 7 traces the evolution of approaches to the accounting for and control of trade receivables. It moves from a retrospective model focused on completed transactions, through the forward-looking concept of IFRS 9 that incorporates expected credit losses, to the proposed cognitive risk-oriented model. The latter integrates accounting records, digital analytics, artificial intelligence techniques and decision-support functions within a unified information environment.

Unlike purely traditional models, the proposed approach enables continuous monitoring of trade receivables, adaptive forecasting of credit risk and the generation of managerial recommendations. It does not replace existing accounting standards. Instead, it extends their practical reach by combining the regulatory reliability of financial information with contemporary digital analytics tools. Human oversight remains essential: the system supplies ranked recommendations and early signals, while final decisions on credit policy, limits and recovery actions rest with managers.

Table 7

Comparative Characteristics of the Traditional Approach, the IFRS 9 Model and the Cognitive Risk-Oriented Model of Trade Receivables Management

Comparison criterion	Traditional accounting approach (UAS 10)	IFRS 9 Model (Expected Credit Loss)	Proposed cognitive risk-oriented model
Primary objective	Faithful representation of trade receivables in the financial statements	Measurement of expected credit losses to ensure faithful representation in the financial statements	Proactive trade receivables management and reduction of credit risk supported by predictive analytics
Object of analysis	Existing trade receivables	Financial assets subject to measurement under the expected credit loss model	Full life cycle of interaction with the counterparty: from contract conclusion to settlement of the receivable
Nature of risk assessment	Retrospective	Forward-looking, but governed by regulatory requirements	Continuous, adaptive, forward-looking and risk-oriented
Time horizon of assessment	Past events	Future credit losses over the life of the asset	Current position together with short-, medium- and long-term forecasts of debtor behaviour
Assessment methods	Receivables ageing analysis, doubtful debt coefficients, accountant's professional judgement	Expected Credit Loss (ECL) model (PD, LGD, EAD), scenario analysis	Machine learning, predictive analytics, scoring models, behavioural analysis, clustering, anomaly detection, scenario modelling
Frequency of control	Periodic (at the reporting date or during inventory-taking)	Regular, in accordance with the requirements of the standard	Continuous monitoring with near real-time capability
Support for managerial decision-making	Limited; used after completion of the accounting cycle	Partial; supports credit risk assessment and the recognition of loss allowances	Extensive; the system generates recommendations on credit limits, settlement terms, factoring, claims management and risk actions. Final decisions remain with managers
Response to changes in risk	After the occurrence of a negative event	Following risk reassessment in accordance with the requirements of the standard	Before adverse consequences materialise, through forecasting of default probability

Source: Compiled by the author

Several limitations must be acknowledged. The effectiveness of the model depends heavily on the quality, completeness and timeliness of input data. Incomplete or biased historical records reduce the reliability of predictive outputs. The explainability of certain machine-learning components remains limited, which may hinder auditability and regulatory acceptance. Organisational resistance to changes in established credit and accounting processes can slow adoption. The pilot results, while encouraging, derive from a specific organisational context and sample; broader generalisation requires further testing across industries, firm sizes and economic conditions.

Future research should examine the model's performance under varying data-quality regimes, develop more transparent hybrid analytical architectures, and assess long-term effects on working-capital metrics and credit-policy outcomes.

Comparative multi-enterprise studies and longitudinal evaluations would strengthen the evidence base and clarify the conditions under which cognitive risk-oriented control delivers sustained benefits.

CONCLUSIONS

The study has examined the methodological foundations of accounting for and control of trade receivables in the context of digital transformation. It has shown that traditional approaches, grounded in Ukrainian Accounting Standard 10, remain largely retrospective. They record the consequences of credit risk after it has materialised and therefore provide limited support for timely managerial action. IFRS 9 introduces a forward-looking expected-credit-loss framework, yet its primary purpose is still the faithful representation of information in the financial statements rather than continuous operational risk management.

Empirical evidence from ATIF LLC confirmed the practical consequences of this gap. Rapid growth in trade receivables was accompanied by a sharp deterioration in collection periods, elevated capital immobilisation and fragmented control between accounting and commercial functions. Liquidity ratios appeared satisfactory while the underlying quality of receivables declined, illustrating the divergence between regulatory measurement and economic reality.

In response, the concept of cognitive risk-oriented control has been developed. The concept integrates the reliability and auditability requirements of formal accounting standards with continuous monitoring, predictive analytics and decision-support tools. Accounting data are treated not solely as the basis for retrospective reporting but as a continuously updated substrate for forward-looking credit-risk assessment.

The dynamic accounting–management continuum supplies the methodological architecture for this integration. Continuity, integration, adaptability, predictive capability and cognitive learning operate as interrelated principles that convert the linear sequence of transaction, recording and reporting into a continuous feedback loop. Building on this continuum, a two-layer model has been proposed. The conservative accounting layer maintains full compliance with existing standards. The cognitive analytical layer generates early-warning signals, probability-of-default estimates and ranked recommendations while leaving final decisions with managers.

A six-month pilot implementation at ATIF LLC demonstrated practical feasibility. The overall volume of receivables remained stable, yet qualitative and operational indicators improved: the allowance for doubtful debts declined, the average overdue period shortened by thirty days, the share of overdue receivables fell by 10.5 percentage points and forecast accuracy reached 84.2 per cent. Economic assessment indicated a positive net cash effect arising primarily from faster working-capital turnover, with attractive short-term investment metrics. Scenario modelling over a three-year horizon confirmed that the net present value remained positive under optimistic, baseline and pessimistic assumptions.

The proposed approach does not replace existing accounting standards. It extends their functional scope by embedding predictive capability within a structure that preserves regulatory reliability and professional accountability. Human oversight remains essential.

Several limitations must be noted. Model performance depends on the quality and completeness of input data. The explainability of certain machine-learning components is still limited. Organisational resistance may slow adoption. The pilot results derive from a single enterprise and a relatively short observation window; broader generalisation requires further testing.

Future research should examine the model under varying data-quality regimes, develop more transparent hybrid architectures, and evaluate long-term effects on working-capital metrics across different industries and firm sizes. Comparative multi-enterprise studies and longitudinal assessments would strengthen the evidence base and clarify the conditions under which cognitive risk-oriented control delivers sustained benefits.

Overall, the findings support the view that the systematic integration of formal accounting with continuous digital analytics constitutes a viable and economically promising direction for the further development of accounting methodology under conditions of digital transformation.

References:

1. Thanasas, G., Kampiotis, G. & Halkiopoulos, C. (2026) Transforming Digital Accounting: Big Data, IoT, and Industry 4.0 Technologies – A Comprehensive Survey. *Journal of Risk and Financial Management*, vol. 19, no. 1, p. 92. DOI: https://doi.org/10.3390/jrfm19010092

2. Rise2040 Project (2023). *The Future of the Accounting Profession: Global Report 2023*. London: ACCA & Chartered Global Management Accountant, 84 p. Available at: https://rise2040.com/vision-report

3. Vitrenko, O., Katranzhy, L. & Prydatko, E. (2020) Orhanizatsiia obliku debitorskoi zaborhovanosti v systemi upravlinnia ryzykamy [Organisation of accounts receivable accounting in the risk management system]. *Naukovyi visnyk Uzhhorodskoho natsionalnoho universytetu. Seriia: Mizhnarodni ekonomichni vidnosyny ta svitove hospodarstvo – Uzhhorod National University Herald. Series: International Economic Relations and World Economy*, vol. 34, pp. 35–42. DOI: https://doi.org/10.32782/2413-9971/2020-34-6

4. Brazilii, N. & Bilan, Yu. (2025) Vplyv tsyfrovoi transformatsii bukhhalterskoho obliku na pidkhody do otsinky ta upravlinnia debitorskoiu zaborhovanistiu v umovakh nestabilnoho rynku [The impact of digital transformation of accounting on approaches to assessing and managing accounts receivable in an unstable market]. *Visnyk Cherkaskoho derzhavnoho tekhnolohichnoho universytetu – Bulletin of Cherkasy State Technological University*, vol. 26, no. 4, pp. 75–90. DOI: https://doi.org/10.24025/2306-4420.77(4).2025.342909 (in Ukrainian).

5. Ministry of Finance of Ukraine (1999) Polozhennia (standart) bukhhalterskoho obliku 10 «Debitorska zaborhovanist» [Regulation (Standard) of Accounting 10 «Accounts Receivable»]: zatverdzheno nakazom Ministerstva finansiv Ukrainy vid 08.10.1999 № 237. Available at: https://zakon.rada.gov.ua/laws/show/z0725-99#Text (in Ukrainian).

6. International Accounting Standards Board. (2014). *IFRS 9 financial instruments*. IFRS Foundation. Available at: https://www.ifrs.org/issued-standards/list-of-standards/ifrs-9-financial-instruments/

7. Hutsalenko, L. & Melnyk, A. (2020) Oblik debitorskoi zaborhovanosti: kontseptualni osnovy P(S)BO ta MSFZ [Accounting for receivables: conceptual foundations of national accounting standards and IFRS]. *Efektyvna ekonomika – Efficient Economy*, no. 9. Available at: http://www.economy.nayka.com.ua/?op=1&z=8173 (in Ukrainian)

8. Shepel, T. & Vintoniak, A. (2023) Orhanizatsiino-metodychni aspekty obliku debitorskoi zaborhovanosti: vitchyznianyi ta zarubizhnyi dosvid [Organizational and methodological aspects of receivables accounting: domestic and foreign experience]. *Ekonomika ta suspilstvo – Economy and Society*, no. 52. DOI: https://doi.org/10.32782/2524-0072/2023-52-56

9. Demchenko, T. (2025) Oblikovo-analitychne zabezpechennia upravlinnia debitorskoiu zaborhovanistiu pidpryiemstv v umovakh avtomatyzatsii [Accounting and analytical support for trade receivables management of enterprises under conditions of automation]. *Ekonomichni horyzonty – Economies' Horizons*, vol. 2(31), pp. 92–99. DOI: https://doi.org/10.31499/2616-5236.2(31).2025.330127 (in Ukrainian).

10. Cai, T. (2024). Continuous auditing and risk monitoring: Implementation with credit line management. *ISACA Journal*, no. 5. Available at: https://www.isaca.org/resources/isaca-journal/issues/2024/volume-5/continuous-auditing-and-risk-monitoring

11. Hemati, H., Schreyer, M., & Borth, D. (2021). Continual learning for unsupervised anomaly detection in continuous auditing of financial accounting data. Available at: https://arxiv.org/abs/2112.13215

12. State Tax Service of Ukraine (2026) Analitychna platforma «Big Data TP» [Big Data TP Analytical Platform]. Ofitsiinyi sait. Available at: https://tax.gov.ua/big-data (in Ukrainian).

BILLIONS THROUGH "DORMANT" COMPANIES: A STUDY BASED ON THE ANALYTICAL TOOLS YOUCONTROL AND YC.MARKET

Nadiia Paranytsia[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-11

Abstract. Under the current conditions of digitalization of state registers and increased openness of corporate information, analytical tools that make it possible not only to obtain information about individual companies but also to identify hidden patterns in their functioning are becoming increasingly important. One such tool is the YouControl platform, which integrates data from state registers, financial statements, court decisions, enforcement proceedings, sanctions lists, and other official sources. A comprehensive analysis of these data makes it possible to identify potentially risky companies and examine their role in corporate networks.

The present study focuses on the analysis of so-called "dormant" or "phantom" companies–legal entities that formally demonstrate minimal business activity but may nevertheless be involved in significant financial transactions. Of particular interest are enterprises that have one or several officially employed workers while simultaneously declaring turnovers measured in hundreds of millions or even billions of hryvnias. This discrepancy between the scale of activity and human resources is one of the risk indicators that requires further investigation.

The purpose of the study is to demonstrate the capabilities of the YouControl and YC.Market analytical tools for identifying networks of companies that may potentially be used to conceal ultimate beneficial owners, transit financial flows, minimize tax liabilities, or conduct other operations requiring increased attention from analysts, journalists, and regulatory authorities. At the same time, the study does not aim to establish facts of legal violations; rather, it considers such companies as objects of risk-oriented analysis.

[1] Ph.D. in Economics, Associate Professor,
Associate Professor of the Department of Economic Policy,
Marketing and Business Analytics, State Tax University, Ukraine

© Nadiia Paranytsia

The relevance of the study is determined by the fact that the external characteristics of an enterprise's activity do not always reflect its actual economic role. A company may have no employees, demonstrate no significant changes in its financial indicators, or even remain inactive for a long period of time, while still being involved in complex corporate structures. Significant financial flows, transfers of corporate rights, or other business processes may be carried out through such legal entities. Therefore, combining financial analysis with the examination of corporate relationships makes it possible to obtain a much more comprehensive understanding of the actual nature of an enterprise's activities.

INTRODUCTION

The main research question was whether the YouControl analytical tools make it possible to identify a network of companies that formally demonstrate the characteristics of "dormant" entities but may potentially be used to conduct significant financial transactions.

The research methodology includes several consecutive stages. At the first stage, a sample of enterprises is formed according to specified criteria. It includes companies that have demonstrated no or minimal business activity in recent years, unchanged financial indicators, no employees or a very small number of employees, a low level of tax activity, and other characteristics that may indicate the nominal nature of their operations. For this purpose, the "Company Vitality Indicators" factor implemented in the YouControl system is used.

At the second stage, the risk level of the selected enterprises is assessed using the Express Analysis, FinScore, MarketScore, and other risk indicators. These tools make it possible to automatically identify factors that may indicate an increased level of business risk or the nominal nature of a legal entity's activities.

The third stage involves examining corporate relationships among the selected companies. Using YouControl tools, the study analyzes common founders, ultimate beneficial owners, directors, registered addresses, contact details, and instances of legal succession. Particular attention is paid to cases in which a significant number of enterprises are connected through one individual or one registered address, which may indicate the existence of a corporate network.

At the final stage, the financial indicators of the enterprises, asset dynamics, changes in corporate rights, participation in public procurement, court disputes, enforcement proceedings, and other processes are analyzed in order to assess the scale of the companies' actual activities. Combining information from various state registers ensures a comprehensive examination of each business entity.

The practical part of the study was based on an analysis of data exported from the YouControl system. A sample of companies was formed according to the following criteria: no more than three employees in 2025 and net income exceeding UAH 100 million. As a result, 1,489 companies were found to meet these conditions.

Among the enterprises with the largest turnovers, several illustrative examples were identified. For instance, EPPL UKRAINE LLC, with only two employees, declared income of UAH 11.28 billion. MG BUSINESS GROUP LLC, with one employee, generated income of UAH 5.93 billion, while RONSTRIT CORPORATION LLC, also with one employee, reported more than UAH 6 billion in income. In addition to these examples, the sample contains hundreds of enterprises with between one and three employees that demonstrate turnovers ranging from several hundred million to several billion hryvnias.

The results obtained do not automatically indicate violations of the law. For certain types of activities, such as distribution, agency services, trade, or the management of corporate rights, significant financial turnovers may be combined with a minimal number of employees. At the same time, such a combination of indicators is an important risk marker that may indicate the need for additional analysis of the ownership structure, counterparties, financial flows, and the economic justification of the declared results.

Thus, the study demonstrates that the use of YouControl analytical tools makes it possible to effectively form risk-oriented samples of companies, identify hidden corporate relationships, and detect business entities requiring an in-depth financial, tax, or journalistic investigation. Combining the criteria of a minimal number of employees, significant financial turnovers, and corporate relationship analysis is an effective approach to identifying potentially risky companies and examining the functioning of complex corporate networks in Ukraine.

Purpose. To identify a network of companies that formally do not conduct active business operations ("dormant" companies) but may be used to conceal beneficial owners, transfer funds, minimize taxes, or participate in capital flight schemes.

Scientific novelty of the obtained results lies in the development of an integrated approach to identifying potentially risky business entities based on the combined use of open data, modern analytical platforms, and statistical analysis methods.

1. Research Methodology

1.1. Data Sources and Analytical Tools

In recent years, considerable attention in Ukraine has been paid to counteracting the use of so-called "dormant" companies, firms with nominee directors, and legal entities that may be used to transit financial flows, minimize tax liabilities, or conceal actual beneficial owners. Such companies often demonstrate minimal business activity, have an insignificant number of employees, or remain without noticeable operational activity for a long period of time. Nevertheless, they may continue to be involved in complex corporate networks and be used to conduct large-scale financial transactions.

The problem has become particularly relevant in light of the findings of investigations conducted by the State Tax Service of Ukraine (STS), the Economic Security Bureau of Ukraine (ESB), and the National Anti-Corruption Bureau of Ukraine (NABU) [7]. According to information published by the STS in 2026, more than 2,300 Ukrainian companies, after conducting significant financial transactions and transferring almost UAH 198 billion abroad, effectively ceased active operations or acquired the characteristics of "dormant" enterprises. These data indicate that legal entities with minimal signs of business activity may be used as elements of complex financial schemes and therefore require particular attention in analytical studies [8].

For this reason, digital tools for analyzing corporate data are becoming increasingly important. The YouControl analytical system combines information from dozens of state registers and makes it possible to comprehensively assess the activities of enterprises, analyze financial indicators, examine relationships between companies, and identify

risk factors. The use of such tools makes it possible not only to verify individual enterprises but also to form samples of companies with atypical characteristics that may indicate the need for further financial or journalistic investigation [1–5].

1.2. Company Selection Criteria

This study applies a risk-oriented approach to the selection of companies. Using data exported from YouControl, a sample of enterprises was formed that have no more than three employees while simultaneously declaring income exceeding UAH 100 million. The analysis showed that 1,489 companies meet these criteria, including enterprises with turnovers of several billion hryvnias and an officially reported workforce of only one or two employees (Figure 1).

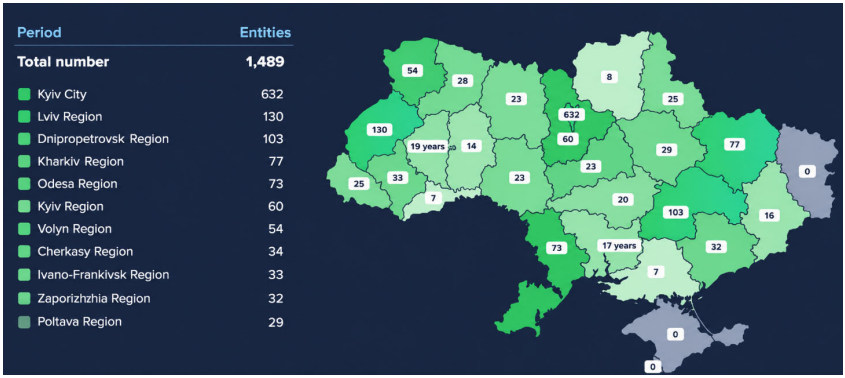


Figure 1. Regional Distribution of Companies with a Minimal Number of Employees and High Financial Turnovers in Ukraine in 2025

Source: compiled by the author based on data from [6]

The analysis of the regional distribution of the sample indicates a significant territorial concentration of enterprises that combine a minimal number of employees with exceptionally high financial indicators. In total, 1,489 companies were selected according to the established criteria [1–5].

The largest number of such enterprises is registered in the city of Kyiv– 632 companies, accounting for almost 42.5% of the entire sample. This concentration can be explained by the fact that Kyiv is the country's main financial and corporate center, where a significant number of large holdings, trading companies, importers, and enterprises performing corporate asset management functions are registered. Among the regions, the largest number of companies was identified in Lviv region – 130, Dnipropetrovsk region – 103, Kharkiv region – 77, Odesa region – 73, Kyiv region – 60, and Volyn region – 54 (Figure 1).

The presence of such enterprises is also notable in Cherkasy region – 34, Ivano-Frankivsk region – 33, Zaporizhzhia region – 32, Poltava region – 29, Zhytomyr region – 28, and Chernivtsi and Zakarpattia regions – 25 companies each. At the same time, the number of such companies is relatively small in a number of regions. In particular, only eight companies were recorded in Chernihiv region, seven companies each in Ternopil and Kherson regions, while no such companies were identified in the sample in the temporarily occupied territories of Luhansk region and the Autonomous Republic of Crimea [6].

In general, the spatial distribution indicates that enterprises with a minimal number of employees and high financial turnovers are concentrated primarily in the most economically active regions of Ukraine, where the country's main financial, logistics, and trade centers are located. The high concentration of such companies in the capital and major industrial regions may be explained by the specifics of business registration, the location of the headquarters of corporate groups, and the spread of business models involving significant financial turnovers with a minimal number of officially employed workers.

At the same time, the mere presence of such enterprises does not constitute evidence of legal violations. However, their territorial concentration provides a basis for further risk-oriented analysis using YouControl tools, including the examination of corporate relationships, ultimate beneficial owners, counterparties, litigation history, and financial flows.

Identifying companies with signs of nominal or minimal business activity is one of the important areas of modern business analytics and financial investigations. At first glance, an enterprise may appear to be an ordinary legal entity; however, a detailed analysis of its financial indicators,

ownership structure, and corporate relationships often reveals atypical characteristics that may indicate an elevated level of risk.

Today, there are sufficient digital tools that make it possible to assess a company's activities quickly and comprehensively. One of the most functional among them is the YouControl analytical system, which combines information from dozens of state registers, financial statements, court decisions, sanctions lists, and other official sources. This makes it possible not only to verify an individual counterparty but also to conduct large-scale analytical studies and form samples of enterprises according to specified risk criteria.

To search for potentially "dormant" companies in the YouControl system, a combination of financial, personnel, and registration indicators can be used. In particular, it is effective to select enterprises that have a minimal number of employees while simultaneously demonstrating exceptionally high financial turnovers. Such a combination does not automatically indicate legal violations; however, it is an important risk indicator requiring additional analysis.

YouControl's analytical modules make it possible to quickly assess a company's key financial indicators, analyze the dynamics of income, assets, and liabilities, determine the level of financial stability, and identify sharp changes in business activity. In addition to financial information, the system makes it possible to examine corporate relationships between enterprises, analyze common founders, ultimate beneficial owners, directors, registered addresses, and other factors that may indicate the existence of related structures.

For the practical study, the functionality of the YC.Market analytical system was used to analyze the market according to the indicator of net revenue from the sale of enterprises' products. The sample included 1,489 companies, which made it possible to conduct a statistical analysis of revenue distribution and examine the financial characteristics of enterprises with minimum, median, and maximum values of this indicator. This approach provides a comprehensive understanding of the market structure and makes it possible to identify enterprises requiring further analysis from the perspective of financial risks.

2. Initial Company Screening

2.1. Formation of the Initial Sample

As might be expected, the company received the risk marker "C." An analysis of the factors showed that, under the universal criteria, one critical factor requiring special attention and eight lower-level risk factors were recorded. A total of 581 security factors were successfully passed.

The combination of negative revenue amounting to almost UAH 48 million and an elevated "C" risk level clearly indicates that the enterprise may be experiencing a deep crisis, undergoing liquidation or bankruptcy proceedings, or being involved in tax investigations related to excise goods, particularly the tobacco market.

Median revenue: UAH 161,843,250 (with LLC "UKRCITYESTATE" representing a typical company). This is the most objective indicator of the "middle" of the market. It shows that 50% of the companies in the sample generate less than this amount, while the other 50% generate more. The median eliminates the influence of exceptionally large corporations and demonstrates the actual average scale of businesses represented in the sample. The company reflects the standard profile of a stable Ukrainian business. An automated verification identified no critical red flags in the basic official registers.

Maximum revenue: UAH 98,096,823,000 (LLC "DONBAS INDUSTRIAL AND TRANSPORT ENTERPRISE"). This indicator belongs to the leading company in the sample, which is part of the powerful financial and industrial group "SCM".

Despite its position as the sales leader, with revenue exceeding UAH 98 billion, LLC "DONBAS INDUSTRIAL AND TRANSPORT ENTERPRISE" has a risk rating of "C". During the analysis of the relevant factors, the system identified two factors requiring particular attention and three factors requiring attention. For companies of this scale and with geographical ties to the Donetsk region, a "C" rating is relatively common. It may be associated with a large number of court cases, significant tax liabilities, changes in the ownership structure, or operational risks arising from proximity to the combat zone. At the same time, 585 risk factors are absent and fall within the green zone.

The sample demonstrates a substantial disparity in the financial scale of the companies, ranging from multi-billion-hryvnia giants to enterprises

with deeply negative financial results. This confirms that a simple arithmetic mean cannot be used for an accurate analysis of the market, as it would be heavily distorted by the leading company. Instead, the analysis should rely primarily on the median (UAH 161.8 million). Companies demonstrating non-standard financial results, such as the negative revenue reported by "United Tobacco", are immediately flagged by the compliance system as entities requiring increased attention (the "C" risk zone). The presence in the sample of companies belonging to the "SCM" group with revenues approaching UAH 100 billion indicates that some enterprises operate within closed intra-group contractual arrangements. Their performance indicators do not always reflect overall market competition, which should be taken into account in further modeling of the Ukrainian economy in 2026.

Of particular value to researchers are the Express Analysis, FinScore, MarketScore, risk indicators, and the "Company Activity Indicators" factor, which enable a comprehensive assessment of the actual condition of an enterprise. Combining these analytical modules makes it possible not only to assess the financial condition of an individual company but also to identify networks of enterprises with similar characteristics that may be used for the transit of financial flows, concealment of beneficial owners, or other transactions requiring additional verification [6].

The chart (Figure 2) presents the ten companies with the highest financial turnover, selected according to the study criteria (up to three employees and revenue exceeding UAH 100 million), as well as the aggregate share of the remaining enterprises in the sample.

At the same time, the largest segment of the chart is occupied by the "Other companies" category, indicating a high degree of heterogeneity within the sample. This means that exceptionally high financial turnover combined with a minimal number of employees is characteristic not only of several of the largest enterprises but also of a significant number of other legal entities. In other words, the phenomenon is widespread rather than limited to a few exceptional cases.

The presence of enterprises operating in different sectors of the economy among the top ten indicates that this business model is not a sector-specific phenomenon. High turnover combined with a minimal workforce may be characteristic of trading, logistics, distribution, holding, and other companies whose activities involve substantial financial flows and the outsourcing of certain functions.

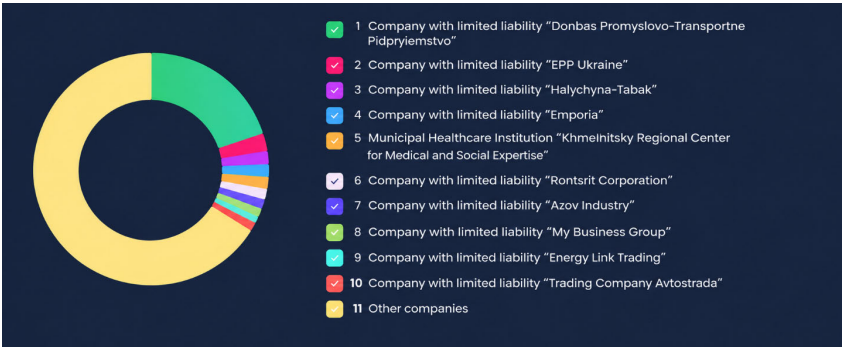


Figure 2. TOP 10 Companies with the Highest Revenues among Enterprises with up to Three Employees, According to YouControl Data, 2025

Source: compiled by the author based on data from [6]

At the same time, the combination of a minimal number of officially employed workers with multi-million or billion-hryvnia revenues constitutes a significant risk indicator that requires further analysis. This fact alone does not indicate a violation of the law; however, it provides grounds for examining the ownership structure, corporate relationships, financial flows, counterparties, and the economic rationale underlying the reported financial indicators.

The analysis of the sectoral structure shows that enterprises with a minimal number of employees and significant financial turnover are represented in virtually all sectors of the Ukrainian economy. However, their concentration is uneven. The largest share of the sample consists of enterprises classified under Section G, "Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles" – 621 companies, accounting for almost 42% of the total number of enterprises under study (1,489 companies). Such concentration is logical, since trading activities are most often characterized by substantial financial flows, while some business processes may be performed through outsourcing or by engaging external contractors.

The second-largest group is Section D, "Electricity, Gas, Steam and Air Conditioning Supply," which includes 184 enterprises. The high proportion of companies in this sector may be associated with the specific

characteristics of the energy market, where substantial financial turnover is often accompanied by a relatively small administrative workforce (Figure 3).



Figure 3. Sectoral Distribution of Enterprises with a Minimal Number of Employees and Revenue Exceeding UAH 100 Million, According to YouControl Data, 2025

Source: compiled by the author based on data from [6]

A smaller number of enterprises are represented in the fields of professional, scientific and technical activities (36 companies), as well as transportation, warehousing and courier activities (24 companies). The results demonstrate that the phenomenon of combining a minimal workforce with exceptionally high financial turnover is not limited to a single sector of the economy. It is observed in trade, energy, the financial sector, real estate operations, construction, services, and other types of economic activity.

2.2. Regional Distribution of Companies

At the same time, the absolute dominance of the trade sector indicates that this particular industry requires the greatest attention when conducting risk-oriented analysis. Significant financial turnover, which is characteristic of wholesale trade, combined with a minimal number of officially employed workers may be associated both with legitimate

business practices and with the use of corporate structures for the transit of goods and financial flows.

The analysis of the sectoral distribution confirms that enterprises with a minimal number of employees and high financial indicators operate across most sectors of the Ukrainian economy. Their highest concentration is observed in wholesale and retail trade, which accounts for more than two-fifths of the entire sample. A significant number of such companies are also registered in the energy sector, services, financial activities, real estate operations, and construction.

Among the selected enterprises, a number of unusual cases were identified. In particular, some companies have only one or two officially employed workers while declaring annual revenues amounting to several billion hryvnias. For example, the sample includes enterprises that reported revenues exceeding UAH 5–6 billion with only one employee, while one company with two employees reported revenue exceeding UAH 11 billion (Table 1).

Such figures do not automatically imply that these companies are violating the law. For certain types of business activities, high turnover combined with a small number of employees may be entirely legitimate. Nevertheless, such a discrepancy between workforce size and the scale of financial activity constitutes a risk indicator that requires further analysis.

Table 1

Companies with Anomalous Indicators, UAH billion

Company	Number of Employees	Revenue in 2025
LLC “RONSTRIT CORPORATION”	1	6.44
LLC “MG BUSINESS GROUP”	1	5.93
LLC “TRADEGASSOLUTION”	1	3.82
LLC “WEST ECO LOGISTICS”	1	2.81
LLC “ALTA-D”	1	2.74
LLC “MODERN ELECTRONICS SERVICE”	1	2.26

Source: compiled by the author based on data from [6]

In fact, each employee in such companies accounts for revenue ranging from UAH 2 billion to more than UAH 6 billion, which significantly exceeds the average indicators even for the largest enterprises in Ukraine.

An analysis of the information concerning LLC “RONSTRIT CORPORATION” demonstrates a combination of a minimal number of officially employed workers (one person) with exceptionally high financial indicators. Within our sample, the company belongs to the group of enterprises with very high revenues (exceeding UAH 6 billion). The company’s primary activity is wholesale trade in textiles (NACE 46.41), which theoretically allows for the use of outsourced business models. At the same time, this combination of indicators constitutes a risk indicator that requires further comprehensive examination of the ownership structure, financial flows, counterparties, and corporate relationships. The set of characteristics presented above does not in itself constitute evidence of a violation of the law; however, it indicates the need for an in-depth financial analysis.

A study of companies with the highest turnover shows that among enterprises employing only 1–3 officially registered workers, there are entities with exceptionally high financial indicators. In particular, LLC “APPLE UKRAINE”, with two employees, reported revenue of UAH 11.28 billion in 2025, while LLC “MG BUSINESS GROUP” and LLC “RONSTRIT CORPORATION”, each with one employee, reported approximately UAH 6 billion in revenue. In addition, the sample contains a significant number of other companies with turnover ranging from hundreds of millions to several billion hryvnias despite having a minimal workforce.

Such indicators are atypical for most enterprises and may reflect the specific nature of the business model (distribution, trading, agency activities, or outsourcing). At the same time, they constitute a risk indicator requiring additional analysis. High revenue combined with a small number of employees does not, in itself, constitute evidence of violations; however, such a combination of indicators provides sufficient grounds for an in-depth examination of the business structure, financial flows, counterparties, and the economic rationale underlying the reported results.

The recurrence of the same directors across several companies may indicate the existence of corporate groups, holding structures, or a centralized business management system. Such a practice is also characteristic of companies that employ professional or nominal managers to administer several legal entities.

At the same time, a significant concentration of managerial powers in the hands of the same individuals may indicate interconnections between enterprises and therefore requires further analysis of their ownership structures, ultimate beneficial owners, business transactions, and financial relationships between companies.

The presence of directors who simultaneously head between five and nine companies indicates a high likelihood of organizational or corporate interconnectedness among some of the legal entities in the sample under study. At the same time, this fact alone does not constitute evidence of unlawful activity or a violation of the law. To confirm or refute potential risks, a comprehensive analysis of the owners, financial flows, contractual relationships, and other indicators of affiliation between the respective companies is required.

An additional indicator of potential interconnectedness between companies is the analysis of their registered legal addresses. While the recurrence of the same directors may indicate common management, the concentration of legal entities at a single address makes it possible to assess potential organizational or infrastructural links between them.

A large number of legal entities registered at the same address may be explained by the presence of business centers, mass-registration services, or corporate groups. For journalistic purposes, this constitutes grounds for further verification rather than a basis for concluding that any violation has occurred (Table 2).

Table 2

Recurring addresses (most frequently encountered addresses)

Company	Address
Kyiv, str. Zhilyanska, 75	20
Kyiv, str. Jones Gareth, 8	9
Kyiv, str. Zoologichna, 4A	5
Kyiv, str. Velika Vasylkivska, 72	5
Kyiv, str. Bolsunovska, 13–15	5

Source: compiled by the author based on data from [6]

The concentration of a large number of legal entities at a single address may be attributable to the location of business centers, coworking spaces,

office complexes, or companies providing mass-registration services for legal entities. In addition, a shared address may indicate that enterprises belong to the same corporate group or use centralized administrative infrastructure.

At the same time, the recurrence of the same legal addresses is one of the indirect indicators of potential interconnections between companies. Therefore, it is advisable to examine additional information concerning the founders, ultimate beneficial owners, directors, business activities, and commercial relationships between the respective entities.

The analysis indicates the existence of addresses at which a significant number of legal entities are registered. In particular, at 75 Zhylianska Street, Kyiv, 20 companies are registered. Such concentration may result from the specific organization of business activities, the use of mass-registration services, or the operation of corporate groups. This fact alone does not constitute evidence of a violation of the law; however, it is an important analytical indicator that requires further verification in combination with other criteria of corporate interconnectedness.

Given the difficulty of conducting a thorough analysis of such a large sample, additional restrictions were introduced: the number of employees was limited to no more than three, while total revenue was set at UAH 500 million or more (Figure 3).

To further narrow the sample, additional criteria were applied: no more than three employees and total revenue exceeding UAH 500 million. As a result of the analysis, a sample of 298 legal entities meeting these parameters was formed (Figure 4).

The analysis of the geographical distribution revealed a significant concentration of such companies in the capital. The largest number of business entities is registered in Kyiv – 128 companies, accounting for almost 43% of the entire sample. The next largest concentrations are observed in Lviv region (32 companies), Dnipropetrovsk region (20), Volyn and Odesa regions (12 companies each), as well as Kharkiv and Cherkasy regions.

At the same time, in most other regions, the number of such enterprises is relatively small and does not exceed several entities. This uneven distribution may be explained by the concentration of large businesses, corporate headquarters, legal firms, and consulting companies in the country's major economic centers, primarily Kyiv.

Particular attention should be paid to the fact that the sample includes companies with very high financial indicators but a minimal number of employees. Such a business model is not automatically evidence of violations; however, it may indicate the use of legal entities as holding, financial, or transit structures through which assets, corporate rights, or financial flows are managed without the need to maintain a large workforce.

2.3. Sectoral Distribution of Companies

An important question arises as to why the "Net revenue from sales of products" indicator is not available for all 298 companies. In our sample, this indicator is missing for 117 out of 298 companies. This means that almost 40% of the sample does not have reported revenue for 2025 in the available financial data.

The main reasons are as follows:

1. Absence of financial statements for 2025. Some companies have not yet submitted or disclosed their financial statements – 112 companies (37.6%).

2. Non-profit organizations (NGOs, condominium associations, foundations). Such entities do not generate "net revenue from sales of products" in the conventional sense – 117 companies (39.3%).

3. Companies with zero or inactive operations ("dormant" companies). Legal entities may formally exist without conducting operational activities – 229 companies (76.9%).

The analysis of the financial indicators of the sample of 298 companies demonstrates a significant proportion of legal entities with absent or zero financial activity in 2025. In particular, more than 77% of companies either did not report revenue or recorded zero results, which may indicate the use of simplified corporate structures or "dormant" companies. Based on an analysis of YouControl data, a sample of companies with a minimal workforce (up to 3 employees) and significant revenue volumes in 2025 was formed.

The results of the TOP 10 companies analysis confirm that among enterprises with a minimal workforce there are business entities reporting exceptionally high financial turnover. At the same time, the dominance of the "Other companies" category indicates that such characteristics are not limited to isolated cases but are shared by hundreds of enterprises

included in the sample. This confirms the relevance of using YouControl analytical tools for the risk-oriented selection of such companies and their subsequent comprehensive examination through the analysis of corporate relationships, financial statements, and other risk indicators. It is precisely this comprehensive approach that makes it possible to identify enterprises whose activities require more detailed financial and economic assessment.

At the same time, these characteristics do not constitute direct evidence of violations but form a cumulative analytical indicator which, when combined with recurring directors, shared addresses, and geographical concentration, requires further in-depth investigation of corporate relationships and financial flows.

Thus, the analysis of the financial dynamics of 298 companies revealed significant gaps in reporting: between 16.8% and 47.7% of companies had no reported revenue data in different years of the 2021–2024 period. This provides grounds for the hypothesis that the sample includes a proportion of legal entities exhibiting signs of limited or "dormant" activity that may have been reactivated in 2025 [6].

Given these findings, in order to ensure the reliability of the subsequent analysis and eliminate potentially distorting factors, it was decided to narrow the initial sample. Further analysis focuses exclusively on enterprises demonstrating specific characteristics potentially associated with low operational activity or business optimization processes. Accordingly, after establishing the selection thresholds, we examine the regional distribution of companies with no more than one employee and total revenue of up to UAH 500 million in Ukraine in 2025.

The further analysis focuses exclusively on enterprises demonstrating specific characteristics potentially associated with low operational activity or business optimization processes. Accordingly, after establishing the selection thresholds, we examine the regional distribution of companies with no more than one employee and total revenue of up to UAH 500 million in Ukraine in 2025.

However, in addition to the geographical location of these business entities, a thorough understanding of the structure of their cash flows is critically important. Since the selected group of enterprises is highly specific due to its minimal workforce, a detailed analysis of their revenue makes it possible to identify hidden patterns and internal market disparities. For this

purpose, a detailed calculation of the key financial indicators of the selected sample was conducted. The descriptive statistics for the "Total Revenue 2025" variable are presented below, including the mean, median, quartile distribution, and identified anomalies (Table 3).

Table 3

Financial Statistics (Mean, Median, Quartiles, and Anomalies) for the Total Revenue of Companies in 2025 (UAH)

Metric	Value
Number of companies	105
Average revenue	1 940 329 170,48
Median	933 661 000
1st quartile (Q1)	686 199 900
3rd quartile (Q3)	1 615 546 700
Interquartile range (IQR)	929 346 800
Lower outlier limit	−707 820 300
Upper outlier limit	3 009 566 900
Number of outliers	11

Source: compiled by the author based on data from [6]

The average revenue (UAH 1.94 billion) significantly exceeds the median (UAH 0.934 billion), indicating a right-skewed distribution: several very large companies substantially increase the mean value (Table 5). Specifically, 50% of the companies have total revenue ranging from UAH 686.2 million to UAH 1.616 billion. According to the 1.5×IQR criterion, 11 exceptionally high values were identified. There are no lower outliers because the lower bound is negative.

Using the interquartile range method (1.5×IQR), 11 exceptionally high values of the "Total Revenue 2025" indicator were identified. All of them exceed the upper threshold of UAH 3.01 billion. The presence of these observations explains the significant difference between the mean and median and indicates a right-skewed distribution of revenues within the sample.

The results produced a sample of 105 legal entities that meet the established search criteria, including revenue level, number of employees, and express-analysis indicators. This dataset can serve as an analytical

basis for further research into market structure, the identification of potential relationships between business entities, and the assessment of the characteristic features of their activities. At the same time, the mere fact that enterprises meet the specified criteria does not indicate violations of the law or joint activities. Only a comprehensive analysis of such indicators as corporate relationships, common directors and founders, registered addresses, regional concentration, financial indicators, participation in public procurement, and other relevant characteristics can provide grounds for well-founded conclusions regarding possible economic relationships between legal entities and the need for further investigative analysis.

To assess the concentration of financial flows, the share of the largest enterprise in the total revenue of the sample was determined. Thus, three enterprises account for more than UAH 5.8 billion in revenue, indicating a high concentration of financial flows [6]. The first company, LLC "MODERN ELECTRONICS SERVICE", accounts for 38.76%; the second, LLC "BRUKH LIMITED", for 1.35%; and the last company, LLC "TEKLA UKRAINE", for 29.89%.

3. Conclusions and Research Prospects

3.1. Main Research Findings

At the same time, an analysis based solely on financial indicators does not make it possible to fully assess the potential risks associated with the activities of enterprises. Therefore, the next stage of the study involved the application of the YC.Market express analysis, which enables a comprehensive assessment of the risk level of business entities based on a broad range of financial, legal, and reputational indicators. This approach provides a more objective assessment of the reliability of enterprises and complements the results of the financial analysis. One of the modern tools for assessing the reliability of business entities is the YC.Market express analysis (Figure 4).

Express analysis is an analytical scoring indicator based on 595 factors that reflects the level of negativity associated with the company under review [6].

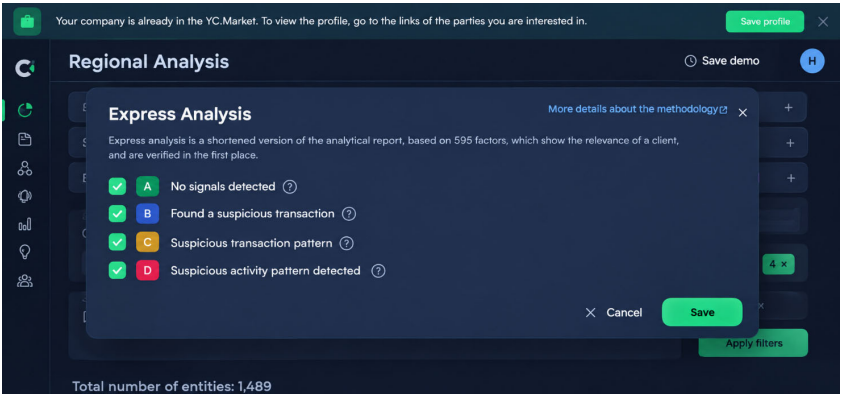


Figure 4. YC.Market Express Analysis

Source: compiled by the author based on data from [6]

We analyzed the 105 companies included in our sample using the express analysis. The results demonstrate that more than half of the enterprises under study (55.6%) received a "C" rating, indicating the need for a more detailed assessment before entering into business cooperation. This category includes, in particular, several limited liability companies with certain risk indicators identified by the automated analytical system.

A "B" rating was assigned to 22.2% of the enterprises. For such business entities, the system recommends paying attention to specific risk factors, although these do not indicate a critical level of risk.

Only 16.6% of the enterprises received an "A" rating, characterizing them as entities for which no significant risk signals were identified.

At the same time, only 5.6% of the companies were assigned a "D" rating, representing the highest level of risk. Such a rating indicates the need for an exceptionally detailed examination of financial activities, ownership structure, litigation history, tax compliance, and relationships with counterparties before making any management decisions.

To deepen the analysis, the next stage involved applying stricter selection criteria to identify the most atypical business entities based on two parameters: net revenue from sales exceeding UAH 500 million according to financial statements and only one officially employed worker.

This approach makes it possible to identify companies whose financial indicators substantially exceed the average levels for enterprises with a comparable workforce and may indicate the use of atypical business models.

As a result of the selection process, 37 business entities were included in the sample. At the same time, to ensure the objectivity of the study, two companies were excluded from further analysis:

– LLC “POVER UA”, as the company is in the process of terminating its business activities;

– LLC “LITAI”, in respect of which bankruptcy proceedings have been initiated.

Thus, the subsequent analysis was conducted on 35 active business entities that were actually engaged in economic activities.

The analysis of total expenses and financial results before taxation makes it possible to assess the scale of companies’ business activities, their level of financial efficiency, and the presence of potential risks. The main focus is placed on the relationship between the volume of expenses and the financial result obtained, as well as on identifying companies with the highest profits, losses, or zero financial results. The financial results before taxation of these companies are heterogeneous: 22 enterprises generated a positive financial result, 8 enterprises ended the period with a loss, and 3 enterprises reported a zero result. It is noteworthy that the leading company in our ranking, LLC “RONSTRIT CORPORATION” [1], reported a zero financial result. At the same time, this company is the business entity with the largest volume of expenses among all enterprises included in the analyzed population. According to the results of 2025, the company’s total expenses amounted to UAH 6,437,634,900, which is the highest figure among the 35 analyzed business entities.

At the same time, the financial condition of the analyzed population is uneven. The positive result is primarily generated by several highly profitable enterprises, whereas significant losses incurred by certain entities substantially reduce the overall financial effect.

The most significant conclusion is that a high level of expenses does not guarantee the generation of a corresponding profit. Some enterprises with expenses amounting to billions of hryvnias have a zero or minimal financial result, while certain entities with lower volumes of expenses demonstrate significantly higher efficiency.

Thus, for a more in-depth assessment, it is advisable to additionally analyze the structure of revenues and expenses, profitability, tax burden, types of business activities, and the dynamics of indicators over previous years. Particular attention should be paid to enterprises with the largest losses and to entities that incur significant expenses while reporting a zero or minimal financial result.

Particular attention during the study was drawn to certain companies whose activities are characterized by significant activity in the field of public procurement. First and foremost, this concerns LLC "TEKLA UKRAINE", which, according to YouControl data, submitted 1,415 tender bids, 63 of which resulted in victories. Such a number of participations indicates systematic and continuous activity in the public procurement market. At the same time, the preparation, submission, administration, and execution of such a large number of tender procedures with only one officially employed worker appears atypical and may be explained by the use of outsourcing mechanisms or other organizational models of conducting business. Therefore, the company's activities require additional analysis with regard to the organization of business processes and staffing.

The conducted study should be viewed not merely as a collection of individual examples of enterprises with atypical indicators, but as a consistent system of risk-oriented selection and further refinement of the analytical sample. The initial stage of the study covered 1,489 companies that, in 2025, simultaneously had no more than three officially employed workers and net income exceeding UAH 100 million. This criterion made it possible to identify a broad range of business entities characterized by a combination of a minimal staffing base and substantial financial turnover. It is precisely the relationship between human resources and the scale of financial activity that constitutes one of the key indicators underlying the subsequent in-depth analysis.

It is important to emphasize that the sample of 1,489 enterprises cannot be regarded as a population of companies whose activities are unlawful in nature. Such an approach would contradict the principles of objective economic analysis. Significant turnover with a small number of employees may be characteristic of enterprises that use outsourcing, agency models, centralized management, distribution, trading, or other forms of organizing

business activities. Therefore, this criterion should be interpreted specifically as an initial signal for further investigation [7].

At the same time, the size of the initial sample indicates that the phenomenon is not isolated. The study identified 1,489 legal entities that meet the established combination of staffing and financial criteria. Consequently, a minimal number of employees combined with substantial turnover is a sufficiently widespread characteristic of a segment of Ukrainian businesses. This creates a need to move from merely identifying such enterprises to classifying them according to the level of financial concentration, nature of activity, regional distribution, corporate relationships, and other risk indicators.

The next stage involved narrowing the sample by increasing the income threshold. Applying the criteria of no more than three employees and income exceeding UAH 500 million resulted in 298 legal entities. Thus, enterprises in which the disproportion between the number of employees and the scale of financial operations is more pronounced were identified from the initial population. While the first stage of the analysis covered a broad range of companies, the second stage focused on entities whose financial scale already significantly exceeded the established minimum threshold.

3.2. Study Limitations and Future Research

A distinctive feature of the sample of 298 companies is its heterogeneity. It simultaneously includes enterprises with very significant financial indicators, legal entities with limited or no operational activity, as well as organizations for which the indicator of net revenue from sales of products is not directly comparable with the indicators of conventional commercial enterprises. Therefore, a mechanical comparison of all 298 entities may lead to distorted results.

A notable feature is the absence of data on net revenue for 2025 for a significant proportion of the enterprises in the sample. The research materials indicate that this indicator is unavailable for 117 out of 298 companies, accounting for approximately 39% of the sample. The reasons for this situation may vary, including the absence of publicly available financial statements, the specifics of the organizational and legal form, or the actual absence of operational activity. Therefore, the absence of this indicator cannot automatically be interpreted as a negative characteristic; however, it

reduces the possibility of direct financial comparison between enterprises.

Of particular importance is the relationship between the number of employees and financial performance. The study identified enterprises with only one to three employees that nevertheless report revenues of hundreds of millions or even billions of hryvnias. Among the most illustrative examples are LLC "APPLE UKRAINE," LLC "MG BUSINESS GROUP," LLC "RONSTRIT CORPORATION," and other enterprises. These findings demonstrate that the number of employees alone cannot serve as a sufficient indicator of the scale of an enterprise. However, when combined with financial indicators, it constitutes an important analytical indicator.

The subsequent narrowing of the sample to 105 legal entities made it possible to move from general screening to statistical analysis. This group is the most suitable for examining the structure of revenues, median values, quartiles, and anomalous observations. The calculated indicators demonstrate substantial asymmetry in the financial distribution. The average revenue of the enterprises amounted to UAH 1.94 billion, whereas the median value was UAH 933.66 million. Thus, the mean value was more than twice as high as the median.

This difference is of fundamental analytical importance. It indicates that the revenue distribution in the sample is influenced by several exceptionally large values. In other words, the arithmetic mean does not represent a typical company in the sample. In this case, the median is more appropriate for characterizing the central tendency, as it is less sensitive to extremely large values.

Half of the companies under study have revenues ranging from UAH 686.2 million to UAH 1.616 billion. The interquartile range (IQR) amounts to UAH 929.35 million. According to the 1.5×IQR criterion, 11 exceptionally high values were identified that exceed the upper threshold of UAH 3.01 billion. This group includes both commercial enterprises and organizations with other organizational and legal forms. This circumstance further confirms the need for a differentiated approach to interpreting the results.

CONCLUSIONS

The analysis of anomalous values allows for an important conclusion: the financial scale of individual legal entities differs substantially from the

typical structure of the sample. For example, among the highest revenue values there are enterprises with revenues exceeding UAH 5–20 billion, whereas the median revenue level is below UAH 1 billion. Thus, a significant share of the financial flows within the sample is concentrated among a relatively small number of entities.

From an economic perspective, this means that the assessment of such a population should rely not on a single indicator but on a system of interrelated indicators. These include the absolute amount of revenue, the ratio of revenue to the number of employees, profit before taxation, the dynamics of revenues, expenses and assets, as well as information on corporate relationships. It is precisely the combination of these parameters that makes it possible to distinguish ordinary business-model characteristics from genuinely atypical situations.

A separate direction of in-depth analysis involved forming a sample of 35 active business entities that met a stricter criterion: net revenue exceeding UAH 500 million and only one officially employed worker. Two companies were excluded from further analysis because they were in the process of terminating their activities or had bankruptcy proceedings initiated against them. This approach made it possible to focus specifically on active enterprises with the most pronounced disproportion between human resources and financial scale.

Among the 35 enterprises, 22 companies achieved a positive financial result, 8 ended the period with a loss, and 3 reported a zero result. This is an important addition to the revenue analysis, since high turnover alone does not characterize the economic efficiency of an enterprise. A company may have a substantial volume of sales while simultaneously demonstrating low or zero profitability due to a high level of expenses.

Thus, the analysis of 35 enterprises demonstrates the need to move from the concept of “high revenue” to that of “economic efficiency.” For this purpose, revenue, expenses, and financial results should be considered in combination. Particular attention should be paid to enterprises where multimillion or billion-hryvnia turnover is accompanied by minimal profit or a loss. Such a situation may have a completely legitimate economic explanation, for example, operation in a low-margin trading segment, but it requires additional examination of the cost structure.

An important finding of the analysis is also the recurrence of certain managers and legal addresses. The sample includes managers who simultaneously head several legal entities. The highest identified figure is nine companies headed by a single manager. Cases in which one person heads six or five companies were also identified. A similar situation is observed with respect to legal addresses: certain addresses are used by a significant number of legal entities. For example, 20 companies are registered at one of the addresses in Kyiv.

Taken together, these indicators make it possible to move from the analysis of an individual legal entity to the analysis of a corporate network. If companies have common managers, founders, ultimate beneficial owners, legal addresses, or other contact characteristics, it is appropriate to examine them not in isolation but as a potentially related group. At the same time, the recurrence of a single indicator is not sufficient to conclude that companies are affiliated. The combination of several independent indicators is required.

The combination of financial and network indicators is of particular importance. For example, an enterprise with one employee and revenue exceeding UAH 500 million is not necessarily high-risk in itself. However, if a common manager with other companies, a shared legal address, similar business activities, significant turnover, and participation in a large number of commercial transactions are identified simultaneously, the level of analytical attention devoted to such an enterprise should increase.

Therefore, the proposed selection system can be presented as a sequence of four levels. The first level involves broad screening of 1,489 companies according to the criteria of minimal workforce and revenue exceeding UAH 100 million. The second level narrows the sample to 298 enterprises with revenue exceeding UAH 500 million. The third level involves a statistically more homogeneous sample of 105 companies for the analysis of revenues, quartiles, and anomalous values. The fourth level comprises 35 active enterprises with one employee and revenue exceeding UAH 500 million for the most detailed financial and corporate analysis.

Such a multi-level model is more justified than a one-time selection of enterprises based on a single criterion. At each subsequent stage, the number of companies decreases, while the analytical value of each observation increases. This makes it possible to move from the mass identification

of atypical characteristics to the identification of specific cases requiring detailed verification.

A generalization of the results obtained makes it possible to propose a conditional risk-oriented assessment system. The first group may include enterprises where a minimal workforce is combined only with high revenue. The second group is characterized by an additional financial anomaly–an exceptionally high revenue, a loss, or a zero financial result. The third group is formed when corporate indicators are present, including recurring managers, founders, beneficial owners, or addresses. The highest level of analytical attention should be devoted to enterprises where financial, corporate, and operational indicators are present simultaneously.

This approach helps minimize the risk of misinterpreting the data. It is based on the premise that no single indicator can constitute evidence of a violation of the law. At the same time, a combination of independent signals may provide a reasonable basis for further verification. Therefore, the findings of the study should be used not for the automatic identification of "problematic" companies, but for establishing priorities for further analytical investigation.

Thus, the in-depth analysis of samples comprising 1,489, 298, 105, and 35 enterprises demonstrates the effectiveness of a step-by-step risk-oriented approach to the study of the corporate environment. The initial dataset makes it possible to identify the scale of the phenomenon; the sample of 298 companies focuses on enterprises with higher financial turnover; the sample of 105 companies makes it possible to assess the statistical structure of revenues and anomalous values; and the sample of 35 enterprises enables a detailed analysis of financial results, corporate relationships, and organizational characteristics.

In this context, the analytical capabilities of YouControl and YC.Market can be regarded not only as tools for verifying individual companies but also as means of forming and progressively narrowing large datasets. Their use makes it possible to move from quantitative analysis to qualitative assessment of specific business entities. This sequence–from a broad sample to a detailed analysis of individual companies–provides a basis for financial, corporate, and journalistic investigations and increases the validity of the conclusions obtained [8].

The results of LLC “SKYHUB” are also noteworthy. The company submitted 238 tender bids and won 68 of them. The share of successful procurements amounts to almost 29%, which is a relatively high indicator of participation efficiency in competitive procedures. Given the company’s significant financial turnover, minimal workforce, and active participation in the public procurement market, its activities also deserve particular attention from analysts.

The most atypical indicators are demonstrated by LLC “REMSTAR.” The enterprise participated in only 182 tender procedures, yet 178 of them resulted in a successful bid, corresponding to approximately a 98% success rate. This figure substantially exceeds the average success rate of participants in the public procurement system and may indicate stable specialization, high competitiveness, or other factors that warrant further investigation. At the same time, the execution of a significant number of construction and installation contracts with only one officially employed worker also represents an atypical organizational model.

Particular attention should be paid to the “BUILDING UA” Consortium, which, according to the analytical system, acted as a manager of public funds. During 2023–2026, 22 budget transactions were recorded, totaling UAH 172,146,939. The presence of a substantial volume of public funds combined with a minimal number of officially employed persons is a factor requiring increased attention, since effective management of financial flows of this scale would normally involve a significantly larger organizational structure.

In view of this, LLC “TEKLA UKRAINE,” LLC “SKYHUB,” LLC “REMSTAR,” and the “BUILDING UA” Consortium may reasonably be classified as enterprises with an elevated level of analytical risk. Their activities require further comprehensive examination using YouControl, YC.Market, the Prozorro system, open state registers, and other sources to assess ownership structures, business relationships, the performance of public contracts, staffing capacity, and the economic rationale underlying their financial indicators. Such an approach makes it possible to distinguish legitimate uses of modern business models from situations that may require additional attention from regulatory or law-enforcement authorities.

The results obtained confirm the practical value of the YC.Market express analysis as a tool for preliminary counterparty assessment.

The use of a scoring model makes it possible to promptly identify enterprises with an elevated level of risk, determine the priority of their verification, and support managerial decision-making in the areas of financial control and economic security. At the same time, it should be emphasized that a high risk score does not constitute evidence of a violation of the law; rather, it signals the need for a comprehensive analysis of the enterprise's financial indicators, ownership structure, tax compliance, and business relationships.

The study confirms that the use of modern analytical platforms, including YouControl and YC.Market, creates new opportunities for comprehensive research into Ukraine's corporate sector and for identifying enterprises whose activities require additional attention from the perspectives of financial monitoring, economic security, and risk-oriented analysis. Combining information from state registers, financial statements, court decisions, sanctions lists, corporate relationships, and other open sources makes it possible to move from the analysis of an individual company to the study of entire corporate networks.

The study demonstrates that one of the most informative criteria for the initial selection of potentially high-risk business entities is the combination of a minimal number of officially employed workers with exceptionally high financial turnover. Such an indicator, taken alone, does not constitute evidence of a violation of the law; however, it serves as an effective risk indicator that makes it possible to form a sample of enterprises for further comprehensive investigation.

The analysis revealed that a considerable number of legal entities in Ukraine report revenues amounting to hundreds of millions or even tens of billions of hryvnias while employing only one to three workers. Such companies are represented across virtually all sectors of the economy, although their highest concentration is observed in wholesale and retail trade, energy, financial activities, real estate operations, and corporate management. This indicates that the phenomenon under study is neither random nor localized but has a systemic character.

The regional analysis demonstrated a significant territorial concentration of such enterprises in the city of Kyiv, as well as in Ukraine's most economically active regions. This distribution may be explained by the characteristics of large-business registration, the functioning of corporate centers, the concentration of holding structures, and the use of modern

business management models. At the same time, the geographical concentration of enterprises constitutes an additional analytical indicator that should be taken into account when examining corporate networks.

Particular attention in the study was devoted to the application of a risk-oriented approach. The research demonstrated that combining financial indicators with an analysis of corporate relationships, recurring managers, legal addresses, ownership structures, and express-analysis results can substantially improve the effectiveness of identifying potentially high-risk companies. It was established that certain managers simultaneously head several legal entities, while a number of enterprises are registered at the same addresses. Such characteristics do not constitute evidence of unlawful activity, but they may indicate the existence of corporate groups or centralized business-management models.

The practical part of the study confirmed the high effectiveness of YouControl tools for the automated selection of enterprises according to specified criteria. The use of the system made it possible not only to form samples of companies with a minimal number of employees and significant financial turnover, but also to conduct a multi-level analysis of financial indicators, regional and sectoral distributions, as well as to perform a preliminary assessment of risk using scoring models.

Particular attention was also paid to the statistical analysis of the data obtained. The use of the median, quartile analysis, and the interquartile range made it possible to assess the structure of the sample more objectively while minimizing the influence of exceptionally large companies on the overall results. The identification of enterprises with exceptionally high financial indicators confirmed the substantial asymmetry of the revenue distribution and the need to apply modern statistical methods when analyzing corporate data.

The practical significance of the findings lies in the possibility of using the proposed methodology by government authorities, financial monitoring units, law-enforcement agencies, investigative journalists, banking institutions, auditors, compliance departments, and corporate economic security services. The proposed analytical algorithm can be used for the initial selection of potentially high-risk counterparties, assessment of corporate structures, financial investigations, verification of the business reputation of economic entities, and minimization of financial risks.

The scientific novelty of the study lies in the proposed comprehensive approach to identifying potentially "dormant" companies through the integration of financial analysis, statistical methods, corporate-network analysis, and modern digital analytical platforms. Unlike traditional approaches, the proposed methodology makes it possible to assess not only individual financial indicators but also a set of interrelated factors that shape the risk profile of an enterprise.

At the same time, the findings of the study have certain limitations. The selection criteria used cannot be regarded as conclusive evidence of unlawful activity by enterprises. Significant financial turnover combined with a minimal number of employees may be characteristic of distribution companies, agency structures, holding companies, investment enterprises, or other business models that do not require a large workforce. Therefore, all findings should be regarded as a basis for further in-depth analysis rather than as definitive conclusions regarding the activities of specific legal entities.

Promising areas for further research may include the development of automated machine-learning models for classifying high-risk enterprises, the construction of graph-based models of corporate networks, analysis of financial flows between related companies, investigation of changes in corporate relationships over time, and integration of data from international registers to identify cross-border corporate structures. The use of artificial intelligence technologies to automatically detect hidden interconnections between enterprises and predict potential financial risks also offers considerable potential.

Thus, the study confirms that modern open-data analytical systems are effective tools for investigating Ukraine's corporate sector and supporting risk-oriented analysis. The proposed approach makes it possible to identify enterprises with atypical characteristics in a timely manner, develop well-grounded samples for further financial and journalistic investigations, improve the effectiveness of financial control, and contribute to the development of modern open-data analytics. At the same time, all identified patterns should be regarded exclusively as analytical indicators requiring comprehensive verification rather than as evidence of violations of the law.

References:

1. How to Find Out the Financial Condition of a Business Partner? YouControl. Available at: https://youcontrol.com.ua/blog/yak-diznatysia-finansovyy-stan-biznes-partnera/

2. How to Properly Read YouControl Financial Analytics. YouControl. Available at: https://youcontrol.com.ua/blog/yak-pravilno-chitati-finansovu-analitiku-youcontrol/

3. Ukraine as a Trend-Setter of Open Data in Europe: What Is the Role of Business? YouControl. Available at: https://youcontrol.com.ua/blog/ukrayina-trend-setter-vidkrytykh-danykh/

4. YouControl Launches a Free Tool for Checking Procurement Participants in One Click. YouControl. Available at: https://youcontrol.com.ua/news/instrument-z-perevirky-uchasnykiv-zakupivel/

5. "Tender Analysis": An Ideal Tool for Checking Public Procurement from YouControl. YouControl. Available at: https://youcontrol.com.ua/news/analiz-tenderiv-perevirky-publichnykh-zakupivel/

6. YC.Market: Market Analysis. Available at: https://youcontrol.market/

7. YC.Market: Analysis of Your Clients and Competitors. Available at: https://youcontrol.market/analiz-klientiv-ta-konkurentiv/

8. State Tax Service of Ukraine. The State Tax Service Identified Signs of a Large-Scale Scheme of Funds Withdrawal Abroad Involving More Than Two Thousand High-Risk Companies. 02.06.2026. Available at: https://tax.gov.ua/media-tsentr/novini/1016811.html

GLOBAL AND NATIONAL FEATURES OF SOCIAL INEQUALITY: A MULTIDIMENSIONAL APPROACH

СВІТОВІ ТА НАЦІОНАЛЬНІ ОСОБЛИВОСТІ СОЦІАЛЬНОЇ НЕРІВНОСТІ: БАГАТОВИМІРНИЙ ПІДХІД

Tetiana Perehudova[1]
Olha Serikova[2]

DOI: https://doi.org/10.30525/978-9934-26-715-4-12

Abstract. *Purpose.* The purpose of the study is to establish a methodological framework for monitoring social inequality through the systematization of its key dimensions, indicators, and risks, taking into account the contemporary challenges facing Ukrainian society and based on the examination of current approaches to assessing social inequality and the generalization of the experience of international organizations.

Subject of the study. The subject of the research is social inequality as a multidimensional socio-economic phenomenon, including its manifestations, determinants, and impact on human development, social mobility, and social cohesion.

Methodology. The study is based on systemic, comparative, and interdisciplinary approaches. The research employs methods of analysis and synthesis, comparison, generalization, content analysis of international and national reports, statistical analysis of socio-economic indicators, as well as systematization methods to identify the key dimensions and risks of social inequality.

Results. The study examines the issue of social inequality in the context of contemporary global challenges and Ukraine's post-war recovery. Based

[1] Candidate of Economic Sciences, Associate Professor,
Senior Researcher at the Department of Labour Socioeconomics,
Institute for Economics and Forecasting of the NAS of Ukraine, Ukraine
ORCID: https://orcid.org/0000-0002-3093-6104
[2] Candidate of Economic Sciences, Associate Professor,
Associate Professor of the Department of Accounting and Taxation,
East Ukrainian Volodymyr Dahl National University, Ukraine
ORCID: https://orcid.org/0000-0002-0410-1242

© Tetiana Perehudova, Olha Serikova

on the analysis of reports produced by international organizations, including UNDP, the United Nations, the OECD, Oxfam, the World Inequality Lab, and the World Economic Forum, current approaches to the assessment of social inequality were generalized and its main dimensions were identified. The interconnections between economic, educational, gender, regional, inclusive, and socio-political inequalities, as well as their impact on human development, social mobility, and social cohesion, were explored.

The study also investigates the specific manifestations of social inequality in Ukraine under martial law. It was found that the war has significantly deepened existing disparities in income, employment, access to education, healthcare, and social protection, while also exacerbating regional inequalities and the risks of social exclusion among vulnerable population groups. Particular attention is paid to issues of labour and social inclusion of persons with disabilities, gender inequality in the labour market, educational inequality, and challenges related to social mobility.

The risks of social inequality were systematized across individual dimensions, and their interaction and cumulative impact on social cohesion were identified. The findings demonstrate that economic and educational gaps intensify socio-economic instability; gender inequality in employment and wages contributes to lower levels of social mobility; territorial disparities have been substantially aggravated by the consequences of war; and insufficient social infrastructure for vulnerable groups reinforces cyclical patterns of inequality.

It is substantiated that overcoming social inequality is a key prerequisite for strengthening social solidarity in Ukrainian society, as reducing structural disparities in access to opportunities contributes to greater trust in public institutions, enhanced social integration, and sustainable economic development.

The study provides a fundamental basis for the development of a comprehensive socio-economic policy that addresses not only income disparities but also the structural determinants of social inequality, including educational, gender, territorial, and demographic factors. Such a framework enables the design of cross-sectoral strategies and programmes aimed at increasing equal participation in the labour market, supporting vulnerable groups, reducing inequalities in access to social services, and strengthening social solidarity.

ВСТУП

В очікуванні миру та подальшого відновлення економіки в Україні важливо замислитися над питанням подолання соціальної нерівності та посилення солідаризації суспільства. Суспільні та економічні потрясіння, пов'язані з війною загострили коло питань стосовно нерівності у доходах, економічних та інституційних можливостей, доступу до якісної освіти, цифрових ресурсів, професійного розвитку, нерівності, обумовленою інвалідністю, внутрішнім переміщенням, наближенням території проживання до лінії бойових дій, а також можливостей інтеграції у локальні ринки праці. Значна частина громадян втратила роботу, житло та/або була змушена змінити місце проживання, що призвело до формування нових соціально вразливих груп населення та поглиблення територіальних диспропорцій.

У цих умовах проблема соціальної нерівності виходить за межі виключно економічного явища і стає одним із ключових чинників соціальної стабільності, суспільної згуртованості та ефективності повоєнного відновлення країни. Питання соціальної нерівності – одне з важливих при повоєнному відновленні та інституціалізації соціальної політики України. Значні диспропорції в доходах, не обумовлені продуктивністю праці, нерівні права у доступі до ресурсів, освіти, охорони здоров'я та участі у прийнятті рішень негативно впливають на соціальний та економічний розвиток та солідаризацію суспільства.

Питання соціальної нерівності є предметом обговорення та дослідження в межах діяльності таких світових організацій, як: Всесвітня лабораторія нерівності (World Inequality Lab), ПРООН (UNPD), Департамент з економічних та соціальних питань ООН (UNDESA), Організація економічного співробітництва та розвитку (OECD), Світовий економічний форум (WEF) та інш., результати досліджень яких регулярно висвітлюються у відповідних звітах, що підтверджує той факт, що соціальна нерівність несе загрозу суспільному устрою та подальшому розвитку, і потребує підвищеної уваги з боку як політичних, економічних, так і наукових організацій.

1. Соціальна нерівність: глобальні тренди та виміри

Для глибшого розуміння природи сучасної соціальної нерівності та визначення напрямів її подолання доцільно проаналізувати глобальні

тенденції, які представлені в звітах міжнародних організацій та публікаціях науковців.

Окремим аспектам нерівності в контексті людського розвитку присвячено дослідження ПРООН, в межах діяльності якої періодично публікуються звіти, присвячені питанням людського розвитку [1]. У Звіті про розвиток людського потенціалу за 2025 рік під назвою «Питання вибору: люди та можливості в епоху штучного інтелекту» підкреслюється, що глобальний прогрес у розвитку людського потенціалу значно зупинився. У звіті розглядається потенціал штучного інтелекту (ШІ) для відродження розвитку та наголошується, що формування майбутнього за допомогою ШІ залежить від людського вибору та уяви для створення нових шляхів розвитку, а не від прогнозів. Ключові теми включають роль ШІ у підвищенні людських можливостей, подоланні виключення та сприянні сталому розвитку.

Основним висновком доповіді стало те, що прогрес за індексом розвитку людського потенціалу різко сповільнився, і є найменшим зростанням з 1990 року, за винятком кризових років 2020-2021. Нерівність між країнами з високим та низьким рівнем доходу зростає. ШІ надає як можливості для покращення розвитку людського потенціалу, так і ризики посилення виключення. У звіті стверджується, що для подолання поточної стагнації розвитку люди повинні активно формувати майбутнє, роблячи усвідомлений вибір щодо ШІ.

У звіті викладено рекомендації щодо розвитку, що підтримується ШІ, у трьох сферах:

– економіка: сприяння новим економічним системам, які працюють для всіх;

– інновації: сприяння інноваціям, орієнтованим на людину;

– інвестиції в освіту: зміцнення систем освіти для підготовки людей до епохи ШІ.

За даними останньої доповіді ПРООН про людський розвиток індекс людського розвитку (ІЛР) України становив 0,779 (станом на 2023 р.), що відносило її до країн із високим рівнем людського розвитку. Україна посідала 87 місце у загальному рейтингу країн. ІЛР є узагальненим показником для оцінки усереднених досягнень за трьома основними вимірами людського розвитку: довге та здорове життя, доступ до знань та гідний рівень життя. У період з 1990 по 2023 рік

значення ІЛР України зросло з 0,750 до 0,779. Індекс людського розвитку, скоригований з урахуванням нерівності, був значно менший і становив 0,715. Індекс скоригованого доходу з урахуванням нерівності в 2022 р. становив 0,672 [1].

Постійний представник UNDP в Україні Яко Сільє зазначив, що, хоча розвиток в Україні виявився стійким, зважаючи на наслідки пандемії COVID-19 та повномасштабної війни, виклики для України ще попереду. «Ми все ще не знаємо усієї глибини впливу на Україну повномасштабного вторгнення через складність збору даних, особливо на окупованих територіях. Але загальна картина є вкрай складною для України, і для пом'якшення негативних наслідків та утримання України на шляху до сталого розвитку будуть потрібні дії та підтримка» – сказав пан Сільє [2].

Індекс гендерної нерівності (ІГН) станом на 2022 р. для України був на рівні 0,188, що ставило її на 48 місце зі 166 країн світу. Цей індекс вимірює гендерну нерівність у трьох основних категоріях: репродуктивне здоров'я, розширення прав і можливостей та ринок праці. В Україні значення ІЛР для жінок становить 0,741, на відміну від 0,726 для чоловіків, унаслідок чого індекс гендерного розвитку (ІГР) дорівнював 1,021 (ІЛР для жінок поділений на ІЛР для чоловіків). Цей індекс вимірює гендерний розрив у досягненнях за трьома основними вимірами людського розвитку: здоров'я, знання та рівень життя, які вимірюються через оцінку валового національного доходу (ВНД) на особу для жінок і чоловіків. В Україні ВНД на особу знизився приблизно на 32,1% у період з 1990 по 2022 рік [2].

Зі збільшенням нерівності в країні зростають і втрати в людському розвитку. За оцінками ОЕСР понад 5 млн українців працездатного віку тимчасово чи постійно інтегровані в ринки праці країн Європейського Союзу [3].

Це зумовило різке зменшення пропозиції робочої сили в Україні та посилило ризик довгострокової втрати висококваліфікованих кадрів, сформувало значні диспропорції у структурі національного трудового потенціалу. Окреслюючи міграційний стан та прогнозуючи демографічний стан в Україні, більшість вчених звертає увагу на те, що затягування війни негативно відображається на намірах українців щодо повернення на Батьківщину.

Наступний звіт, присвячений питанням нерівності, є Всесвітній соціальний звіт за 2025 р. «Новий політичний консенсус для прискорення соціального прогресу» (World Social Report 2025. A new policy consensus to accelerate social progress) [4]. У доповіді про стан світового соціального становища за 2025 рік наведено огляд соціальних проблем, що перешкоджають досягненню цілей сталого розвитку. Доповідь підготовлена з метою детального аналізу таких проблем, як бідність, соціальна інтеграція, нерівність, зайнятість та гідна праця, довіра та соціальна згуртованість, включаючи основні зобов'язання, закріплені в Копенгагенській декларації та Програмі дій 1995 року.

У Всесвітньому соціальному звіті за 2025 рік обґрунтовується необхідність нового політичного консенсусу, заснованого на трьох принципах – рівність, економічна безпека для всіх та солідарність, які є важливими для зміцнення не лише соціальних, а й економічних та екологічних вимірів сталого розвитку.

Незважаючи на покращення матеріального добробуту, люди в усьому світі відчувають економічну нестабільність. Значна частина людей залишається вразливою до злиднів. За останніми оцінками 60 % людей у всьому світі борються за виживання. Понад 690 мільйонів людей живуть у крайній бідності, заробляючи менше 2,15 доларів на день. Понад 2,8 мільярда, що становить понад третину населення світу, живуть на суму від 2,15 до 6,85 доларів на день. Навіть невеликі потрясіння можуть призвести до того, що людина може опинитися у стані крайньої бідності, і будь-який вихід з бідності часто є тимчасовим. Зміна клімату та конфлікти посилюють загрози: майже кожна п'ята людина у світі перебуває під ризиком кліматичних катастроф, а кожна сьома зазнала конфлікту у 2024 році. Це перешкоджає подоланню бідності й поглиблює нерівність [4].

Майже 60 відсотків людей у всьому світі стурбовані втратою роботи та тим, що не зможуть її знайти. Неформальна зайнятість залишається найпоширенішою на ринку праці в країнах з низьким та середнім рівнем доходу. Переважна більшість працівників залишаються неформально зайнятими протягом тривалого часу – часто протягом усього свого життя. Хоча працівники, що отримують офіційну заробітну плату, рідко переходять на неформальну роботу, ризик низхідної мобільності – від формальної до неформальної зайнятості – є знач-

ним для працівників, що займаються формальною самозайнятістю, особливо для тих, хто зайнятий на низькокваліфікованій роботі. Таким чином, існує великий соціальний та економічний розрив між працівниками, що отримують офіційну заробітну плату, чиї шанси перейти до більш нестабільної самозайнятості або неформальної зайнятості низькі, та рештою робочої сили [4, с. 1-2].

Ще одним із важливих висновків дослідження стало те, що світ стикається з кризою інституційної довіри. Понад половини населення світу мало або взагалі не довіряє своєму уряду: 57 % відсотків людей стверджують, що їхній рівень довіри до уряду низький. У понад 50 % країн, в яких проводилось дослідження, спостерігається зростання частки людей, які взагалі не довіряють своєму уряду [4, с. 55-56].

Наступна доповідь, яка спрямована на дослідження нерівності – це звіт Oxfam про нерівність (Oxfam inequality report) [5]. Oxfam оприлюднила звіт «Takers, Not Makers», який показав, що у 2024 році глобальне багатство мільярдерів зросло на 2 трильйони доларів – у три рази швидше, ніж попереднього року, тоді як кількість людей у бідності майже не змінилася з 1990 року. У звіті підкреслюється, що 60% багатства мільярдерів є «незаробленим» – воно отримане через спадщину, монопольну владу або корупційні зв'язки. Oxfam закликає уряди підвищити податки для багатих, покінчити з надмірним збагаченням і інвестувати у громадські послуги та гідну оплату праці для боротьби з нерівністю.

У звіті прогнозується, що протягом наступного десятиліття з'явиться щонайменше п'ять трильйонерів. За висновками Oxfam: економічна система побудована на користь корпорацій і надбагатих.

Для вирішення даної проблеми запропоновано наступні рекомендації:

– оподаткувати багатих: уряди мають підвищити податки для найбагатших аби фінансувати громадські послуги та зменшити нерівність;

– інвестувати у громадські послуги: розвиток сильної системи охорони здоров'я, освіти та соціального захисту є ключовим для зниження нерівності;

– запроваджувати гідну оплату праці: уряди повинні забезпечити справедливе оподаткування та трудові права включно зі значним підвищенням мінімальних зарплат;

– демонополізувати економіку: слід розділяти приватні монополії та регулювати корпорації для справедливого ставлення до працівників і довкілля;

– подолати колоніальну спадщину: колишні колоніальні держави мають визнати заподіяну шкоду та надати репарації.

Серед світових доповідей, присвячених означеному питанню варто звернути увагу на Звіт про світову нерівність (World Inequality Report 2022 [6]), який був сформований на базі Всесвітньої лабораторії нерівності (World Inequality Lab), авторами якого стали Лукас Шансель (Lucas Chancel), Тома Пікетті (Thomas Piketty), Еммануель Саез (Emmanuel Saez), Габріель Цукман (Gabriel Zucman). Фокус дослідження спрямований на глобальній і національній нерівності доходів і багатства, капіталу, податкової справедливості, вплив політик. Базове поняття доходу, яке використовується, відповідає значенню, яке багато людей бачать у своїх платіжних відомостях у різних країнах світу – тобто це дохід до сплати податків на доходи та майно, але з урахуванням пенсійних і страхових внесків – це «дохід після заміщення, до оподаткування» (post-replacement, pre-income tax). Інший важливий тип доходу – це дохід, порахований після всіх податків на доходи, майно та споживання, і з урахуванням усіх трансфертів, не пов'язаних із заміщенням (наприклад, допомога на охорону здоров'я, інвалідність, житло тощо) – «післяподатковий дохід» (post-tax income). У звіті використовуються ці два поняття, при цьому базовим є «дохід після заміщення, до оподаткування». Як правило, дані надаються про доходи лише дорослих осіб і загальний дохід ділиться порівну між подружжями. Багатство домогосподарств визначається як сукупність фінансових активів (наприклад, депозити, акції, облігації, частки в бізнесі) та нефінансових активів (наприклад, житло, бізнес), за вирахуванням боргів, які належать окремим особам.

Ознайомлення з даними доповіді доводить наступні факти. Найбагатші 10% населення світу наразі отримують 52% світового доходу, тоді як найбідніша частина населення заробляє 8,5% від нього. В середньому людина з 10% найбагатших у світі заробляє €87 200 ($122 100) на рік, тоді як людина з найбіднішої частини світового розподілу доходів заробляє €2 800 ($3 920) на рік [6].

Глобальна нерівність у багатстві ще більш виражена, ніж нерівність у доходах. Найбідніша частина населення світу ледве володіє будь-яким багатством, володіючи лише 2% від загальної суми. На противагу цьому, найбагатші 10% населення світу володіють 76% усього багатства. У середньому найбідніша частина населення володіє ПКС у розмірі 2900 євро на дорослу людину, тобто 4100 доларів США, а верхні 10% володіють у середньому 550 900 євро (або 771 300 доларів США) [6].

У 2020 році середній дохід 10% найбільш забезпечених верств населення світу перевищував середній дохід 50% найбідніших у 38 разів. Частка доходів глобальних 50% найбіднішого населення залишається історично низькою, попри зростання в країнах, що розвиваються, протягом останніх десятиліть.

Жінки отримують лише 35% світових доходів від праці, чоловіки – решту 65%. Представництво жінок у групі 1% найбагатших суттєво нижче, ніж у групі 10% у всіх країнах, що вказує на виражений ефект «скляної стелі». Це означає, що розрив в оплаті праці зростає на найвищих рівнях доходів, головним чинником чого є недостатня представленість жінок на високооплачуваних посадах. Зростання частки жінок у топ-1% відбувається повільно у США, тоді як у Іспанії та Бразилії воно було динамічнішим. Вражає, що сьогодні жінки краще представлені у топ-1% в Іспанії та Бразилії, ніж у США, які у XX столітті вважалися лідером у сфері розширення прав і можливостей жінок [6].

Варто зазначити, що звіт охоплює обмежену кількість країн. Не дивлячись на те, що Україна не представлена у доповіді, аналіз результатів дозволяє визначити індикатори для національного моніторингу соціальної нерівності та визначення напрямів удосконалення економічної та соціальної політик в Україні.

Наступний звіт, який слід проаналізувати в контексті дослідження соціальної нерівності – це звіти ОЕСР про нерівність доходів (OECD income inequality reports) [7].

ОЕСР регулярно публікує звіти про нерівність доходів та багатства, ключові висновки яких свідчать про значне зростання нерівності в країнах-членах протягом останніх десятиліть, зумовлене розширенням ринкових доходів та зменшенням перерозподільної ролі податків та трансфертів. Серед відомих публікацій – «Суспільство з першого

погляду», в якій досліджуються суспільні тенденції, та книга «Нерівність доходів», в якій висвітлюються причини та наслідки зростання розриву нерівності. ОЕСР також веде базу даних розподілу доходів для отримання детальної статистики.

Основними висновками досліджень ОЕСР стали:

– нерівність доходів збільшилась у більшості країнах ОЕСР протягом останніх 30 років;

– зростання нерівності зумовлене більшою нерівністю ринкових доходів (заробітна плата, дивіденди) та менш ефективним перерозподілом через податки та трансферти;

– багатство зосереджене переважно у верхніх прошарках суспільства, причому 1% найбагатших часто володіє значною частиною загального багатства як показано у звіті «Оподаткування та нерівність»;

– зростання нерівності може негативно вплинути на економічне зростання.

Ще одним документом, який присвячений аналізу нерівності, є Світовий звіт про соціальну мобільність (Global Social Mobility Report) [8]. Важливим цільовим орієнтиром соціальної політики країни має бути підвищення соціальної якості суспільства, одним із критеріїв якого є соціальна мобільність, яка у загальному розумінні означає можливості людини покращити свій соціальний статус та матеріальне становище, рухаючись вгору за соціальними сходами; іншими словами, це здатність дітей жити краще, ніж їхні батьки за рахунок зменшення нерівності у доходах, соціальному захисті, освіті тощо. При розрахунку даного індексу враховують внутрішньогенераційну мобільність, тобто здатність людини переміщатися між соціально-економічними класами протягом життя; мобільність між поколіннями – рух родини вгору або вниз за соціально-економічними сходами у проміжку декількох поколінь; абсолютну мобільність доходів – можливість людини заробляти більше ніж його батьки в тому ж віці; абсолютну освітню мобільність – здатність досягати більш високого рівня освіти ніж у батьків; відносну мобільність доходу – доходи людини відносно доходів батьків; відносну освітню мобільність – освіта людини відносно освіти батьків [8, с. 9].

Країною, яка відзначилася кращими досягненнями за показником «здоров'я», став Кіпр; за показником «доступ до освіти» – Нідер-

ланди; «якість освіти» – Швеція; «освіта протягом життя» – Швейцарія; «доступ до технологій» – Данія; «трудові можливості» – Ісландія; «справедливий розподіл заробітної плати» – Бельгія; «умови праці» – Швеція; «соціальний захист» – Данія; «інклюзивні інститути» – Нова Зеландія. Рівень соціальних досягнень України за компонентами індексу соціальної мобільності у порівнянні з рівнем інших країн.

За рівнем соціальної мобільності Україна посіла 46 місце в рейтингу серед 82 країн світу (рис. 1), що відповідає становищу станом на 2020 р.

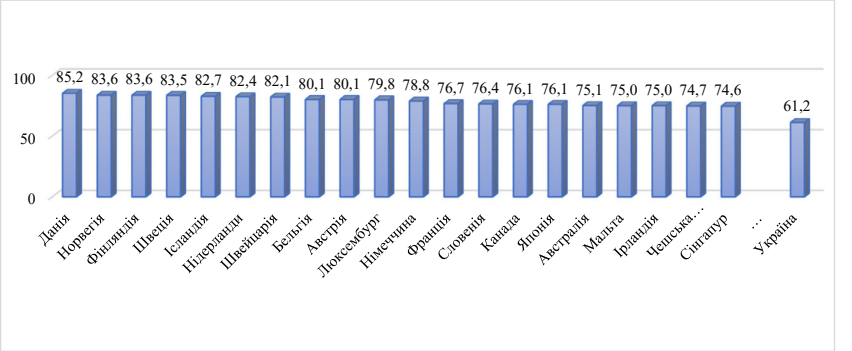


Рис. 1. Топ-20 країн та Україна
в рейтингу глобальної соціальної мобільності у 2020 р.

Джерело: сформовано за джерелом [8]

Аналіз за складовими даного індексу показав сильні сторони України довоєнного стану за такими показниками, як: здоров'я, трудові можливості, соціальний захист; слабкі сторони за наступними: інклюзивні інститути та освіта протягом життя.

Війна загострила багато питань людського, соціального, економічного та гуманітарного характеру, що негативно відображається на соціальній мобільності та посилює загрози соціальній безпеці людини, що обумовлює необхідність визначення тактичних та стратегічних пріоритетів соціальної політики як в умовах воєнного стану, так і в подальшому при відновленні країни.

Проведене дослідження доповідей світових організацій показало, що соціальна нерівність є ключовою загрозою стабільності та сталого розвитку. Соціальна нерівність існує в різних взаємопов'язаних вимірах життя суспільства. Нерівність проявляється не лише у доходах чи багатстві, а й у доступі до освіти, охорони здоров'я, політичної участі, соціального статусу тощо. Ознайомлення з даними досліджень світових та національних організацій дозволяє виділити такі основні виміри соціальної нерівності, які мають бути враховані під час впровадження національного моніторингу соціальної нерівності:

– економічний – нерівність у доходах, майні, можливості працевлаштування;

– освітній – нерівний доступ до якісної освіти, цифрових ресурсів, професійного росту;

– політичний – нерівність у впливі на прийняття рішень, участі в управлінні;

– гендерний – різниця між чоловіками й жінками у можливостях, оплаті праці, представництві;

– територіальний – відмінності між містом і селом, регіонами, центром і периферією;

– культурний – визнання чи невизнання мов, традицій, стилів життя;

– інституційний – доступ до правосуддя, соціальних послуг, адміністративних процедур;

– інформаційний – доступ до цифрових технологій, медіа, знань (цифрова нерівність);

– символічний – престиж, репутація, соціальна повага (наприклад, до певних професій чи меншин).

Як показало дослідження соціальна нерівність не зводиться лише до бідності. Вона може існувати навіть у формально забезпечених людей, якщо їм бракує політичного голосу, поваги чи безпеки. Одночасно, слід сказати, що виміри переплітаються: наприклад, люди з низькою освітою часто мають менші доходи, гірше обізнані про свої права, менше представлені в політиці.

Нерівність у доходах посилює цілу систему економічних та соціальних ризиків. Так, збільшується розрив у розвитку людського потенціалу різних верств населення. Створюються нерівні можливо-

сті доступу до освіти, медичного обслуговування, гідної праці, що загострює проблему інклюзивного економічного розвитку. Проведене дослідження доводить той факт, що проблема соціальної нерівності має багатовимірний характер, що визначається історичними, політичними, економічними, соціальними та інституційними чинниками.

Дослідження соціальної нерівності ускладнено неоднозначністю методологічної бази щодо визначення даної категорії, що видно з аналізу світових доповідей, в яких соціальна нерівність досліджується за різними критеріями, та існування різних концепцій соціальної рівності та справедливості, дискусії стосовно яких є важливим етапом формування методологічної бази при розробці соціальної політики України.

Дослідження соціальної нерівності в Україні є надзвичайно важливим для формування ефективної державної політики в контексті посилення солідаризації суспільства. Ця тема потребує глибокого аналізу причин, наслідків і можливих шляхів подолання нерівності в умовах сучасних викликів. У пошуках шляхів солідаризації суспільства вважаємо за необхідне створити методологічне та аналітичне підґрунтя для визначення пріоритетних напрямів соціальної політики, спрямованої на подолання нерівності, забезпечення рівних можливостей та посилення суспільної солідарності в умовах трансформаційних викликів, що постали перед Україною.

У контексті воєнного стану та соціально-економічної нестабільності ця проблема набула ще більшої гостроти. Незважаючи на численні реформи, подальшу євроінтеграцію, розрив між різними соціальними групами продовжує зростати. Рівень доходів, доступ до якісної освіти, медицини, соціальних гарантій значною мірою залежить від місця проживання, професії, соціального статусу та інших чинників. Поглиблюється бідність серед вразливих категорій населення, водночас зберігається непрозорість у розподілі ресурсів, що посилює недовіру до державних інституцій. Соціальна нерівність стає не лише економічною, а й політичною та моральною загрозою для національної єдності та демократії.

Аналіз підходів провідних міжнародних організацій до дослідження соціальної нерівності засвідчив, що переважна більшість з них зосереджується насамперед на оцінці доходів, рівня добробуту та розподілу багатства, тобто економічного виміру нерівності, а також окре-

мих соціально-демографічних аспектів, зокрема гендерного. Водночас фрагментарно представленими залишаються такі важливі виміри соціальної нерівності, як інституційний, що відображає нерівний доступ до владних ресурсів і механізмів прийняття рішень, культурний, пов'язаний із символічним капіталом і соціальними нормами, а також освітній, який визначає відтворення нерівності в довгостроковій перспективі. Така обмеженість підходів звужує можливості комплексного аналізу соціальної нерівності та зумовлює потребу в інтегративних міждисциплінарних моделях її дослідження.

2. Український профіль соціальної нерівності

Глобальні тенденції зростання соціальної нерівності мають свої специфічні прояви в Україні, які суттєво посилилися внаслідок повномасштабної війни та пов'язаних із нею соціально-економічних трансформацій. Сучасний український профіль соціальної нерівності характеризується багатовимірністю та охоплює економічні, соціальні, територіальні, цифрові та інституційні аспекти.

Економічний вимір. Україна продовжує характеризуватися високим рівнем економічної нерівності та бідності, які зберігаються протягом четвертого року повномасштабного вторгнення. Очікуваний рівень бідності у 2025 році становить 36,9%, що майже не відрізняється від показника 2024 року (37,0%), але істотно перевищує довоєнні значення. Поглиблення економічної нерівності відображається у зростанні коефіцієнта Джині з 0,41 у 2023 році до 0,50 у 2025 році, що свідчить про розширення розриву між найбіднішими та найбагатшими домогосподарствами. Ключовими чинниками зростання нерівності є нерівномірне скорочення доходів від праці, стагнація або зниження реальних доходів у низькодохідних групах, а також зменшення реальної купівельної спроможності пенсій, що непропорційно вдарило по бідніших домогосподарствах [9].

Регіональний вимір. Регіональна нерівність в Україні суттєво посилилася внаслідок просторових зрушень населення та економічної активності. У період 2023–2025 років області Західної України та місто Київ демонструють вищі показники зайнятості та отримання трудових доходів, тоді як регіони, що зазнають активних бойових дій, характеризуються підвищеною продовольчою небезпекою, втратою активів

та руйнуванням житлової інфраструктури. Майже половина домогосподарств у постраждалих регіонах повідомляють про пошкодження житла або активів, порівняно з 7% у західних регіонах, що свідчить про поглиблення територіальних диспропорцій та необхідність цілеспрямованої регіональної політики.

Гендерний вимір. Однією з ключових проблем соціально-економічної нерівності у світі та в Україні залишається ґендерна нерівність у соціально-трудовій інклюзії та оплаті праці. Вона призводить до втрат ВВП, зниження купівельної спроможності населення, неповної реалізації трудового потенціалу жінок, обмежених кар'єрних можливостей, зростання бідності та погіршення якості життя. Ґендерні розриви у доступі до зайнятості, освіти й професійного зростання безпосередньо впливають на рівень оплати праці жінок. Водночас скорочення таких розривів сприяє економічному зростанню, збільшенню споживання й заощаджень, а також ефективнішому використанню людського капіталу.

Ратифікація Україною Конвенції МОП № 100 «Про рівну винагороду чоловіків і жінок за працю рівної цінності» [10] актуалізує необхідність аналізу національного законодавства на відповідність міжнародним стандартам забезпечення ґендерної рівності, зокрема щодо впровадження принципу рівної оплати праці.

Упродовж останніх років в Україні зберігається проблема ґендерної нерівності в оплаті праці. Для формування ефективної політики її скорочення важливо враховувати чинники, що зумовлюють ґендерні розриви. За даними МОП, до них належать рівень освіти й трудового досвіду, тривалість робочого часу, розмір і сфера діяльності підприємства, а також гендерні стереотипи, упереджені методи оцінки праці та слабші переговорні позиції жінок, зокрема через нижчий рівень профспілкової участі [11].

Попри наявність в Україні розвиненої нормативно-правової бази з питань ґендерної рівності, вивчення міжнародного досвіду свідчить про доцільність запозичення ефективних механізмів подолання ґендерного розриву в зайнятості та оплаті праці. Практика МОП і країн ЄС демонструє результативність таких інструментів як запровадження обов'язкової звітності підприємств щодо ґендерної рівності в оплаті, розвиток соціальної інфраструктури та гнучких форм зайнятості,

використання квотних механізмів, діяльність спеціалізованих органів і агентств із протидії дискримінації, а також укладання колективних договорів із дотриманням принципів ґендерної рівності. Важливу роль відіграють також національні програми й методичні рекомендації з оцінки праці та формування рівної оплати [12].

Варто зазначити, що гендерна нерівність на ринку праці посилюється в умовах війни. Жінки стикаються з підвищеними бар'єрами до зайнятості через зростання навантаження з догляду, інституційні прогалини у сфері регулювання зайнятості. Водночас зростання заробітних плат концентрується у висококваліфікованих секторах, де представництво жінок є обмеженим, що поглиблює гендерні розриви в доходах і доступі до економічних можливостей.

Віковий вимір. Вікова нерівність проявляється насамперед через погіршення становища осіб старшого віку та працездатного населення, що втратило роботу. Зниження реальних пенсійних доходів посилило ризики бідності серед домогосподарств, у складі яких є люди похилого віку.

Інклюзивний вимір. Інклюзивна нерівність значно загострилася внаслідок зростання кількості вразливих груп населення. Близько чверті домогосподарств включають принаймні одного члена з числа внутрішньо переміщених осіб, ветеранів або осіб з інвалідністю. Зокрема, 9,2% домогосподарств мають члена сім'ї з інвалідністю внаслідок травм, пов'язаних з війною, а 9,4% – ветерана. Такі домогосподарства частіше стикаються з бар'єрами доступу до ринку праці, медичних послуг та базових комунальних ресурсів, а також значною мірою залежать від державних трансфертів. Умови доступу до медичної допомоги залишаються нерівними: третина домогосподарств з вразливими членами змушені покривати медичні витрати з власних коштів [9].

Протягом останніх років спостерігається зростання чисельності людей з інвалідністю, що переважно зумовлено наслідками воєнних дій. Серед інших чинників підвищення рівня інвалідності – старіння населення, поширення хронічних захворювань, патологій, зловживання алкоголем і наркотичними речовинами, погіршення екологічної ситуації, а також дорожньо-транспортні аварії.

У цих умовах особливої актуальності набуває питання соціально-трудової інтеграції людей з інвалідністю, зокрема забезпечення

їх доступу до гідної праці. Особи з інвалідністю працездатного віку становлять значну частку від загальної чисельності людей з інвалідністю в Україні, проте рівень їхнього працевлаштування залишається надзвичайно низьким – лише близько 16%, що є одним із найнижчих показників у Європі.

Як зазначає колишня міністерка соціальної політики Оксана Жолнович, із понад трьох мільйонів осіб з інвалідністю працевлаштованими є лише близько 16%. Вона підкреслює, що цей показник суттєво відстає від європейських стандартів, де рівень зайнятості людей з інвалідністю перевищує 50% [13].

В умовах післявоєнного відновлення економіки та розбудови інклюзивного суспільства особливого значення набуває забезпечення реалізації права людей з інвалідністю на працю та зайнятість, що є важливим соціальним чинником та вагомим економічним ресурсом, що сприяє зниженню рівня нерівності, розвитку людського капіталу та посиленню соціальної єдності.

Слід підкреслити, що право на працю та зайнятість є одним із ключових напрямів соціальної інтеграції людей з інвалідністю і закріплене у статті 27 Конвенції ООН про права осіб з інвалідністю. Україна ратифікувала цю Конвенцію 16 грудня 2009 року, взявши на себе зобов'язання щодо створення сприятливих умов для професійної реабілітації, розвитку трудових навичок та працевлаштування осіб з інвалідністю.

Додатково, формування ефективної системи соціально-трудової інклюзії підсилюється положеннями Конвенції Міжнародної організації праці (МОП) № 159 про професійну реабілітацію та зайнятість людей з інвалідністю (ратифікована Україною 6 березня 2003 року) та Рекомендації МОП № 168 (1983 р.), яка містить конкретні орієнтири щодо політики зайнятості, адаптації робочих місць і створення рівних можливостей на ринку праці.

Узгодження національної політики з цими міжнародними документами має практичне значення: воно забезпечує підвищення рівня соціальної справедливості, сприяє реалізації принципу гідної праці та інтеграції людей з інвалідністю у всі сфери суспільного життя. Такий підхід вимагає розроблення комплексних державних програм, спрямованих на подолання дискримінаційних бар'єрів, модернізацію системи

професійної освіти та реабілітації, а також розширення можливостей працевлаштування на основі інклюзивних принципів.

З моменту ратифікації Конвенції було ухвалено низку нормативно-правових актів, спрямованих на посилення соціального захисту осіб з інвалідністю, забезпечення їхнього права на працю та зайнятість, упровадження принципів універсального дизайну, а також створення механізмів стимулювання роботодавців до працевлаштування таких осіб і розширення повноважень відповідних інституцій. Окрім того, в окремих регіонах України почав функціонувати інститут помічника ветерана, який відіграє важливу роль у координації заходів соціальної підтримки, професійної реабілітації та сприяння працевлаштуванню учасників бойових дій, зокрема тих, хто отримав інвалідність унаслідок війни.

Аналіз динаміки абсолютних показників показав, що чисельність працевлаштованих осіб з інвалідністю поступово збільшується і вже перевищує кількість робочих місць, спеціально передбачених для їхнього працевлаштування (рис. 2). Така тенденція свідчить про зростання активності людей з інвалідністю на ринку праці та посилення зацікавленості роботодавців у їхньому залученні до трудової діяльності.

За даними Фонду соціального захисту осіб з інвалідністю, у 2024 році частка підприємств, які дотрималися нормативу щодо працевлаштування осіб з інвалідністю, становила 82,5% від їх загальної кількості. Це нижче, ніж у 2021 році, коли показник досяг найвищого рівня за 2016–2024 рр. – 90,9% [14]. Після різкого спаду, зумовленого подіями 2022 року, ситуація поступово стабілізується, що свідчить про відновлення позитивних тенденцій у виконанні соціальних зобов'язань у сфері зайнятості людей з інвалідністю.

З початку року Державна служба зайнятості надала послуги понад 20 тис. осіб з інвалідністю, що на 14% більше, ніж за аналогічний період минулого року. Водночас кількість осіб з інвалідністю, які набули статусу безробітного, склала 18,4 тис., що на 12% більше, ніж торік. Профорієнтаційними послугами охоплено 16,5 тисяч осіб, що на 13% більше, ніж за аналогічний період у попередньому році [15].

Така динаміка свідчить не лише про активізацію звернень до служби зайнятості, але й про зростання потреби у підтримці працевлаштування серед людей з інвалідністю, що вимагає системного вирішення проблеми, адже значна частина осіб з інвалідністю все ще залишається

поза активними програмами зайнятості. Представлені дані свідчать як про наявність позитивних тенденцій у сфері зайнятості осіб з інвалідністю, так і про те, що значна частина людей працездатного віку залишається поза межами ринку праці, що вказує на наявність бар'єрів у реалізації їхнього права на працю, що мають як інституційний, так і соціально-економічний характер. До основних бар'єрів реалізації права на працю осіб з інвалідністю належать:

– недостатня ефективність реалізації законодавства про квотування робочих місць, що часто проявляється у формальному підході до працевлаштування без створення реальних умов для продуктивної праці;

– обмежена кількість адаптованих робочих місць, які відповідають функціональним можливостям працівників, а також необхідність додаткових фінансових ресурсів для їх облаштування;

– стереотипи з боку роботодавців щодо нібито низької ефективності працівників з інвалідністю, що формує упереджене ставлення до їхнього найму;

– психологічні бар'єри з боку самих осіб з інвалідністю – самостигматизація, невпевненість у власних силах;

– недостатній рівень інформованості про можливості працевлаштування, грантові програми та інструменти підтримки від державної служби зайнятості, відсутність доступної інформації у форматах, адаптованих до різних типів інвалідності;

– недостатній рівень фізичної доступності середовища – відсутність універсального дизайну у транспортній інфраструктурі, адміністративних будівлях, виробничих і офісних приміщеннях;

– недостатньо розвинене інклюзивне освітнє середовище, що ускладнює отримання професійної освіти та подальшу інтеграцію на ринок праці;

– відсутність законодавчо закріпленого механізму підтриманого працевлаштування, який успішно функціонує у країнах Європейського Союзу.

Для подолання бар'єрів соціально-трудової інтеграції осіб з інвалідністю в Україні у 2025–2026 роках передбачено низку законодавчих змін, спрямованих на підвищення ефективності працевлаштування цієї категорії громадян та усунення формального підходу до виконання квот.

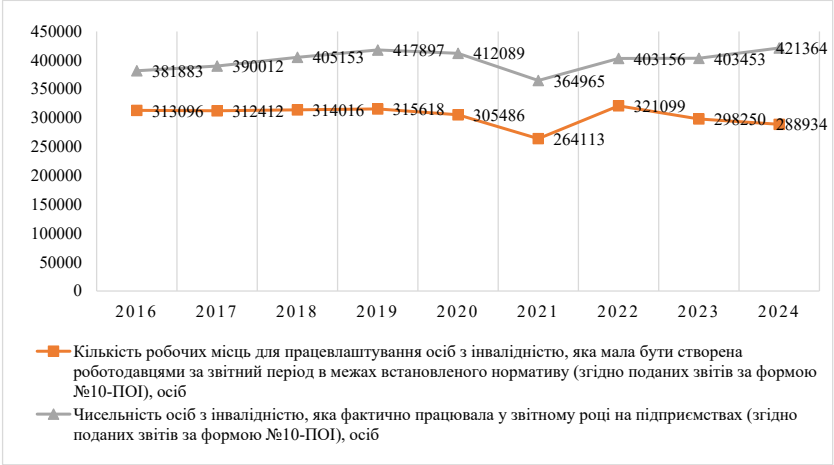


Рис. 2. Планова та фактична зайнятість осіб з інвалідністю в 2016-2024 рр., осіб

Джерело: сформовано за даними офіційного вебпорталу Фонду соціального захисту осіб з інвалідністю. Зайнятість та працевлаштування осіб з інвалідністю [14]

Зокрема, відповідно до Закону України від 15 січня 2025 року № 4219-IX «Про внесення змін до деяких законодавчих актів України щодо забезпечення права осіб з інвалідністю на працю», який вносить зміни до Закону України від 21 березня 1991 року № 875-XII «Про основи соціальної захищеності осіб з інвалідністю в Україні», з 2026 року суттєво оновлюються правила визначення та виконання нормативу робочих місць для осіб з інвалідністю. Основні новації:

– норматив виконуватиметься поквартально, а не за підсумками року, що дозволить оперативніше реагувати на зміни у структурі зайнятості;

– встановлюються диференційовані нормативи працевлаштування осіб з інвалідністю;

– до нормативу буде зараховано лише тих працівників з інвалідністю, заробітна плата яких перевищує мінімальну за повністю відпрацьований місяць. Це усуває практику формального працевлаштування без фактичної зайнятості чи з частковою оплатою праці.

У разі невиконання нормативу або несвоєчасної сплати внеску передбачено фінансові санкції.

З 2026 року роботодавці звітуватимуть до територіальних органів Пенсійного фонду України про нарахування, обчислення та сплату цільового внеску у ті ж строки, що і звітність із ЄСВ. За неподання чи несвоєчасне подання звіту передбачено штраф.

Окрім законодавчих змін, передбачено системні дії, спрямовані на підвищення рівня інклюзивності ринку праці:

– розвиток інституту помічника ветерана, який виконує інформаційну, консультативну та координуючу функції у сфері соціального захисту, реабілітації та працевлаштування осіб з інвалідністю внаслідок війни;

– створення мережі регіональних центрів професійної реабілітації, які забезпечуватимуть адаптацію, перекваліфікацію та підготовку осіб з інвалідністю до умов сучасного ринку праці;

– удосконалення державних програм підтриманого працевлаштування, що передбачають індивідуальний супровід людини з інвалідністю на робочому місці (job coaching);

– запровадження фінансових стимулів для роботодавців – грантів, податкових пільг і компенсацій витрат на облаштування робочих місць;

– розширення цифрових сервісів Державної служби зайнятості для осіб з інвалідністю, включно з адаптованими онлайн-платформами для пошуку роботи;

– популяризація інклюзивної культури серед роботодавців через просвітницькі кампанії, тренінги та партнерські програми з бізнесом і громадським сектором.

У сукупності ці заходи спрямовані на перехід від формальної до реальної інклюзії осіб з інвалідністю у сфері праці, забезпечення рівного доступу до гідної праці та зміцнення соціальної згуртованості в українському суспільстві.

На думку О. Мірошниченко, президента Конфедерації роботодавців України залучення на ринок праці 1 млн осіб з інвалідністю працездатного віку дозволить прискорити ріст ВВП на 2,5-3,0% за рік [16].

Отже, забезпечення права на працю та зайнятість людей з інвалідністю в Україні є не лише питанням дотримання міжнародних стандартів

і конституційних гарантій, а й стратегічним напрямом національного розвитку. У період післявоєнного відновлення це набуває особливої ваги – адже саме через створення умов для гідної праці, професійної реабілітації та інклюзивної економіки держава може забезпечити соціальну згуртованість.

Розвиток інклюзивного ринку праці – це шлях до сталого економічного зростання, де кожна людина має право і можливість реалізувати себе у праці, бути корисною суспільству й відчувати власну гідність.

Освітній вимір нерівності. Освітня нерівність в Україні суттєво посилилася в умовах воєнного стану. Вона формується на перетині соціально-економічних, регіональних, цифрових та інституційних чинників і відіграє ключову роль у відтворенні загальної соціальної нерівності.

По-перше, зберігається нерівний доступ до якісної освіти залежно від місця проживання. Учні з сільських територій та прифронтових регіонів мають гірші освітні результати, обмежений доступ до очного навчання, кваліфікованих педагогічних кадрів і навчальної інфраструктури. Воєнні дії призвели до руйнування освітніх закладів, тривалих перерв у навчанні та вимушеного переходу на дистанційні форми навчання, що нерівномірно вплинуло на різні групи населення.

По-друге, соціально-економічний статус родини суттєво визначає освітні можливості дітей і молоді. Домогосподарства з нижчими доходами мають обмежені ресурси для додаткової підготовки, доступу до цифрових засобів навчання та приватних освітніх послуг. Це посилює розрив в освітніх досягненнях і знижує шанси на подальшу соціальну мобільність.

По-третє, актуалізувалася цифрова освітня нерівність. Дистанційне навчання виявило значні відмінності у доступі до стабільного інтернету, комп'ютерної техніки та цифрових навичок, особливо серед дітей із сільських територій та соціально вразливих домогосподарств.

По-четверте, спостерігається нерівність освітніх траєкторій молоді, що проявляється у зростанні частки молодих людей зі статусом NEET (не навчаються, не працюють і не проходять професійної підготовки), а також у нерівному доступі до вищої освіти та професійного навчання. Освітня мобільність між поколіннями залишається обмеженою, що сприяє відтворенню соціальної нерівності в довгостроковій перспективі.

За результатами опитування ЮНІСЕФ 2023 року, 59,9% учнів зазначили про погіршення рівня знань з окремих навчальних дисциплін. Основними чинниками зниження успішності стали втома та психологічний стрес (55,2%), дистанційний формат навчання (51,9%) і недостатня адаптація навчальних програм до умов онлайн-освіти (37,6%). Найбільші навчальні втрати респонденти зафіксували з математики (68,2%), а також з хімії (39,7%) і фізики (39,4%). Загалом 64,8% школярів і студентів повідомили, що протягом попереднього року пропускали заняття. Найпоширенішими причинами цього були відключення електроенергії (50%), повітряні тривоги та обстріли (49,3%) і виснаження (39,3%) [17].

За даними ЮНЕСКО та інших міжнародних організацій, упродовж трьох років після початку повномасштабної війни частка українських учнів і студентів, які навчаються в європейських країнах, зросла і у 2024 році в середньому досягла 78% у десяти країнах Європи. Половина з них здобуває освіту виключно за програмами країни перебування, 29% поєднують навчання в приймаючих закладах з українською онлайн-освітою, 16% навчаються лише дистанційно за українськими програмами, тоді як 6% фактично випали з освітнього процесу. Поєднання двох освітніх систем супроводжується надмірним навчальним навантаженням: понад 25% учнів щоденно витрачають більше трьох додаткових годин на виконання вимог обох програм, що негативно позначається на якості навчання та психоемоційному стані. Водночас проблема рівного доступу до освіти залишається гострою: мовні бар'єри істотно знижують шанси на зарахування, студенти з інвалідністю стикаються з додатковими обмеженнями, а новоприбулі діти значно рідше інтегруються в освітні системи країн перебування [18].

Така ситуація свідчить не лише про тимчасові труднощі адаптації, а про формування стійкої освітньої нерівності серед українських дітей і молоді за кордоном. Збереження високої частки дистанційного або подвійного навчання без системної підтримки з боку України і приймаючих країн підвищує ризики академічних втрат, соціальної ізоляції та погіршення психічного здоров'я. У довгостроковій перспективі це може призвести до зниження людського капіталу України та обмеження можливостей професійної реалізації молодого покоління, що

потребує скоординованих рішень на національному та міжнародному рівнях.

Соціально-політичний вимір. Аналіз за показником свобода у світі. «Свобода у світі» – це щорічний звіт Freedom House, який оцінює політичні права та громадянські свободи в кожній країні. Дослідження відображає стан демократії, вищі рівні за показниками свободи корелюють з прозорим управлінням та верховенством права, вказує на громадянські свободи. В той час як зниження часто сигналізує про цензуру, репресії або порушення прав людини.

Що стосується України, упродовж періоду 2021–2024 років спостерігається суттєве зниження значення відповідного показника – на 10 пунктів, з 61 до 51. Для порівняльного аналізу доцільно звернутися до показників окремих країн, які у 2023 році демонстрували значно вищі значення: Фінляндія – 100, Норвегія – 98, Данія – 97, Естонія – 95, Ісландія – 94, Німеччина – 93, Велика Британія – 91, Сполучені Штати Америки – 83 та Польща – 80. Наведені дані свідчать про істотне відставання України за цим індикатором у порівнянні з країнами з розвиненими інституційними та соціально-економічними системами [19].

Наступний показник – верховенство права в Україні. Верховенство права вимірює ступінь – як агенти довіряють правилам суспільства та дотримуються їх, зокрема, якості виконання контрактів, прав власності та судів. Це частина Всесвітніх показників управління Світового банку, з оцінками від –2,5 (слабкий) до 2,5 (сильний). Вищі значення вказують на краще виконання законів та доступ до правосуддя. Відображає безпеку інвестицій, оскільки сильні правові рамки забезпечують виконання контрактів та захист прав власності. Сприяє соціальній стабільності, оскільки громадяни вірять, що спори будуть вирішені справедливо, а корупція менш імовірна. Уряди країн використовують цей показник для виявлення слабких місць у судових системах та пріоритетів реформ.

В Україні значення цього показника станом на 2023 рік становить 0,89. Водночас у низці країн він наближається до максимально високих значень, зокрема в Сінгапурі – 1,78, Новій Зеландії – 1,73, Норвегії – 1,76 та Швеції – 1,69 (дані за 2022 рік). Такий розрив у значеннях індикатора свідчить про суттєві міжкраїнні відмінності та підкреслює

відносно нижчий рівень розвитку відповідної сфери в Україні порівняно з державами, що демонструють високі інституційні та соціально-економічні показники [20].

Наступний показник – голос та підзвітність. У період з 1996 по 2023 рік показник Voice & Accountability в Україні зріс на 0,22 індексу. Найбільша річна зміна (за період за 2022-2023 рр.) становила –0,08 індексу. Найнижчого рівня показник досяг у 2004 році – –0,67 індексу, тоді як найвищий рівень було зафіксовано у 2008 році – 0,09 індексу [21].

Голос та підзвітність вимірюють ступінь наскільки громадяни країни можуть брати участь у виборі свого уряду, а також свободу слова, об'єднань та вільні засоби масової інформації. Це частина Всесвітніх показників управління Світового банку, з оцінками від –2,5 (слабкий) до 2,5 (сильний). Вищі значення вказують на більш інклюзивні політичні процеси та більші громадянські свободи. Відображає демократичну участь, оскільки сильний голос означає, що громадяни можуть впливати на політику через вибори та громадянське суспільство. Вказує на свободу ЗМІ, оскільки вільна преса притягує посадовців до відповідальності та інформує громадські дебати. Інформує про якість управління, оскільки уряди, які реагують на думку громадян, з більшою ймовірністю задовольняють суспільні потреби та зменшують корупцію. Австралія очолює 2 рейтинг прогресу зі зростанням з 1,32 до 1,51, а Іспанія замкнула трійку лідерів, піднявшись з 1,02 до 1,20 [22].

Український профіль соціальної нерівності формується на перетині економічних, регіональних, інституційних та демографічних чинників, взаємодія яких зумовлює стійкий характер соціально-економічних диспропорцій. Повномасштабна війна істотно загострила вже наявні нерівності, трансформувавши їх у системні ризики та висунувши на перший план проблеми бідності, нерівного доступу до ринку праці, освіти й соціальних послуг, а також підвищену вразливість осіб з інвалідністю і постраждалих територіальних громад, внутрішньо переміщених осіб. Унаслідок цього відбулося не лише накопичення, а й поглиблення ризиків соціальної нерівності, які набули комплексного, взаємопов'язаного характеру та потребують багатовимірного аналізу. Узагальнення й систематизація зазначених ризиків за ключовими вимірами подані в табл. 1.

Таблиця 1

Ризики соціальної нерівності в Україні

Вимір	Ризики
Економічний	Нерівномірний розподіл доходів, багатства, доступу до праці та ресурсів загострює питання збільшення бідності та соціальної вразливості населення, подальшої тінізації ринку праці, нестабільної та незахищеної зайнятості, посилення майнової поляризації.
Регіональний	Поглиблення диспропорцій між великими містами і периферією. Втрата економічного потенціалу прифронтових і деокупованих територій. Ризик маргіналізації громад із низькими бюджетними ресурсами.
Гендерний	Ускладнення кар'єрного зростання для жінок через догляд за дітьми. Вища вірогідність жіночої бідності (особливо серед матерів-одиначок). Нерівномірний розподіл неоплачуваної домашньої праці.
Віковий	Молодь – еміграція та «відтік мізків». Особи старшого віку – ризик бідності через низькі пенсії та медичні витрати. Соціальна ізоляція літніх людей.
Освітній	Нерівний доступ до якісної освіти знижує шанси на здобуття вищої освіти для дітей з малозабезпечених родин. Посилення цифрової та мовної нерівності.
Цифровий	Відставання сільських територій у цифровій інфраструктурі. Обмежений доступ до онлайн-послуг для малозабезпечених. Вразливість до цифрової дискримінації на ринку праці, у сфері освіти.
Соціально-політичний	Нерівне представництво у процесах прийняття рішень. Низька довіра до інституцій. Ризик соціальної напруги. Нерівність у доступі до влади, участі в ухваленні рішень, захисті прав формує ризики маргіналізації та дискримінації меншин і вразливих груп; корупцію; зниження довіри до інституцій; політичну нестабільність, соціальні протести.
Інклюзивний	Бар'єри у доступі до праці, освіти та медичних послуг. Недостатня адаптація інфраструктури. Зростання кількості осіб з інвалідністю через війну – ризик перевантаження соціальної системи. Ризик соціального відторгнення.
Культурно-ціннісний	Нерівний доступ до культурного капіталу, суспільного визнання, символічних ресурсів формує ризики ізоляції культурних та етнічних меншин; втрати ідентичності та почуття належності; соціальної напруги та конфлікти.

Джерело: сформовано авторами

Сукупність зазначених ризиків формує стійкий механізм відтворення соціальної нерівності, який має характер замкненого кола: бідність зумовлює обмежений доступ до освіти та ресурсів, що, своєю чергою, знижує конкурентоспроможність на ринку праці й підвищує ймовірність потрапляння наступного покоління у стан соціально-економічної вразливості. У цьому контексті аналіз ризиків потребує міжсекторального підходу, що інтегрує економічні, соціальні, освітні та інституційні виміри. Збройний конфлікт істотно посилює дію цих чинників, загострюючи насамперед економічні та регіональні диспропорції, а також ризики, пов'язані з інвалідністю, що в сукупності поглиблює структурну нерівність і ускладнює можливості соціальної мобільності.

Україна, як країна, яка зазнала масштабних шоків та трансформацій, демонструє специфічний профіль соціальної нерівності, а систематизація ризиків соціальної нерівності за вимірами доводить, що соціальна нерівність є викликом післявоєнного відновлення України. В більшості доповідях дані по Україні відсутні або надані частково, що обмежує комплексний національний аналіз. З метою дослідження соціальної нерівності в Україні було визначено виміри та показники соціальної нерівності, за якими було здійснено оцінювання на національному рівні на основі національних звітів та досліджень.

Основними проблемами дослідження соціальної нерівності в Україні залишаються брак надійних і репрезентативних даних про розподіл багатства, недостатній рівень деталізації показників у національних вибіркових обстеженнях, а також відсутність постійного системного моніторингу соціальної нерівності, зокрема у гендерному, інклюзивному та міжрегіональному вимірах. Додатковим методологічним викликом є спотворення офіційної статистики внаслідок значних масштабів тіньової економіки, що унеможливлює повноцінну оцінку реальних соціально-економічних диспропорцій та рівня концентрації ресурсів.

У цьому контексті важливою є інтеграція України до глобальної системи моніторингу соціальної нерівності. Це передбачає вдосконалення збору та обробки статистичних даних відповідно до міжнародних стандартів у співпраці з провідними міжнародними організаціями, а також запровадження регулярного національного аналізу соціальної

нерівності. Такий аналіз доцільно здійснювати на засадах міжсекторальної взаємодії академічного середовища, органів державної влади та громадянського суспільства з метою розроблення національного індексу соціальної нерівності та соціальної справедливості, який би відображав багатовимірний характер нерівності та взаємозв'язок її окремих вимірів.

На наш погляд, моніторинг соціальної нерівності в Україні доцільно здійснювати на основі багатовимірного підходу, який враховує не лише рівень доходів, а й доступ до ключових ресурсів і можливостей та має будуватися за такими принципами:

– комплексність – охоплення різних вимірів нерівності;

– порівняння у часі та просторі – можливість аналізу динаміки та регіональних відмінностей;

– дезагрегація даних – за статтю, віком, місцем проживання, статусом ВПО, інвалідністю тощо;

– поєднання кількісних і якісних методів оцінювання;

– відповідність міжнародним стандартам (ООН, ОЕСР, ЄС, МОП).

Результати моніторингу мають бути публічними, регулярно оновлюватися та використовуватися для коригування соціально-економічної політики. На нашу думку, ефективний моніторинг соціальної нерівності в Україні можливий лише за умови переходу від вузького доходного підходу до багатовимірної моделі, що враховує структурні, регіональні та ґендерні аспекти, а також наслідки війни. Такий підхід дозволить не лише фіксувати масштаби нерівності, а й виявляти її першопричини, що є важливим для формування результативної соціальної політики та відновлення людського капіталу країни.

Окремої уваги потребує інституційне закріплення принципу «чутливості до нерівності» в системі державного управління, зокрема в процесах бюджетування, перерозподілу доходів, формування соціальної політики та системи соціального захисту, а також у стратегіях післявоєнного відновлення. Впровадження такого підходу сприятиме переходу від фрагментарних заходів до системної політики зменшення соціальної нерівності, орієнтованої на довгострокову соціальну згуртованість і стійкий розвиток.

ВИСНОВКИ

Узагальнюючи проведене дослідження, можна стверджувати, що соціальна нерівність залишається однією з ключових проблем сучасного українського суспільства та одним із визначальних викликів для післявоєнного відновлення України. Дослідження показало, що інформація, наведена у звітах світових організацій створює можливість багатокомпонентного вивчення проблематики. Однак у доповідях недостатньо представлено такі виміри соціальної нерівності як територіальні диспропорції, цифрова нерівність, гендерний вимір та вплив воєнних дій на соціальну стратифікацію населення, що обмежує широту аналізу та дає поштовх для подальших наукових розвідок у цій царині.

Проведене дослідження показало, що війна суттєво трансформувала структуру соціальної нерівності в Україні. У сучасних умовах соціальна нерівність набуває багатовимірного характеру та виходить далеко за межі традиційного розуміння нерівності як відмінностей у рівнях доходів населення. Соціальна нерівність дедалі більше проявляється через нерівний доступ до якісної освіти, медичних послуг, цифрової інфраструктури, можливостей зайнятості та професійного розвитку, участі у суспільному та політичному житті, а також через нерівномірний розподіл економічних та інституційних ресурсів.

Проведене дослідження соціальної нерівності показало, що вона може стати суттєвим викликом післявоєнного відновлення в Україні. Зростання соціальної поляризації, поглиблення регіональних диспропорцій та нерівність можливостей негативно впливають на суспільну довіру, соціальну згуртованість і солідарність, які є необхідними умовами успішної реалізації відновлювальних реформ та забезпечення довгострокової стійкості держави.

Проведене наукове дослідження створює методичну основу для визначення пріоритетних напрямів соціальної політики, спрямованої на подолання соціальної нерівності, забезпечення рівних можливостей та посилення суспільної солідарності в умовах трансформаційних викликів, що постали перед Україною.

Список літератури:

1. Human development report 2025. A matter of choice: people and possibilities in the age of AI. UNDP. URL: https://surl.lu/zikjwt

2. Україна залишається країною з високим Індексом людського розвитку – звіт UNDP. 13 березня 2024. UNDP Україна. URL: https://surl.li/pvjyhh

3. International Migration Outlook 2023. OECD. URL: https://surl.li/mhzruz

4. World Social Report 2025: A New Policy Consensus to Accelerate Social Progress. United Nations. Department of Economic and social affairs. URL: https://surl.li/dwfkmz

5. Takers, not makers. The unjust poverty and unearned wealth of colonialism. OXFAM. URL: https://surl.li/izdjao

6. World Inequality Report 2022. UNDP. URL: https://surl.li/zuqmub

7. OECD Economic Surveys: Ukraine 2025 May 2025 Volume 2025/10. 129 p. URL: https://surl.li/fmxbrb

8. The Global Social Mobility Report 2020. Equality, Opportunity and a New Economic Imperative. Platform for Shaping the Future of the New Economy and Society. January 2020. 218 p. URL: https://www3.weforum.org/docs/Global_Social_Mobility_Report.pdf

9. Моніторинг умов життя в Україні: оновлення за осінь 2025 року. Опитування «Слухаючи громадян України». WORLD BANK GROUP. 8 жовтня 2025 року. URL: https://surl.li/kcqecp

10. Конвенція МОП № 100 «Про рівне винагородження чоловіків і жінок за працю рівної цінності». URL: https://zakon.rada.gov.ua/laws/show/993_002#Text

11. Сприяння рівності. Ґендерно нейтральне оцінювання робіт щодо рівної оплати: поетапний посібник. – Міжнародне бюро праці. Женева. Міжнародна організація праці, 2009 р. URL: https://surli.cc/qepfef

12. National cases and good practices on equal pay / Author – Susanne Burri, Coordinator: Susanne Burri, Alexandra Timmer. – European network of legal experts in gender equality and non-discrimination. – European Commission. 2019. 92 p. URL: https://ec.europa.eu/info/sites/default/files/equalpaygoodpractices.pdf

13. В Україні з понад трьох мільйонів людей з інвалідністю працевлаштовані лише близько 420 тисяч. ZMINA. 11 травня 2025. URL: https://surl.li/mziqcw

14. Офіційний вебпортал Фонду соціального захисту осіб з інвалідністю. Зайнятість та працевлаштування осіб з інвалідністю. URL: https://surl.lt/lzckjx

15. Все більше осіб з інвалідністю знаходять роботу завдяки службі зайнятості. Львівський обласний центр зайнятості. 27.06.2025. URL: https://surl.li/ftyvee

16. The unemployment rate among able-bodied people with disabilities reaches 85%. Confederation of employers of Ukraine. URL: https://surl.li/hbldff

17. Опитування ЮНІСЕФ показує прогалини в навчанні серед молодих українців. ЮНІСЕФ. Україна. 02 жовтня 2023 р. URL: https://surl.li/gkcsax

18. Education of refugee children and youth from Ukraine. An analysis of major trends and challenges in education of refugees from Ukraine in Europe. Regional

Refugee Response for the Ukraine Situation. 2025. URL: https://data.unhcr.org/en/documents/details/115988

19. Ukraine's Freedom in the World. World Scorecard. URL: https://surl.lu/lyjakr

20. Rule of Law by Country. World Scorecard. URL: https://surl.lu/mazorh

21. Ukraine's Voice & Accountability. World Scorecard. URL: https://surli.cc/tzgdng

22. Voice and Accountability by Country. World Scorecard. URL: https://surl.li/dbhlaf

References:

1. United Nations Development Programme. (2025). *Human development report 2025: A matter of choice: People and possibilities in the age of AI*. Available at: https://surl.lu/zikjwt

2. United Nations Development Programme Ukraine. (2024, March 13). *Ukraina zalyshaietsia krainoiu z vysokym indeksom liudskoho rozvytku – zvit UNDP* [Ukraine remains a country with a high Human Development Index – UNDP report]. Available at:https://surl.li/pvjyhh

3. Organisation for Economic Co-operation and Development. (2023). *International migration outlook 2023*. OECD Publishing. Available at: https://surl.li/mhzruz

4. United Nations, Department of Economic and Social Affairs. (2025). *World social report 2025: A new policy consensus to accelerate social progress*. Available at: https://surl.li/dwfkmz

5. Oxfam International. (2025). *Takers, not makers: The unjust poverty and unearned wealth of colonialism*. Available at: https://surl.li/izdjao

6. World Inequality Lab. (2022). *World inequality report 2022*. Available at: https://surl.li/zuqmub

7. Organisation for Economic Co-operation and Development. (2025). *OECD economic surveys: Ukraine 2025* (Vol. 2025/10). OECD Publishing. Available at: https://surl.li/fmxbrb

8. World Economic Forum. (2020). *The global social mobility report 2020: Equality, opportunity and a new economic imperative*. Available at: https://www3.weforum.org/docs/Global_Social_Mobility_Report.pdf

9. World Bank Group. (2025, October 8). *Monitorynh umov zhyttia v Ukraini: Onovlennia za osin 2025 roku. Opytuvannia "Slukhaiuchy hromadian Ukrainy"* [Monitoring living conditions in Ukraine: Fall 2025 update. Listening to citizens of Ukraine survey]. Available at: https://surl.li/kcqecp

10. International Labour Organization. (1951). *Convention No. 100 concerning equal remuneration for men and women workers for work of equal value*. Available at: https://zakon.rada.gov.ua/laws/show/993_002

11. International Labour Office. (2009). *Promoting equity: Gender-neutral job evaluation for equal pay: A step-by-step guide*. International Labour Organization. Available at: https://surli.cc/qepfef

12. Burri, S., & Timmer, A. (2019). *National cases and good practices on equal pay*. European Network of Legal Experts in Gender Equality and Non-Discrimination, European Commission. Available at: https://ec.europa.eu/info/sites/default/files/equalpaygoodpractices.pdf

13. ZMINA Human Rights Center. (2025, May 11). *V Ukraini z ponad trokh milioniv liudei z invalidnistiu pratsevlashtovani lyshe blyzko 420 tysiach* [In Ukraine, only about 420 thousand out of more than three million people with disabilities are employed]. Available at: https://surl.li/mziqcw

14. Fund for Social Protection of Persons with Disabilities. (n.d.). *Zainiatist ta pratsevlashtuvannia osib z invalidnistiu* [Employment and employability of persons with disabilities]. Available at: https://surl.lt/lzckjx

15. Lviv Regional Employment Center. (2025, June 27). *Vse bilshe osib z invalidnistiu znakhodiat robotu zavdiaky sluzhbi zainiatosti* [More and more persons with disabilities find jobs thanks to the employment service]. Available at: https://surl.li/ftyvee

16. Confederation of Employers of Ukraine. (n.d.). *The unemployment rate among able-bodied people with disabilities reaches 85%*. Available at: https://surl.li/hbldff

17. United Nations Children's Fund. (2023, October 2). *Opytuvannia YuNISEF pokazuie prohalyny v navchanni sered molodykh ukraintsiv* [UNICEF survey reveals learning gaps among young Ukrainians]. Available at: https://surl.li/gkcsax

18. United Nations High Commissioner for Refugees. (2025). *Education of refugee children and youth from Ukraine: An analysis of major trends and challenges in education of refugees from Ukraine in Europe*. Available at: https://data.unhcr.org/en/documents/details/115988

19. Freedom House. World Scorecard. *Ukraine's freedom in the world*. Available at: https://surl.lu/lyjakr

20. World Justice Project. World Scorecard. *Rule of law by country*. Available at: https://surl.lu/mazorh

21. World Bank. World Scorecard. *Ukraine's voice and accountability*. Available at: https://surli.cc/tzgdng

22. World Bank. World Scorecard. *Voice and accountability by country*. Available at: https://surl.li/dbhlaf

FINANCIAL RISKS OF FRAUD IN THE SYSTEM OF INSURANCE RELATIONS: ECONOMIC CONSEQUENCES AND COUNTERMEASURES

Olena Petrushka[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-13

Abstract. Insurance fraud is one of the most common types of economic offenses that has accompanied the development of insurance relations over a long historical period. Its spread negatively affects the financial stability of insurance companies, violates the principles of fair distribution of insurance risks, and creates an additional burden on bona fide participants in insurance relations.

The purpose of the article is to study insurance fraud, reveal its characteristic features and ways of manifestation, as well as find ways to combat financial abuse in the insurance sector. The motivational basis of insurance fraud is mainly associated with the desire to illegally obtain material benefits, reduce one's own financial expenses or evade contractual obligations. At the same time, the nature of the motives may vary depending on the status of the offender, the characteristics of the insurance product, the economic situation and the level of control by the insurance company.

One of the main features of insurance fraud is the illegal encroachment on the property interests of the insurer or other participants in insurance legal relations. An obligatory characteristic of insurance fraud is its illegal nature, which is manifested in the intentional misleading of the insurer by providing false information, concealing material circumstances or falsifying documents.

Due to the large scale of financial abuse in the insurance market, the author has shown the need to find effective ways to overcome this problem. The methods of combating insurance fraud at different stages of execution of the insurance contract are outlined. In the scientific research the author

[1] Ph.D. in Economics, Associate Professor,
Associate Professor of Department of Finance named after S.I. Yuriy,
West Ukrainian National University, Ukraine
ORCID: https://orcid.org/0000-0002-2065-8825

© Olena Petrushka

emphasizes the tactical and strategic methods of combating financial abuse in the insurance business, as well as points to the expediency and effectiveness of application in the process of detection of fraudulent schemes of software, technical and operational ways. The article proves the need to consolidate the efforts of the state, insurance companies and their associations in order to combat the manifestations of insurance fraud in Ukraine.

It has been established that in the context of digitalization, the role of modern technologies in detecting and preventing insurance fraud is increasing. The use of Big Data tools, artificial intelligence and behavioral analytics for the timely identification of suspicious transactions is of particular importance. It is substantiated that effective counteraction to insurance fraud requires a comprehensive approach that combines the improvement of the internal control system, the development of human resources and the active interaction of insurers with state and law enforcement agencies.

INTRODUCTION

The development of the insurance market is one of the important factors in the formation of an effective economy and is entirely dependent on its state. Today, there are a number of problems that hinder the development of the insurance market in Ukraine, namely: imperfection of the legislative framework, low level of insurance culture, underdevelopment of the institute of personal insurance, etc. Among the important destructive factors of influence, financial fraud and fraudulent schemes in insurance activities can also be distinguished.

Insurance fraud is one of the most common types of economic offenses that has accompanied the development of insurance relations over a long historical period. Despite the improvement of regulatory and legal regulation, financial control mechanisms and risk management systems, this phenomenon remains an urgent problem of the functioning of the modern insurance market. Its spread negatively affects the financial stability of insurance companies, violates the principles of fair distribution of insurance risks and creates an additional burden on bona fide participants in insurance legal relations. The conditions of digital transformation of the economy, the development of information and communication technologies and the expansion of electronic channels of interaction between insurance market entities have significantly contributed to the complication of insurance fraud

schemes and the emergence of new ways of illegally obtaining material benefits.

The methodological and informational basis of this scientific research is the analysis of articles, scientific works of domestic and foreign scientists on financial fraud in the insurance sector, as well as statistical data, regulatory legal acts and Internet resources. In the process of scientific research, the methods of analysis and synthesis, induction and deduction, observation and comparison were used.

The purpose of this scientific work is to study insurance fraud, reveal its characteristic features and methods of manifestation, as well as find ways to combat financial abuse in the insurance sector.

1. Determinants of the Emergence and Features of the Manifestation of Fraud Risks in Insurance Activities

Insurance fraud is the unlawful actions of the subjects of the insurance contract aimed at obtaining insurance compensation by the insured through deception or abuse of trust, making a significantly smaller amount of insurance premium through a fictitious analysis of possible risks, concealing important facts and nuances during the validity of the insurance contract, the insurer's refusal to make insurance payments without good reasons and guarantees, as a result of which the subjects of the insurance contract are given the opportunity to illegally level the basic principles of insurance and receive an unlawful benefit for this.

The essence of insurance fraud lies in the deliberate commission of unlawful actions aimed at illegally appropriating the insurer's funds or obtaining other material benefits through deception, concealing essential information, falsifying documents or manipulating the terms of the insurance contract. Such actions are characterized by the presence of direct intent and a selfish purpose, which distinguishes them from errors or unintentional violations that may arise in the process of implementing insurance legal relations. The main goal of insurance fraud subjects is to obtain unlawful financial benefit at the expense of the resources of insurance companies or other participants in the insurance market.

In the scientific literature, insurance fraud is interpreted as a type of financial fraud that encompasses a complex of intentional actions or inactions of participants in the insurance process aimed at misleading the

insurer regarding factual circumstances that are important for the conclusion, execution or termination of the insurance contract.

A feature of insurance fraud is that its subjects can be not only insureds, but also other participants in the insurance market, in particular insurance agents, brokers, expert appraisers, employees of insurance companies and third parties involved in the process of settling insurance cases. This indicates the complex and multi-level nature of the said offense, which requires a comprehensive approach to its detection, prevention, and minimization of negative consequences.

The spread of insurance fraud causes significant economic, social and reputational losses for the insurance sector. The payment of unjustified insurance claims leads to a decrease in the financial resources of insurers, a deterioration in their solvency indicators and a decrease in the efficiency of insurance reserve management. In order to compensate for the losses incurred, insurance companies are forced to revise their tariff policy, which is often accompanied by an increase in the cost of insurance services for honest customers. As a result, the level of availability of insurance protection decreases and the competitiveness of the insurance market as a whole weakens. The level of development of financial fraud in the insurance sector is inversely proportional to the development of the country's economy. Thus, during periods of significant financial and economic crises in the state, there is a significant increase in the number of illegal actions that entail significant financial losses for both the insured and the insurer. For a deeper understanding of the essence of insurance fraud, let us dwell on the characteristics of the signs by which it is possible to identify the risks of a crime for participants in the insurance market (see Fig. 1).

Today, insurance fraud is one of the most widespread types of offenses. The most popular risks of insurance fraud, in our opinion, are: violation of insurance rules, safety precautions; reporting false information regarding the object of insurance; concealing information about the risky circumstances of concluding an insurance contract; presenting falsified documents; concealing circumstances or distorting information regarding the occurrence of an insured event; double insurance; prior collusion with representatives of the insurer, experts, appraisers, lawyers, employees of medical institutions or auto repair shops; concealing information from the insurer regarding receiving compensation from the perpetrator of the insured event.

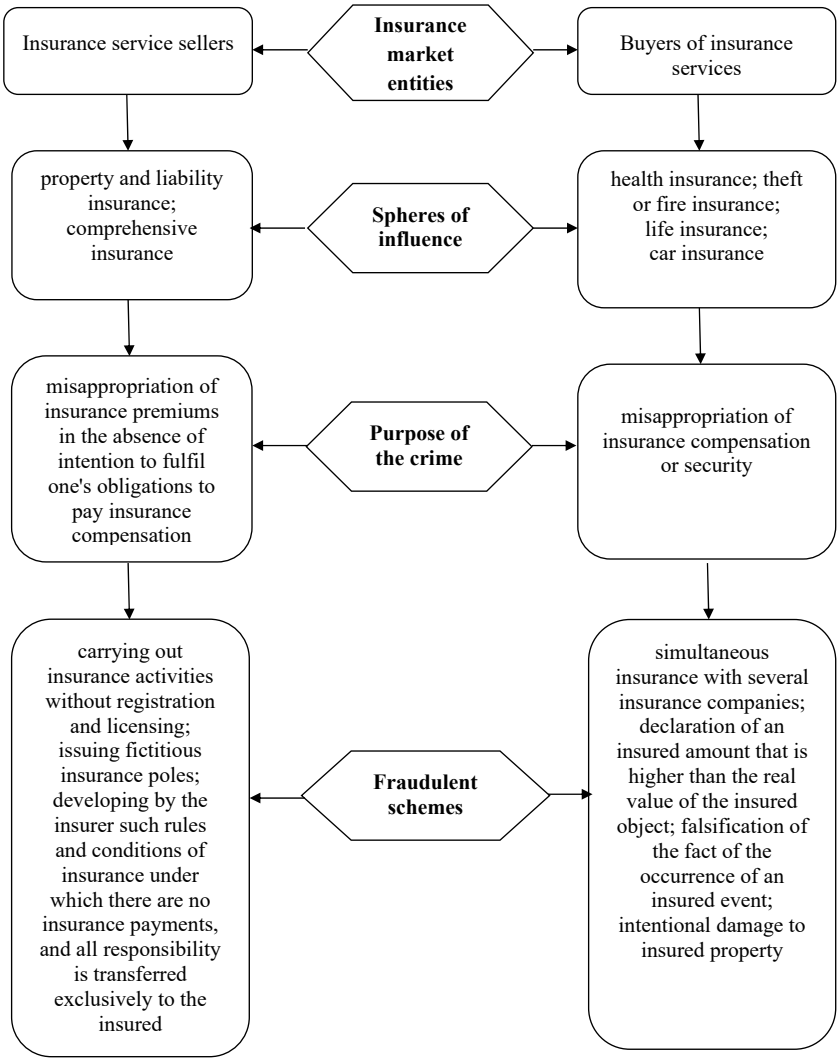


Figure 1. Characteristic signs of fraud in the insurance sector

Source: compiled by the author based on [1, pp. 480-482; 2]

In addition to financial consequences, insurance fraud negatively affects the level of public trust in the insurance institution. The increase in the number of fraudulent schemes complicates the procedures for settling insurance cases, strengthens control measures by insurers and increases the duration of insurance claims verification. This, in turn, can lead to a deterioration in the quality of customer service, the emergence of additional administrative costs and a decrease in the efficiency of the operation of insurance companies. In view of this, combating insurance fraud is one of the priority areas for ensuring the financial security of the insurance market and an important condition for increasing its stability and transparency.

One of the key areas of research into insurance fraud is the establishment and systematization of causal and motivational factors that lead to the commission of illegal actions in the field of insurance services. Analysis of the motives of insurance fraud allows not only to understand the nature of this phenomenon more deeply, but also to form effective tools for its prevention, timely detection and minimization of risks for all participants in the insurance market.

The motivational basis of insurance fraud is mainly associated with the desire to illegally obtain material benefits, reduce one's own financial expenses, or evade contractual obligations. At the same time, the nature of the motives may vary depending on the status of the offender, the characteristics of the insurance product, the economic situation, and the level of control by the insurance company. The most common motives for committing fraudulent acts in the insurance sector include:

– misappropriation of insurance payments or their part for the purpose of personal enrichment;

– the desire to receive insurance compensation in an amount exceeding the actual losses incurred;

– the desire to compensate for previously paid insurance premiums by unjustified receipt of insurance payments;

– using the fact of the occurrence of an insured event to overestimate the amount of material damage and obtain additional financial benefits;

– avoiding the fulfillment of financial obligations or shifting responsibility for the consequences of an insured event to the other party to the insurance contract [3].

The above-mentioned motives form the basis for the implementation of various fraudulent schemes, which differ in scale, level of organization and degree of public danger.

Thus, abuse in the insurance sector has a negative impact on society and is accompanied by financial risks that complicate the formation of insurance funds to fulfill the main obligations under insurance contracts. Financial fraud in the insurance sector hinders the stable operation of business entities, stimulates the emergence of new economic risks and eliminates any incentives for innovation in entrepreneurial activity.

Having studied the specifics of the activities of insurance market participants, we believe that the main factors of the growth of abuse and financial fraud in this area can be conditionally divided into three groups – financial, legal and social (see Fig. 2).

Today, there are about two hundred ways to commit crimes in the insurance sector, the essence of which depends on the type of insurance: voluntary or mandatory, property, life or liability insurance. Among the subjects who commit financial fraud in insurance activities, one can distinguish not only insurers and policyholders, but also other intermediaries who indirectly influence the commission of illegal actions, namely: expert appraisers, employees of technical service stations, representatives of car dealerships, lawyers, notaries, medical professionals, law enforcement officers, etc.

In the scientific literature, economic offenses in the insurance sector are classified depending on the nature of their organization and the method of implementing the criminal intent. The most common is the division of insurance fraud into professional and amateur.

Professional insurance fraud is a complex system of pre-planned and carefully organized illegal actions that are carried out with the aim of systematically obtaining illegal profit. As a rule, such schemes are implemented by organized groups of individuals whose activities have the characteristics of a clearly structured criminal mechanism. Such groups may include specialists from various fields of activity, including lawyers, medical professionals, expert appraisers, intermediaries and even employees of insurance companies. Using professional knowledge, official authority and access to information databases, they create conditions for the illegal receipt of insurance payments, falsification of documents or artificial

formation of insurance cases. This type of fraud is characterized by a high level of latency and causes significant financial losses to the insurance sector.

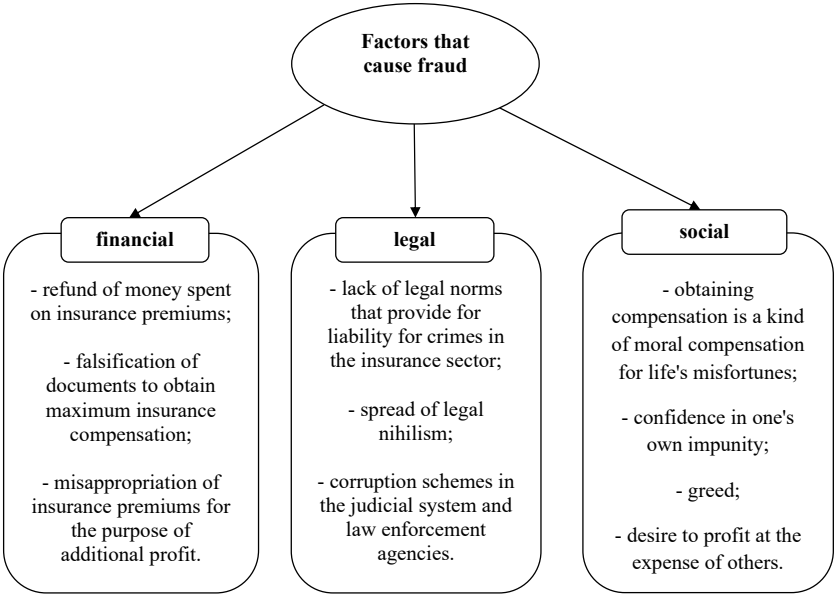


Figure 2. Factors of growth of abuses and financial frauds in the insurance sector

Source: compiled by the author based on [2; 4]

Unlike professional, amateur insurance fraud does not have signs of complex organization and is usually carried out by individual policyholders. Most often it arises as a result of the desire to obtain additional benefits during the settlement of a real insurance event. Typical manifestations of such fraud are overstating the amount of losses, concealing circumstances that are essential for assessing the risk, providing inaccurate information about the nature of the event or deliberately distorting information about the insured object. Despite the relatively small scale of individual cases, the mass of such violations significantly affects the financial results of insurers and increases the costs of implementing control procedures. Research in the

field of combating insurance fraud shows that the ratio of professional and amateur fraud is on average 1:10 [2].

Such statistics confirm that the bulk of fraudulent actions fall on individual policyholders who use the capabilities of the insurance mechanism to obtain undue benefit. At the same time, professional fraud, despite its relatively lower prevalence, causes the largest economic losses to the insurance sector, as it is characterized by a high level of organization, significant amounts of illegally obtained funds and the complexity of the process of detecting and documenting illegal activities.

Depending on the nature of the formation of criminal intent and the specifics of the implementation of illegal actions, insurance fraud is expediently divided into planned and situational.

Planned insurance fraud is characterized by preliminary preparation and purposeful organization of illegal activities. Its distinguishing feature is the presence of a pre-formed intention to obtain unlawful material benefit even before the conclusion of the insurance contract. In most cases, the implementation of such schemes requires careful planning, coordination of actions of several people, and sometimes the assistance of employees of insurance companies or other participants in the insurance process. That is why this type of fraud is characterized by a high level of organization and difficulty in detection.

Situational fraud usually involves policyholders who have concluded a contract for the purpose of classical insurance protection. However, when an insured event occurs, they may take actions related, as a rule, to concealing the true causes and circumstances of the event in order to avoid a refusal to pay or to artificially inflate the amount of damage. For example, this is concealing the fact of the driver's drunkenness, inaccurate information about the insured event, attempts to issue previously received damage for new damage [5].

One of the important classification features of insurance fraud is its division into internal and external depending on the subjects of committing illegal actions. This type of fraud can take place at any stage of the insurance contract:

– after the declaration of risk by the insured or his representative, if the distortion of information is intentional;

– when selling the contract by the insurer's representative (insurance employee or agent);

– after filing a claim [6].

Internal insurance fraud is a type of economic offense committed by employees of an insurance organization or other persons who have access to the insurer's internal business processes. Such actions can be carried out both independently and in collusion with policyholders, beneficiaries, insurance intermediaries or other interested parties. The peculiarity of internal fraud is the use of official authority, professional competence and access to confidential information to obtain unlawful material benefit. That is why this type of fraud poses an increased danger to the insurance company, since its consequences are not only direct financial losses, but also a violation of the effectiveness of the corporate governance system, a decrease in the quality of internal control and a deterioration in the reputational capital of the insurer.

Key manifestations of internal insurance fraud include intentional distortion of information regarding the causes, conditions and consequences of an insured event, falsification of loss assessment results, manipulation of the insured value of insured objects, performance of dubious reinsurance transactions, as well as deliberate violation of underwriting and insurance claims settlement procedures. A separate group of risks includes cases of intentional misleading of policyholders regarding the terms of insurance coverage, forgery of documentation, illegal correction of information in electronic databases, corrupt actions and other forms of abuse of office. Significant damage to insurance activities is also caused by cases of intentional concealment of material circumstances of an insurance contract or assistance in the illegal receipt of insurance compensation by third parties.

Current trends in the development of the insurance sector indicate the transformation of traditional forms of external fraud and the emergence of new risks due to the digitalization of financial services. One of the most significant threats is the growth of cybercrime, which creates additional opportunities for unauthorized access to insurers' information systems, theft of personal data of clients and manipulation of electronic documents. Schemes of using fake or duplicate documents, falsification of individual data, illegal identification of individuals and submission of fictitious

statements about the occurrence of insured events are becoming increasingly widespread.

The issue of financial fraud is quite relevant for the domestic insurance market. In Ukraine, insurance fraud accounts for 21% or 1.5 billion UAH. of gross payments, in particular: 25% for voluntary health insurance, 23% for CASCO insurance, 18% – OSAGO, 16% – liability insurance, 14% – tourist insurance, 12% – property insurance and 10% – accident insurance. Insurance experts are sounding the alarm: every fourth voluntary health insurance policy, every tenth accident insurance policy is fake [2].

Having studied the structure of insurance fraud in the world, we can conclude that financial fraud in the insurance sector abroad has its own characteristics. For example, in the USA, more than 80% of fraudulent schemes fall on health insurance, while only 10% on auto insurance, crimes in the field of home and life insurance account for 1.5% and 1.2%, respectively. As for the European continent, financial crimes in the field of auto insurance (about 60%), home insurance (25%) and health insurance (about 10%) prevail. If we consider the total amount of losses abroad caused by financial fraudsters, they are quite impressive in the USA – over 100 billion USD every year. Most European insurance companies have an average of up to 10-15 billion USD in financial losses from illegal actions of fraudsters annually [7].

Therefore, due to the significant scale of financial abuses in the insurance sector, domestic insurance companies and the government are faced with the acute problem of finding effective ways to overcome this problem.

Given the existence of different groups of entities in the insurance market, in our opinion, it would be advisable to divide the methods of combating fraud in this area into two stages:

1) verification at the stage of concluding an insurance contract;

2) verification at the stage of investigating an insured event.

Tactical methods of combating insurance fraud at the stage of concluding an insurance contract include a detailed check of the insured, a review of the condition of the insured object, monitoring insurance histories (if any), a questionnaire regarding the special conditions of the contract, etc.

As for the second stage, the following tactical methods should be followed: a full investigation of all circumstances of the insured event, a study of the motivations of the beneficiary and the insurance company,

as well as the use of special research tools. The latter include means of operational, technical and programmatic detection of insurance fraud.

Insurance fraud detection software works best in the field of civil liability insurance when detecting those insurance cases that were staged with the aim of misappropriating insurance companies' funds. For example, the use of special software products in auto insurance will make it possible to design the expected deformation of a vehicle in a specific collision, calculate the trajectory of vehicles at the time of collision, and determine possible damage.

Operational methods for detecting insurance fraud include not only the activities of investigative bodies, but also the involvement of insurance companies in cooperation with business entities that provide professional services in the field of security.

A study of foreign experience shows that an important element of combating insurance crimes is the formation of centralized registers of insurance cases, losses, and facts of unfair behaviour of insurance market participants [6]. Innovative digital technologies are actively used to detect fraudulent schemes, including document verification tools, tools for analysing information from social networks and open Internet resources, specialized information platforms, as well as mechanisms for engaging the public through hotlines and other communication channels. At the same time, in Ukraine, the process of forming an effective system for combating insurance fraud is at the stage of formation, and the functioning of a comprehensive information base of insurance cases and coordination of relevant measures remain underdeveloped.

In the context of the digital transformation of the financial sector, the use of modern analytical technologies is a key factor in increasing the efficiency of internal control of insurance companies. Their application ensures timely detection of risky operations, increases the accuracy of forecasting possible threats and contributes to the formation of a preventive risk management model. Big Data technologies are of particular importance, which allow for multidimensional analysis of significant arrays of structured and unstructured information in order to identify hidden patterns, relationships and potential risks. At the same time, artificial intelligence and machine learning algorithms provide automated information processing,

identification of atypical behavioural patterns and prompt detection of suspicious transactions.

One of the most promising areas for improving mechanisms for combating insurance fraud is the use of behavioural analytics. In particular, automated systems are able to record atypical activity during the execution of insurance contracts, submission of applications for the occurrence of insured events or the payment of insurance payments. Analysis of such deviations provides the possibility of early detection of potential violations and significantly reduces the cost of conducting additional inspections.

An important tool for detecting illegal schemes is also a comprehensive analysis of information about insurance cases. Thanks to the use of modern data processing algorithms, insurance companies are able to establish hidden patterns, identify the concentration of suspicious applications in certain regions, insurance segments or among certain groups of clients.

The practice of leading international insurance companies demonstrates the high efficiency of using digital tools to detect and prevent insurance fraud. The combination of Big Data technologies, artificial intelligence, geoinformation services and analysis of open sources of information allows for multi-level verification of insurance claims, assess the reliability of the submitted data and promptly identify signs of potential abuse. As a result, financial losses of insurers are significantly reduced, the quality of customer service increases and trust in the insurance sector is strengthened.

An equally important element of the system for combating insurance fraud is the development of the human resources potential of insurance organizations. Increasing the professional competence of employees is ensured through the implementation of specialized educational programs, trainings, practical seminars and certification courses aimed at developing skills in working with modern analytical tools and risk assessment methods.

At the same time, the effectiveness of the fight against insurance offenses largely depends on the level of cooperation between insurance companies and law enforcement agencies. Such interaction ensures effective exchange of information, coordination of joint actions and increases the effectiveness of the investigation of insurance fraud cases.

Today, there are many ways to combat corporate fraud and actions to detect it in a timely manner, but not all of them bring a positive result.

The most effective, in our opinion, are complex measures that combine the following areas:

1) effective control procedures – the creation of corporate control aimed at eliminating profit losses associated with corporate fraud; development of measures aimed at prevention; early detection of fraud risks and the formation of an effective internal control system [8]; the use of tools that ensure economic security and internal investigations.

Modern organizations operate in conditions of high competition and strict regulatory requirements. This requires them not only accuracy in conducting financial transactions, but also the ability to effectively prevent possible risks associated with fraud. One of the key tools for achieving these goals is the internal control system.

Internal control is a structured approach to management and supervision aimed at ensuring the accuracy of financial information, compliance with regulatory requirements and improving the efficiency of the enterprise. The main goal of internal control is to minimize financial risks, including fraudulent actions that can be committed by both employees and management. The internal control system is developed individually for each enterprise, taking into account its size, industry and specifics [9]. It should be implemented in all business processes, from financial management to personnel policy. The objectives of internal control include ensuring the reliability and completeness of financial reporting, preventing and detecting fraud, strengthening corporate ethics and complying with regulatory requirements, including increasing operational efficiency by reducing the level.

2) personnel policy – the formation of an impeccable corporate culture, personnel certification, the formation of a personnel reserve, the creation of favorable working conditions, etc. When communicating in person at meetings and corporate meetings, explain to employees the importance of ethical business conduct, convey the management's position on corruption and fraud. Conduct internal training for employees on the topic of ethical practices and punish those who initiated fraud [10, p. 172]. A regulated system of training and advanced training of employees of all structures and levels plays an important role in ensuring the economic security of the enterprise.

3) creation of a corporate security service – a separate unit of specialists of various profiles (economic, legal, IT sphere), whose competence will

include the accumulation of information and control over the company's activities in various business processes. An important task of the corporate security service is to timely receive information about the preparation of illegal actions, about the fact of fraud.

The issues of implementing and improving the internal control system are especially relevant in the context of digitalization and automation of business processes. Innovations open up new opportunities for increasing the transparency of operations, but at the same time create additional risks, such as cybercrime and manipulation of various data. In these conditions, a reliable internal control system becomes not just a mandatory element of management, but also a competitive advantage.

In order for the internal control system to be effective, it is important to adhere to such principles as transparency (ensuring the availability of information for all stakeholders), regular audit (organization of verification to assess the effectiveness of the implemented measures), personnel training (conducting regular training of employees on compliance with company policy), technological support (use of licensed software).

Thus, the formation of an effective internal control system in insurance companies involves the implementation of a comprehensive risk-oriented approach, which includes the development of internal regulations, the construction of a multi-level corporate governance system, regular risk assessment and the implementation of appropriate control measures. An important component of such a mechanism is continuous monitoring of the insurer's activities, which ensures timely detection of deviations from established standards, minimization of financial losses, and increasing the level of financial stability of the institution [11].

2) personnel policy – the formation of an impeccable corporate culture, personnel certification, the formation of a personnel reserve, the creation of favorable working conditions, etc. When communicating in person at meetings and corporate meetings, explain to employees the importance of ethical business conduct, convey the management's position on corruption and fraud. Conduct internal training for employees on the topic of ethical practices and punish those who initiated fraud [10, p. 172]. A regulated system of training and advanced training of employees of all structures and levels plays an important role in ensuring the economic security of the enterprise.

3) creation of a corporate security service – a separate unit of specialists of various profiles (economic, legal, IT sphere), whose competence will include the accumulation of information and control over the company's activities in various business processes. An important task of the corporate security service is to timely receive information about the preparation of illegal actions, about the fact of fraud.

The issues of implementing and improving the internal control system are especially relevant in the context of digitalization and automation of business processes. Innovations open up new opportunities for increasing the transparency of operations, but at the same time create additional risks, such as cybercrime and manipulation of various data. In these conditions, a reliable internal control system becomes not just a mandatory element of management, but also a competitive advantage.

In order for the internal control system to be effective, it is important to adhere to such principles as transparency (ensuring the availability of information for all stakeholders), regular audit (organization of verification to assess the effectiveness of the implemented measures), personnel training (conducting regular training of employees on compliance with company policy), technological support (use of licensed software).

Thus, the formation of an effective internal control system in insurance companies involves the implementation of a comprehensive risk-oriented approach, which includes the development of internal regulations, the construction of a multi-level corporate governance system, regular risk assessment and the implementation of appropriate control measures. An important component of such a mechanism is continuous monitoring of the insurer's activities, which ensures timely detection of deviations from established standards, minimization of financial losses, and increasing the level of financial stability of the institution [11].

2. Fraud in the Social Security System: Forms of Manifestation and Ways to Overcome Them

Within the framework of social policy research, social security fraud is usually interpreted as a conscious and purposeful submission by an applicant of false or distorted information in order to illegally obtain material benefits or other types of benefits. This also includes cases of deliberate concealment

by citizens or untimely notification of changes in their circumstances that affect the possibility of receiving social assistance from the state.

In most developed countries, fraud is defined as deliberate deception of relevant authorities in order to obtain undue advantages, which is classified as an administrative or criminal offense depending on the scale of the violation [5]. Along with this, the phenomenon of corruption in the social security system is separately distinguished, which consists in the conscious use of official position by employees of relevant institutions to obtain personal gain or other undue advantages. At the same time, in the process of analysis, it is important to draw a clear distinction between intentional violations (fraud and corruption) and unintentional deviations in the form of errors (see Fig. 3).

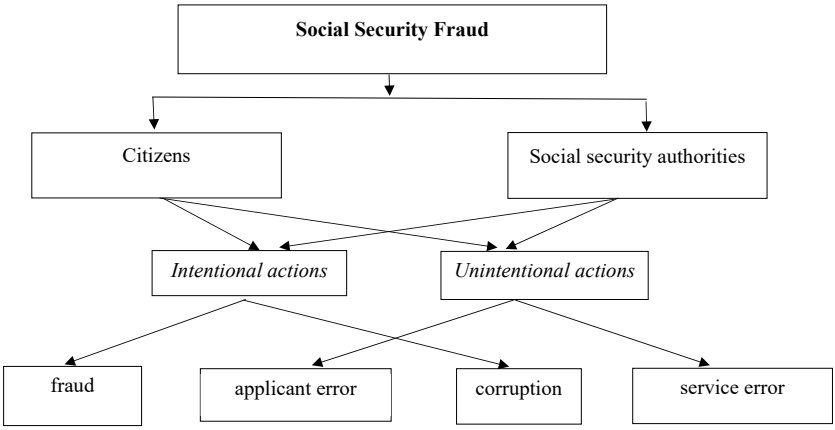


Figure 3. Understanding the essence of fraud in the system of social security of citizens

Source: compiled by the author based on [12; 13]

The latter are not intentional and can occur both on the part of beneficiaries and officials. They manifest themselves in the form of inaccurate submission of data or erroneous decisions on the assignment of payments. The main reasons for such situations are the complexity of social security procedures, as well as inadequate professional competence of staff.

Therefore, as can be seen from Fig. 3, it is important to clearly distinguish between fraud and corruption, taking into account possible errors on the part of both applicants and employees of authorized bodies. An error is considered as an unintentional submission of inaccurate or distorted information by the applicant, as well as the adoption by officials of decisions on the assignment of social benefits based on insufficiently substantiated or incorrect conclusions. At the same time, the improper accrual of benefits may be due to both individual factors and institutional features, in particular, the insufficient level of professional training of personnel, the complexity of regulatory and legal support and the multi-level nature of the social security system, which increases the likelihood of unintentional errors in the process of its functioning.

The main categories of fraudulent actions in the field of social security usually include:

1) the institutional complexity of the social security system, which creates the prerequisites for the simultaneous receipt of social benefits under different administrative or territorial social programs, and also contributes to the emergence of fraudulent practices due to excessive regulation of procedures, the complexity of regulatory requirements and the imperfection of mechanisms for verifying the identity of the recipient [6];

2) abuse of procedural mechanisms, which includes submitting multiple applications by citizens with the aim of illegally receiving assistance, incorrect or intentionally distorted interpretation of the criteria for assessing the financial situation of households, as well as the use of false information or schemes for manipulating identification information regarding persons who are assigned social benefits;

3) improper behaviour of applicants and recipients of social assistance, which is manifested in concealing real income, their deliberate understatement, as well as in concealing facts about changes in financial or family status that directly affect the right to receive relevant social benefits. The latter are not intentional and can occur both on the part of beneficiaries and officials. They manifest themselves in the form of inaccurate submission of data or erroneous decisions on the assignment of payments. The main reasons for such situations are the complexity of social security procedures, as well as inadequate professional competence of staff.

Therefore, as can be seen from Fig. 3, it is important to clearly distinguish between fraud and corruption, taking into account possible errors on the part of both applicants and employees of authorized bodies. An error is considered as an unintentional submission of inaccurate or distorted information by the applicant, as well as the adoption by officials of decisions on the assignment of social benefits based on insufficiently substantiated or incorrect conclusions. At the same time, the improper accrual of benefits may be due to both individual factors and institutional features, in particular, the insufficient level of professional training of personnel, the complexity of regulatory and legal support and the multi-level nature of the social security system, which increases the likelihood of unintentional errors in the process of its functioning.

The main categories of fraudulent actions in the field of social security usually include:

1) the institutional complexity of the social security system, which creates the prerequisites for the simultaneous receipt of social benefits under different administrative or territorial social programs, and also contributes to the emergence of fraudulent practices due to excessive regulation of procedures, the complexity of regulatory requirements and the imperfection of mechanisms for verifying the identity of the recipient [6];

2) abuse of procedural mechanisms, which includes submitting multiple applications by citizens with the aim of illegally receiving assistance, incorrect or intentionally distorted interpretation of the criteria for assessing the financial situation of households, as well as the use of false information or schemes for manipulating identification information regarding persons who are assigned social benefits;

3) improper behaviour of applicants and recipients of social assistance, which is manifested in concealing real income, their deliberate understatement, as well as in concealing facts about changes in financial or family status that directly affect the right to receive relevant social benefits.

In general, different types of social benefits are characterized by specific models of fraud risks, which necessitates a differentiated approach to the development and implementation of measures to counter such violations within the framework of the state social protection policy.

The domestic practice of the social security system is represented by the system of compulsory social insurance and the system of social protection.

Under compulsory social insurance, citizens have the right to receive material security and social services in connection with retirement, health (payment of temporary disability certificates and processing of payments for loss of working capacity due to disability), loss of employment, etc.

As for the social protection system, in Ukraine there is a significant number of social benefits and privileges: social assistance to low-income families, assistance to families with children, assistance to internally displaced persons, social assistance to orphans and disabled children, subsidies for reimbursement of housing and communal services, privileges for certain categories of citizens in accordance with current legislation, etc. As can be seen from the list of services and benefits provided by the state for certain categories of citizens, they are an effective tool of social policy and are subject to abuse by both service consumers and persons who prescribe them.

Despite significant amounts of state spending, the social support system in Ukraine is characterized by insufficient effectiveness. Data from annual sample household surveys conducted by the State Statistics Service indicate that a significant share of social transfers falls on households with higher incomes [14]. This situation indicates a low level of targeting of social assistance, which reduces its focus on the most vulnerable segments of the population.

A significant factor also remains the preservation of the system of benefits that are provided to certain categories of citizens without fully taking into account their financial situation, despite the gradual narrowing of their scope in recent years. At the same time, the lack of an integrated register of social assistance recipients significantly complicates determining their total number. Information about recipients is scattered and is formed within the framework of individual social protection programs, which reduces the level of transparency and limits the effectiveness of managing the social support system as a whole.

In modern social security systems of most countries, one of the pressing problems remains fraud by recipients of social benefits. The scale and intensity of such violations are determined by a set of factors, among which the leading role is played by the structure of social benefits and the conditions for their assignment, as well as the effectiveness of the mechanisms of initial verification when accessing the relevant programs.

An important element of combating abuse is the so-called input control, which includes a set of administrative and confirmatory procedures aimed at verifying the reliability of the information provided by the applicant. Its functional purpose is to establish compliance between the declared socio-economic status of a person and the actual conditions that determine the right to receive state assistance. Most social assistance programs are characterized by strengthening preventive approaches aimed at preventing abuse, which is implemented through the establishment of requirements for the submission of a significant number of supporting documents and the processing of applications for various types of social benefits, including pensions.

One of the effective procedural tools for assessing the legality of the assignment and receipt of social assistance is verification, the main purpose of which is to establish whether the recipient meets the specified legislative criteria, whether he has an actual right to the relevant payments, or whether the payments were assigned as a result of the submission of false information, errors or administrative inaccuracies. In a general sense, verification is an integral part of a broader system for combating fraud in the field of social security. At the same time, in the absence of a developed comprehensive control model, it can be implemented as a one-time verification procedure, which is carried out, for example, after the formation of a register of social assistance recipients or in cases where there are grounds for in-depth analysis.

Considerable attention within the verification procedures is paid to checking the targeted use of budget funds, in particular, confirmation that social payments are received by real persons who have legal grounds for them, and not by fraud subjects. A key element of effective verification is interdepartmental interaction and data exchange, which allows for a comprehensive assessment of the real property status and social status of the recipient. This includes checking the level of income and other characteristics that affect the right to receive social assistance. For this, both state information registers and data from private structures, in particular banking institutions, investment and insurance companies, are used.

According to the generalized results of international research, the implementation of social benefits verification procedures can provide a significant reserve for reducing budget expenditures, which in some

cases can reach 20–30% of the total amount of social sphere financing [15, p. 84]. At the same time, these indicators should be considered as extremely possible, since their achievement requires an appropriate level of institutional capacity and effectiveness of control mechanisms.

Practice shows that the greatest potential for savings is observed in those social security systems that are characterized by a low level of identification and personification of beneficiaries, as well as a complicated structure of administrative procedures [16]. Under such conditions, the likelihood of non-targeted or erroneous allocation of financial resources increases, which, in turn, opens up wider opportunities for their optimization by introducing comprehensive verification tools.

Regarding the effectiveness of the implementation of verification procedures in domestic practice since 2016, it should be noted that this government project did not bring significant results in saving funds from the State Budget [8]. This is explained by the lack of a systematic approach to solving the problem of fraud in receiving social assistance. One of the key obstacles that hindered the prompt implementation of verification mechanisms was the lack of a consolidated electronic register of recipients of social payments and benefits, which are financed from both the state and local budgets. The implementation of the verification project also revealed a serious problem of inadequate information interaction between various state bodies and institutions, the full exchange of information between which is hindered by the lack of a single universal identifier that would be used in all state registers.

The leading tool for detecting the misuse of social benefits is the activity of the social inspectorate. However, the activity of social inspectors in modern conditions has low effectiveness. One of the determining reasons for the low effectiveness of control measures is the organizational dependence of the controller himself, because he checks the activities of the institution to which he himself belongs. Among other factors, it is worth noting the insufficient level of digitalization, the lack of a risk-based selection system for conducting inspections, as well as the excessive burden on inspectors with additional functions. The vast majority of inspections focus on analysing the income of recipients, while the assessment of their property status is carried out to a limited extent. The practice of inspections at the place of residence is also widely used. A significant obstacle is the lack of

direct access of inspectors to state electronic databases, which forces them to send numerous requests to various institutions, which complicates the inspection process in time.

A problematic aspect in the work of social inspectors-controllers is that the mechanism for reimbursement of overpaid state funds is implemented exclusively through the courts. At the same time, the absence of penalties provided for by law for recipients of social benefits for submitting inaccurate information significantly reduces the preventive effect of the control system. Similarly, the imperfection of the mechanisms for holding employees of social security bodies accountable for possible corrupt actions negatively affects the level of institutional integrity in the field of social assistance.

CONCLUSIONS

A comparison of practices of different countries in building fraud prevention systems in the field of social security shows that achieving high performance is possible only if a holistic and multi-level risk management model is implemented. Such a model should provide not only for deterring unscrupulous behaviour of recipients of social benefits, but also for significantly reducing the number of errors that occur in the activities of bodies responsible for administering assistance. The key role in this is played by the integration of preventive, analytical and control tools that function as a single system. This includes, in particular, the implementation of mechanisms for early risk detection, automated data verification procedures, the establishment of effective information exchange between state institutions, as well as increasing the professional competence of employees involved in the process of assigning social benefits. We believe that the key elements of the system for combating fraudulent schemes should be:

– prevention of fraud – the introduction of effective control at the initial stage of considering applications for the assignment of social benefits; informing persons applying for social benefits about the possibility of being held administratively and criminally liable in the event of knowingly providing false information; improving the qualification level of social inspectors responsible for making decisions on the allocation of social assistance through their systematic education and professional training; carrying out systematic information and explanatory work among the

population to prevent fraud and highlight its legal and socio-economic consequences;

– identification of fraud facts – through integration, comparison and analytical processing of significant amounts of data on recipients of social assistance; conducting control measures, including checks on the material and living conditions of applicants and recipients of social benefits in accordance with clearly regulated procedures; joint control measures with other state bodies or institutions (tax service, banks, prosecutor's offices, etc.);

– curbing the level of fraud – applying a system of sanctions to violators, which provides not only for the return of illegally obtained funds, but also for the imposition of financial penalties in the form of fines; confiscation of overpayments; consideration of cases of financial fraud in court and bringing the guilty to justice;

– assessing the effectiveness of measures to combat fraud – continuous monitoring of the allocation of material support and social services to citizens; assessing the effectiveness of the implementation of control measures; comparative analysis of the amount of losses caused to the state from the detection of fraudulent schemes in the social security system to the amount of budget funds spent on the administration of mechanisms to combat abuses in this area.

A comparison of practices of different countries in building fraud prevention systems in the field of social security shows that achieving high performance is possible only if a holistic and multi-level risk management model is implemented. Such a model should provide not only for deterring unscrupulous behaviour of recipients of social benefits, but also for significantly reducing the number of errors that occur in the activities of bodies responsible for administering assistance. The key role in this is played by the integration of preventive, analytical and control tools that function as a single system. This includes, in particular, the implementation of mechanisms for early risk detection, automated data verification procedures, the establishment of effective information exchange between state institutions, as well as increasing the professional competence of employees involved in the process of assigning social benefits. We believe that the key elements of the system for combating fraudulent schemes should be:

– prevention of fraud – the introduction of effective control at the initial stage of considering applications for the assignment of social benefits; informing persons applying for social benefits about the possibility of being held administratively and criminally liable in the event of knowingly providing false information; improving the qualification level of social inspectors responsible for making decisions on the allocation of social assistance through their systematic education and professional training; carrying out systematic information and explanatory work among the population to prevent fraud and highlight its legal and socio-economic consequences;

– identification of fraud facts – through integration, comparison and analytical processing of significant amounts of data on recipients of social assistance; conducting control measures, including checks on the material and living conditions of applicants and recipients of social benefits in accordance with clearly regulated procedures; joint control measures with other state bodies or institutions (tax service, banks, prosecutor's offices, etc.);

– curbing the level of fraud – applying a system of sanctions to violators, which provides not only for the return of illegally obtained funds, but also for the imposition of financial penalties in the form of fines; confiscation of overpayments; consideration of cases of financial fraud in court and bringing the guilty to justice;

– assessing the effectiveness of measures to combat fraud – continuous monitoring of the allocation of material support and social services to citizens; assessing the effectiveness of the implementation of control measures; comparative analysis of the number of losses caused to the state from the detection of fraudulent schemes in the social security system to the amount of budget funds spent on the administration of mechanisms to combat abuses in this area.

To implement an effective internal control system, in our opinion, it is necessary to follow a certain sequence of actions, namely:

1) investing in the digitalization of processes – the implementation of modern technologies such as AI and blockchain allows you to minimize the human factor and increase the accuracy of control [4];

2) continuous training of employees – staff must understand the importance of following procedures and be aware of new methods of preventing financial fraud;

3) modernization of internal control – updating rules and procedures in accordance with changes in legislation and the economy [17, p. 380-382];

4) implementation of internal and external audits – systematic inspections allow you to quickly identify problems and eliminate them in a timely manner.

Companies that invest in the development and maintenance of an effective internal control system not only reduce the risks of fraud, but also strengthen their positions in the market, increasing the trust in themselves from all stakeholders.

References:

1. Plastun V. L. (2009) Problems of insurance fraud and practice of its avoidance. *Ekonomika: problemy teoriji ta praktyky: Zbirnyk naukovykh pracj*. Vol. 254: V 6 t. T. II. DNU, pp.477-488.

2. Insurance fraud in Ukraine. (2024) Available at: http://sk-ridna.com.ua/home/1021-15.html

3. Shebanin, V., Allakhverdiyeva, I. Insurance fraud: Theoretical conceptualization and countermeasures. *Ukrainian Black Sea Region Agrarian Science*. 2022. № 26(1). DOI: https://doi.org/10.56407/2313-092X/2022-26(1)-5

4. Danyliuk M. O., Danyliuk-Chernykh I. M., Matsuk Z. A. (2022) Combating financial fraud in the real sector of the economy. Combating financial fraud in the real sector of the economy. *Biznes Inform*, vol 1. DOI: https://doi.org/10.32983/2222-4459-2022-1-274-279

5. Dorokhin Yu., Iliashko A. (2019) Certain problems of distinguishing between fraud and fraud with financial resources. *Vcheni zapysky TNU imeni V.I. Vernadskoho. Seriia: yurydychni nauky,* vol 3. Available at: https://www.juris.vernadskyjournals.in.ua/journals/2019/3_2019/18.pdf/

6. Khamyha Yu. Ya. (2020) Financial fraud: identification criteria and minimization directions: dys. ... d-ra filos.: 072 – Finansy, bankivska sprava ta strakhuvannia. Ternopil, 284 p.

7. The Association of Certified Fraud Examiners. The Report to the Nation on Occupation Fraud and Abuse. Austin: ACFE, 2024. Available at: https://www.acfe.com/report-to-the-nations/2024/

8. World experience in combating fraud in receiving social assistance: lessons for Ukraine World experience in combating fraud in receiving social assistance: lessons for Ukraine (2017). Available at: FEAO_Cheating_A5_02_web.pdf

9. Yefremov, S.O. (2021), "Theory of combating corporate fraud". Available at: https://news.finance.ua/ua/news/-/440179/svyatoslav-yefremov-teoriya-borotby-z-korporatyvnym-shahrajstvom- chastyna-1/

10. Honchar, L. V., Malakhova, A. V. and Nevkypila, O. S. (2023), "Financial fraud and security", *Innovative economy. Innovative technologies and economic security*, no. 3-4 (87), pp. 170-174.

11. Bohrinovtseva K., Bondaruk O., Kliuchka O. (2024). Ways to combat insurance fraud in modern development conditions. *European Scientific Journal of Economic and Financial Innovations.* № *1*(13). DOI: https://doi.org/10.32750/2024-0111

12. Association of Certified Fraud Examiners (2024), "Report to the Nations: Global Study on Occupational Fraud and Abuse". Available at: https://legacy.acfe.com/report-to-the-nations/2024/

13. Association of Certified Fraud Examiners (2025), "Report to the Nations: Global Study on Occupational Fraud and Abuse". Available at: https://legacy.acfe.com/report-to-the-nations/2025/

14. Expenses and resources of households in Ukraine in 2024 (according to the sample survey of households in Ukraine)]. *Statystychnyi zbirnyk.* Available at: http://www.ukrstat.gov.ua/2025/gdn/dvn_ric/dvn

15. The system of social protection and social security in Ukraine. The real state and prospects for reform. Kyiv: Center for Public Expertise, 2009, 104 p.

16. Reducing Error, Fraud and Corruption (EFC) in Social Protection Programs, Safety Nets Primer Notes, World Bank, 2023. Available at: https://openknowledge.worldbank.org

17. Karlin, M., Stashchuk, O. and Borysiuk, O. (2021), "Financial aspects of taking into account new economic risks in the activities of enterprises", *Financial and Credit Activity Problems of Theory and Practice*, no. 4(39), pp. 376–386.

SOCIAL CAPITAL DEVELOPMENT IN MOUNTAIN TERRITORIAL COMMUNITIES: A STRATEGIC APPROACH IN A MULTI-ETHNIC REGION

Mykhaylo Pityulych[1]
Krystyna Kudak [2]

DOI: https://doi.org/10.30525/978-9934-26-715-4-14

Abstract. The sustainable development of mountain territorial communities depends not only on financial, infrastructural, and natural resources but also on the quality of social relations that determine the ability of residents to cooperate, participate in local governance, and collectively address common challenges. This issue is particularly important for mountainous areas of Zakarpattia, a multi-ethnic region characterized by geographical remoteness, settlement fragmentation, economic disparities, labor migration, and considerable cultural diversity. Under these conditions, social capital can become an important resource for strengthening community resilience, improving local governance, stimulating civic participation, and supporting socio-economic development. *The purpose* of this study is to identify the main factors and barriers influencing social capital development in mountain territorial communities and to substantiate a strategic approach to strengthening trust, civic participation, horizontal cooperation, and local self-organization. *Methodology* is based on the results of sociological monitoring conducted among residents and representatives of local self-government in mountain settlements of the Zakarpattia region. The study applies systemic and comparative approaches, sociological analysis, strategic planning, expert evaluation, and project management methods to assess the current state of social capital and identify strategic priorities

[1] Doctor of Economics, Professor,
Corresponding Member of the National Academy of Sciences of Ukraine,
Head of the Department of Finance and Banking,
Uzhhorod National University, Ukraine;
Director of Transcarpathian Regional Centre
for Socio-Economic and Humanitarian Research of the NAS of Ukraine, Ukraine
[2] PhD, Research Fellow of Transcarpathian Regional Centre
for Socio-Economic and Humanitarian Research of the NAS of Ukraine;
Uzhhorod National University, Ukraine

© Mykhaylo Pityulych, Krystyna Kudak

for its development. *Results* demonstrate that social capital in mountain territorial communities remains insufficient for ensuring sustainable socio-economic development. The major barriers include low trust in local authorities, economic insecurity, weak civic participation, limited development of public associations, insufficient horizontal cooperation, and ineffective communication between authorities and residents. At the same time, the findings confirm the importance of local identity, reciprocity, social infrastructure, volunteer activity, participatory practices, and external networks as resources for strengthening social cohesion. A strategic approach to social capital development is proposed, based on evidence-based planning, socio-economic realism, anticipatory development, strategic alternatives, expert evaluation, and cross-level coordination. Particular attention is given to mechanisms that transform social capital into tangible territorial outcomes through community initiatives, participatory budgeting, entrepreneurship, employment creation, tourism development, environmental cooperation, and improved public services. *Practical implications* of the study lie in the possibility of applying the proposed strategic priorities and mechanisms by local authorities, civil society organizations, and community leaders to strengthen civic engagement, institutional trust, and territorial resilience. *Value/originality* of the research consists in combining the social capital perspective with strategic territorial development and adapting it to the specific conditions of mountainous and multi-ethnic communities.

INTRODUCTION

The sustainable development of mountain territorial communities depends not only on financial, infrastructural, and natural resources but also on the quality of social relations that determine the ability of residents to cooperate, participate in local governance, and collectively address common challenges. This issue is particularly important for mountainous areas of Zakarpattia, a multi-ethnic region characterized by geographical remoteness, settlement fragmentation, economic disparities, labor migration, and considerable cultural diversity. Under these conditions, social capital can become an important resource for strengthening community resilience, improving local governance, stimulating civic participation, and supporting socio-economic development.

Social capital encompasses networks of relationships, interpersonal and institutional trust, shared norms, reciprocity, civic engagement, and the ability of individuals to act collectively. Its importance becomes especially visible in territories where limited material resources increase the need for cooperation and internal mobilization. For mountain territorial communities, social capital can compensate, at least partially, for peripheral disadvantages by facilitating access to information, knowledge, external networks, voluntary resources, and collective initiatives. At the same time, weak social ties, low institutional trust, civic passivity, and insufficient organizational capacity may significantly restrict the development potential of such communities.

The problem is particularly relevant in the context of decentralization and the transformation of local governance in Ukraine. The expansion of territorial communities' responsibilities has increased their opportunities for independent decision-making but has simultaneously created new demands for managerial capacity, strategic planning, public participation, and communication with residents. Mountain communities often face additional institutional and socio-economic constraints, including limited employment opportunities, insufficient social infrastructure, population decline, and migration. Consequently, strengthening social capital should be considered not as a purely social objective but as an integral component of territorial development policy.

The multi-ethnic character of Zakarpattia adds another important dimension to this issue. Cultural diversity may contribute to the accumulation of social capital by creating opportunities for interaction, exchange of experience, and development of broader social networks. However, when combined with social inequality, institutional mistrust, insufficient communication, or weak mechanisms of participation, diversity may also complicate collective action. Therefore, the development of social capital requires an inclusive approach capable of combining local identity and cultural diversity with common territorial interests.

The academic literature offers several approaches to understanding social capital. Community-based approaches emphasize the role of associations and collective activities; network approaches focus on interpersonal and interorganizational connections; institutional approaches highlight the

influence of the quality of public institutions; and synergetic approaches consider cooperation among the state, business, and civil society as a prerequisite for sustainable development. The works of James Coleman [1, p. 97], Mark Granovetter [2, p. 487], Alejandro Portes [3, p. 48], Theda Skocpol [4, p. 117], Michael Woolcock [5, p. 200], and other scholars have substantially contributed to the development of these approaches. At the same time, the practical mechanisms through which social capital can be deliberately strengthened at the level of mountain territorial communities remain insufficiently developed, particularly in the context of multi-ethnic regions.

The purpose of this study is to identify the main factors and barriers influencing social capital development in mountain territorial communities and to substantiate a strategic approach to strengthening trust, civic participation, horizontal cooperation, and local self-organization. The empirical basis of the research is formed by sociological monitoring of residents and representatives of local self-government in mountain settlements of the Zakarpattia region. The study combines systemic, comparative, sociological, and strategic approaches to examine the relationship between social capital and the socio-economic capacity of communities.

The research focuses on two interconnected questions. First, what factors determine the current level and dynamics of social capital in mountain territorial communities? Second, what strategic mechanisms can transform existing social relations and networks into a sustainable resource for local development? Addressing these questions makes it possible to move from the description of social capital to the development of practical approaches to its strengthening.

The originality of the study lies in combining the social capital perspective with strategic territorial development and adapting this approach to the conditions of mountainous and multi-ethnic communities. The research emphasizes that social capital should be regarded as a dynamic and manageable territorial resource whose development requires coordinated action by local authorities, residents, civil society organizations, educational institutions, businesses, and other stakeholders.

1. Social Capital Development in Mountain Territorial Communities: Theoretical and Empirical Dimensions

Social capital has become an important concept in the analysis of socio-economic development because it explains how relationships among individuals and groups can generate resources that are not reducible to financial or physical assets. Despite extensive academic attention, there is still no universally accepted definition of social capital. Different theoretical approaches emphasize particular dimensions of the concept, including trust, networks, reciprocity, norms, collective action, and institutional relationships. These dimensions are complementary rather than mutually exclusive and provide a basis for understanding social capital as a multidimensional resource of territorial development.

The origins of the concept can be traced to Lyda J. Hanifan [6, p. 135], who emphasized the importance of social relationships, mutual assistance, and community interaction for improving collective well-being. Later, Pierre Bourdieu [7] associated social capital with resources derived from durable networks of relationships, while James Coleman interpreted it as a productive resource that facilitates individual and collective action through obligations, expectations, information channels, and social norms. Robert Putnam subsequently emphasized civic engagement, trust, and networks of cooperation as important conditions for effective collective action and institutional performance.

The network dimension of social capital was further developed by Mark Granovetter [2, p. 509] and Alejandro Portes [3, p. 63]. From this perspective, the value of social capital depends not only on the number of social connections but also on their structure, strength, and ability to provide access to information, resources, opportunities, and support. For geographically remote mountain communities, such networks are particularly important because they can reduce the disadvantages associated with peripheral location. Local networks can facilitate mutual assistance and collective action, while external networks can connect communities with migrants, businesses, non-governmental organizations, educational institutions, and other territories.

The institutional dimension is equally important. The accumulation of social capital is influenced by the quality of formal institutions, the transparency of decision-making, the fairness of resource distribution,

and the responsiveness of public authorities. Where institutions are perceived as legitimate and accountable, interpersonal trust can be reinforced by institutional trust. Conversely, corruption, favoritism, opaque decision-making, and ineffective communication may undermine both institutional and interpersonal relationships. Thus, social capital cannot be considered exclusively a characteristic of civil society; it is also shaped by the institutional environment in which social interactions take place.

The concept of reciprocity provides another important theoretical dimension. Repeated acts of assistance, exchange of information, voluntary cooperation, and mutual support create expectations that cooperation will continue in the future. In this sense, reciprocity transforms individual interactions into a broader relational resource. The ideas associated with Karl Polanyi [9, p. 245] are relevant here because reciprocal exchange contributes to the formation of durable social relationships and collective norms. In mountain communities, where formal resources may be limited, reciprocal practices can remain an important mechanism of everyday resilience.

At the same time, social capital should not automatically be regarded as positive. Closed networks may generate exclusion, nepotism, corruption, or preferential treatment of particular groups. Such forms of social capital can strengthen internal solidarity while reducing broader social welfare. The distinction between inclusive and exclusive, or productive and destructive, forms of social capital is therefore particularly relevant for territorial governance. Strategic policies should support networks that expand participation and cooperation rather than those that concentrate resources within narrow circles.

The empirical evidence obtained in the mountain settlements of Zakarpattia demonstrates that the current level of social capital remains insufficient to fully support sustainable socio-economic development. The main weaknesses are associated with low institutional trust, limited civic participation, insufficient horizontal cooperation, weak development of public associations, and a relatively low willingness of residents to participate in local initiatives. These problems are reinforced by economic insecurity and migration, which reduce the time and resources available for participation in community life.

One of the most significant findings concerns the relationship between economic well-being and social participation. Residents of economically depressed communities tend to prioritize individual survival strategies over collective activities. Where households face unstable employment, low incomes, seasonal work, or the need to seek employment outside the community, participation in local initiatives becomes less attractive. Economic insecurity therefore represents not only a material problem but also a factor that limits the accumulation of social capital.

The relationship between poverty and social capital is particularly important for mountain territories. Residents who combine several jobs or depend on labor migration often spend less time within their communities. This weakens everyday interaction and reduces opportunities for developing stable networks of cooperation. Migration may provide households with additional income and create external connections, but it does not automatically strengthen local social capital. Its effect depends on whether financial resources, knowledge, skills, and social connections generated through migration are reinvested in the community.

External networks nevertheless represent a potentially valuable resource. Communities whose residents maintain relationships with people working abroad, former residents living in larger cities, regional organizations, businesses, or other institutions can obtain access to information, investment opportunities, professional knowledge, and new development practices. Such bridging connections are particularly important for remote mountain settlements because they can reduce isolation and expand the range of available resources. However, external networks are most beneficial when they complement local cohesion rather than substitute for it.

Trust emerged as one of the central mechanisms underlying social capital development. The monitoring demonstrated that residents' willingness to participate in collective activities is strongly influenced by their perception of the fairness, transparency, and responsiveness of local authorities. Where administrative decisions are perceived as transparent and opportunities are distributed fairly, residents demonstrate greater willingness to cooperate. Conversely, perceptions of corruption, favoritism, or preferential treatment significantly reduce institutional confidence.

A particularly important indicator of this problem is that 44.9% of respondents reported reluctance to support various initiatives proposed by

local authorities. This result indicates a substantial deficit of institutional trust and demonstrates that formal decentralization does not automatically produce active citizen participation. The transfer of powers to territorial communities must be accompanied by mechanisms that enable residents to influence decisions, monitor implementation, and observe tangible results.

Communication between local authorities and residents is therefore a fundamental component of social capital. In many communities, decisions are formally made according to established procedures but residents are informed only after the decisions have already been taken. Such one-directional communication weakens citizens' sense of ownership and reinforces passivity. In contrast, regular public meetings, consultations, open reporting, digital communication, and accessible feedback mechanisms contribute to greater transparency and strengthen institutional legitimacy.

The empirical evidence also reveals significant differences between communities depending on the intensity of interpersonal interaction. Where residents communicate regularly with neighbors, participate in local events, volunteer, or cooperate to address common problems, perceptions of future development tend to be more positive. Such communities demonstrate stronger mutual assistance and a greater sense of shared responsibility. By contrast, fragmented communication and weak interpersonal ties are associated with dissatisfaction with local governance, pessimism about economic opportunities, and lower confidence in collective problem-solving capacity.

Local identity represents another important component of social capital in mountainous areas. Residents who express pride in their settlement, cultural traditions, natural environment, or historical heritage are more likely to support tourism initiatives, environmental projects, and community improvement activities. Emotional attachment to place creates a connection between individual interests and collective reputation. Consequently, local identity can serve as a motivational mechanism for participation and should be considered in community development strategies.

The multi-ethnic character of Zakarpattia makes the issue of local identity particularly complex. Social capital development should not be based on the exclusion of cultural differences but on the creation of shared interests and inclusive forms of territorial identity. Cultural diversity can become a development asset when different groups participate equally in

community life and perceive local institutions as fair and accessible. In this context, common projects, cultural initiatives, educational activities, and community events can create spaces for regular interaction and strengthen bridging forms of social capital.

Social infrastructure also plays an important role. Communities with active schools, cultural centers, libraries, public spaces, and other institutions that provide opportunities for interaction tend to demonstrate stronger patterns of cooperation. These institutions function not only as providers of particular services but also as social meeting points where residents exchange information, develop relationships, and reinforce a sense of belonging. Their preservation and modernization therefore have implications that extend beyond the provision of basic services.

Volunteerism and collective action constitute another important mechanism for strengthening social capital. Participation in community projects, environmental initiatives, charitable activities, and mutual-aid practices creates repeated opportunities for cooperation. Such activities can gradually establish new norms of reciprocity and collective responsibility. Importantly, visible results of joint action strengthen the belief that cooperation is capable of producing tangible benefits.

The monitoring demonstrated that residents respond more positively to practical results than to formal strategic declarations. Communities where authorities implemented visible improvements, even relatively small ones, tended to demonstrate greater confidence in local institutions. Road repairs, improved lighting, public spaces, playgrounds, water infrastructure, and other tangible results provide evidence that collective action can generate real benefits. Conversely, repeated promises without implementation reinforce cynicism and reduce willingness to participate.

The distribution of participation within communities is another important issue. In many settlements, a relatively small group of active residents carries the main responsibility for public initiatives. These individuals represent valuable local leaders and change agents, but excessive dependence on a narrow group creates risks of burnout and stagnation. Sustainable social capital requires the gradual expansion of participation and the creation of conditions under which less active residents can become involved.

Generational differences further complicate this process. Younger residents generally demonstrate greater openness to digital communication,

entrepreneurship, new forms of civic engagement, and project-based cooperation. At the same time, they are also more likely to express migration intentions, particularly where local labor markets and educational opportunities are limited. This creates a strategic paradox: the population group with considerable potential for innovation and modernization is simultaneously one of the most likely to leave the territory. Consequently, youth retention should be regarded as an important component of long-term social capital development.

Women represent another important but sometimes underestimated resource for community mobilization. Their participation in education, family networks, volunteering, charitable initiatives, and informal care structures contributes to maintaining social cohesion. Strengthening opportunities for women's participation in local decision-making and community leadership can therefore broaden the social base of territorial development.

Environmental cooperation can also serve as an entry point for strengthening social capital. Mountain communities are closely dependent on forests, water resources, landscapes, and environmental quality. Problems such as illegal logging, waste management, and neglect of common spaces are often perceived not only as environmental issues but also as indicators of insufficient collective responsibility. Conversely, participation in environmental campaigns, clean-up activities, conservation projects, and eco-tourism can create practical situations in which residents cooperate around shared interests.

The findings additionally indicate that self-organization in mountain communities often develops in response to immediate problems rather than as a stable institutional practice. Residents may mobilize when faced with infrastructure deficiencies, declining public services, or other urgent challenges, but cooperation may decline after the immediate problem has been resolved. This reactive form of mobilization differs from sustainable social capital, which requires permanent structures, repeated interaction, and institutionalized mechanisms of participation.

An important aspect of the analysis is the role of civic associations. Membership in community groups, professional networks, cultural organizations, volunteer associations, cooperatives, and issue-based initiatives can broaden opportunities for interaction and collective action.

However, the shortage of such organizations remains a significant constraint in many mountain settlements. Expanding civil society institutions would provide residents with additional channels for participation beyond electoral processes and formal interaction with local authorities.

The findings also reveal that social capital can contribute to crisis resilience. Communities with established practices of information exchange, mutual assistance, and collective decision-making are better positioned to respond to economic instability, demographic pressures, and other external shocks. In this sense, social capital is not merely a resource for long-term development; it also functions as a mechanism of adaptation and territorial resilience.

Overall, the empirical evidence confirms that the development potential of mountain territorial communities depends on the interaction of economic, institutional, demographic, cultural, and social factors. Social capital cannot be strengthened through isolated measures directed exclusively at civic participation. Its development requires simultaneous attention to economic well-being, transparent governance, communication, local identity, social infrastructure, youth retention, civil society, and opportunities for collective action.

This perspective makes it possible to conceptualize social capital as a strategic territorial resource. Its value lies not simply in the existence of interpersonal relationships but in the capacity to transform these relationships into collective action and, ultimately, into concrete social and economic outcomes. Such transformation requires a strategic approach capable of connecting existing social resources with clearly defined development priorities. This provides the basis for moving from the diagnosis of social capital toward the development of practical strategic mechanisms for its strengthening in mountain territorial communities.

2. A Strategic Approach to Social Capital Development in Mountain Territorial Communities

The empirical findings indicate that social capital in mountain territorial communities cannot be strengthened solely through spontaneous interpersonal interactions or isolated civic initiatives. Its sustainable development requires a systematic approach that combines institutional, economic, social, cultural, and organizational measures. Such an approach

should recognize social capital as a strategic territorial resource and establish mechanisms through which trust, networks, reciprocity, civic participation, and collective responsibility can contribute to measurable improvements in community development.

The strategic approach proposed in this study is based on the assumption that social capital is a dynamic resource that can accumulate, decline, and transform depending on the institutional and socio-economic environment. Consequently, local authorities should move beyond the traditional perception of social capital as an informal characteristic of communities and incorporate its development into local strategic planning. This requires identifying existing social resources, assessing their strengths and weaknesses, establishing measurable objectives, selecting appropriate instruments, and regularly monitoring progress.

A key principle of the proposed approach is evidence-based strategic planning. Decisions concerning social capital development should be grounded in empirical information about trust, civic participation, communication patterns, social networks, institutional performance, and residents' perceptions of community development. Sociological monitoring should therefore become not a one-time research activity but a regular component of local strategic management. Periodic assessment would allow communities to identify changes in levels of trust, participation, satisfaction with local institutions, and willingness to cooperate, thereby providing a basis for adjusting strategic priorities.

The second principle is socio-economic realism. Strategic objectives must correspond to the actual financial, human, institutional, and demographic capacities of individual communities. Mountain settlements differ substantially in population size, accessibility, economic specialization, infrastructure, demographic structure, and availability of social institutions. Consequently, standardized strategies copied from larger or economically stronger territories may have limited effectiveness. Strategic planning should instead begin with the specific resources and constraints of each community.

The third principle is anticipatory development. Mountain territorial communities should not limit their strategies to solving existing problems but should also anticipate future changes in demographics, employment, migration, digitalization, tourism, environmental conditions, and public

service provision. This is particularly important because demographic decline and labor migration can gradually reduce the human resources necessary for maintaining local social networks. Anticipatory planning should therefore identify emerging opportunities and risks and prepare communities for alternative development trajectories.

The fourth principle is strategic alternatives. The uncertain economic and demographic environment requires communities to avoid dependence on a single development scenario. Alternative trajectories may include an inertial scenario, characterized by gradual continuation of existing trends; a compensatory scenario, focused on reducing the most significant socio-economic and institutional deficits; and a proactive scenario, aimed at creating new competitive advantages through innovation, entrepreneurship, tourism, environmental initiatives, and strengthened civic participation. The availability of several scenarios increases the flexibility of local management and allows communities to respond more effectively to changing external conditions.

The fifth principle is expert evaluation and scientific justification. The development of social capital strategies should involve researchers, practitioners, representatives of civil society, businesses, local leaders, and other relevant stakeholders. Expert participation can help communities identify hidden constraints, evaluate alternative solutions, establish appropriate indicators, and avoid unrealistic objectives. At the same time, external expertise should complement rather than replace local participation. Strategic decisions remain more legitimate when residents are directly involved in identifying priorities and evaluating proposed interventions.

An important element of the strategic approach is the hierarchical structure of goals. Social capital development should be considered at several interconnected levels, ranging from individual and family relationships to community, regional, and national institutions. At the local level, strategic goals should be translated into measurable intermediate objectives. These may include increasing participation in public meetings, expanding the number of active civic associations, improving the accessibility of local information, increasing participation in volunteer initiatives, strengthening satisfaction with local institutions, and improving residents' perceptions of fairness and transparency.

The use of measurable intermediate indicators is particularly important because social capital cannot be created immediately. Trust, reciprocity, and cooperation develop gradually through repeated interactions and accumulated experience. Therefore, strategic planning should distinguish between long-term outcomes and short- and medium-term milestones. For example, a community may initially focus on establishing regular public consultations and transparent reporting, then introduce participatory budgeting, and subsequently develop larger community-based projects. Each successful stage creates practical evidence that collective action can produce tangible benefits.

The strategic approach should also incorporate mechanisms for converting social capital into territorial development outcomes. Social networks and trust become particularly valuable when they facilitate employment, entrepreneurship, investment, tourism, innovation, improved public services, or environmental management. Therefore, the objective is not merely to increase the number of social interactions but to create institutional conditions under which cooperation generates visible economic and social effects.

One of the most effective mechanisms for such conversion is the development of community-driven projects. Projects related to public spaces, local infrastructure, cultural heritage, tourism, environmental protection, social services, and local entrepreneurship can bring residents together around clearly defined common interests. Their implementation creates repeated opportunities for communication and cooperation while simultaneously producing tangible improvements in the community. This dual effect makes community projects an important instrument of both social capital accumulation and territorial development.

Participatory budgeting and public initiative funds represent another important mechanism. Allowing residents to propose and select projects financed from a designated part of the local budget creates direct experience of participation in decision-making. It also improves transparency because residents can observe how priorities are identified, resources are allocated, and projects are implemented. The process can gradually strengthen institutional trust and encourage citizens who previously remained passive to become involved in community affairs.

The effectiveness of participatory instruments depends, however, on the transparency of their procedures. Residents must have access to understandable information concerning available resources, project selection criteria, voting procedures, implementation schedules, and final expenditures. Without transparency, participatory mechanisms may reproduce existing inequalities or become dominated by a small group of active participants. Therefore, participatory budgeting should be combined with broad information campaigns and accessible communication channels.

Communication management should constitute a separate strategic direction. In remote mountain settlements, information asymmetry can significantly limit participation. Local authorities should therefore establish regular communication through public meetings, consultations, digital platforms, social media, local media, community newsletters, and open reporting. Importantly, communication should be multidirectional: authorities should not only inform residents about decisions but also collect feedback and demonstrate how residents' proposals have influenced subsequent actions.

Institutional responsiveness is particularly important for building trust. When residents submit requests or identify local problems, authorities should provide timely responses and communicate the results of their consideration. Even when a proposed solution cannot be implemented immediately, transparent explanation of the reasons can prevent frustration and strengthen perceptions of fairness. Responsiveness thus becomes an important mechanism for transforming formal institutional relations into genuine institutional trust.

Another strategic priority is strengthening civil society institutions. Local associations, volunteer groups, professional organizations, cultural initiatives, youth organizations, cooperatives, and issue-based networks create additional channels through which residents can interact and influence community development. Such organizations are particularly valuable because they distribute leadership and prevent excessive dependence on a small number of local activists.

The development of civil society should be supported through small grants, organizational training, access to information, networking opportunities, and cooperation with regional and national organizations. Mountain communities often lack sufficient organizational capacity,

meaning that relatively modest institutional support can have significant effects. In addition, partnerships between local authorities and civil society organizations can improve the implementation of social, cultural, environmental, and economic projects.

Youth retention and engagement should also become an explicit component of the strategy. Young residents possess significant potential for entrepreneurship, digital innovation, project development, and new forms of civic participation. However, weak labor markets and limited educational opportunities encourage migration. Therefore, strengthening social capital requires creating conditions that make participation and professional development possible within the community. Support for youth entrepreneurship, digital employment, creative industries, local tourism, educational initiatives, and start-up projects can simultaneously reduce migration pressure and expand the pool of community actors.

The strategic importance of employment and economic well-being should not be underestimated. The research confirms that residents experiencing persistent economic insecurity have fewer resources for civic participation. Consequently, policies aimed at strengthening social capital should be integrated with measures supporting local employment, entrepreneurship, small businesses, investment attraction, and diversification of the local economy. Economic development and social capital should be viewed as mutually reinforcing processes rather than separate policy areas.

Tourism represents a particularly relevant field for such integration in mountain communities. Local landscapes, cultural heritage, traditions, crafts, gastronomy, and natural resources can provide a basis for tourism-related cooperation. Community-based tourism initiatives can unite local entrepreneurs, households, cultural institutions, environmental organizations, and local authorities around common economic interests. At the same time, tourism development can strengthen local identity and encourage residents to perceive cultural and environmental resources as collective assets.

Environmental initiatives can provide another practical platform for social capital development. Joint activities related to waste management, forest protection, water resources, landscape preservation, ecological tourism, and public-space improvement require collective responsibility and produce visible outcomes. Such initiatives can be particularly effective

in communities where trust is initially low because cooperation around concrete environmental problems can provide an accessible entry point for broader civic engagement.

The preservation and modernization of local social infrastructure should likewise be incorporated into strategic planning. Schools, cultural centers, libraries, public spaces, sports facilities, and other community institutions provide physical environments for social interaction. Their role extends beyond service provision because they facilitate meetings, informal communication, cultural exchange, and the development of local networks. Investment in such infrastructure should therefore be considered part of social capital policy.

The multi-ethnic character of mountain communities requires a specific emphasis on inclusive participation and intercultural cooperation. Strategic interventions should ensure that representatives of different ethnic and cultural groups have equal opportunities to participate in decision-making and community initiatives. Common territorial projects can provide a practical basis for cooperation by focusing on shared interests rather than differences. Cultural festivals, educational programs, local heritage projects, youth activities, and community development initiatives can strengthen bridging ties between groups and contribute to a common sense of territorial belonging.

At the same time, local identity should not be interpreted as cultural uniformity. A resilient multi-ethnic community can combine strong attachment to local traditions with openness to cultural diversity. The strategic objective is therefore to develop an inclusive territorial identity in which cultural differences are perceived as an asset rather than an obstacle to cooperation. This approach is particularly important for mountain communities where cultural heritage and local traditions can become important economic and social development resources.

An additional strategic dimension concerns external networks and partnerships. Mountain communities should strengthen connections with regional authorities, universities, research institutions, non-governmental organizations, businesses, neighboring communities, and international partners. Such relationships can provide access to knowledge, funding, technology, training, investment, and successful development practices.

External cooperation is especially important for small communities whose internal resources are limited.

Academic institutions can play a more active role in this process. Their contribution should include regular measurement of social capital, development of assessment indicators, methodological support for local strategies, training of local officials, and evaluation of community projects. Cooperation between researchers and territorial communities can also facilitate the transfer of international experience and adaptation of successful practices to local conditions.

A critical condition for the strategic development of social capital is the prevention of destructive or exclusive networks. Informal relationships based on nepotism, corruption, favoritism, or closed access to resources may generate strong internal trust within particular groups while undermining trust at the community level. Strategic governance should therefore strengthen transparency, equal access, accountability, conflict-of-interest prevention, and public monitoring. The aim is to ensure that social networks contribute to inclusive rather than extractive forms of collective action.

The implementation of the proposed strategic approach should be phased. The first stage should involve a diagnostic assessment of the existing level of social capital, including trust, participation, networks, civic organizations, communication practices, and institutional responsiveness. The second stage should focus on priority setting and strategic goal formulation based on identified needs and available resources. The third stage should involve implementation of pilot projects designed to produce visible short-term results and build confidence in collective action. The fourth stage should provide for monitoring and evaluation, including regular assessment of indicators and adjustment of strategic measures.

Such phased implementation is consistent with project management principles. Each intervention should have clearly defined objectives, responsible actors, resources, implementation periods, expected results, and indicators. This makes strategic processes more transparent and allows communities to identify which measures generate the greatest social and economic effects. Small successful projects can subsequently be scaled up and integrated into broader development programs.

The strategic model should therefore combine several interconnected components: diagnosis, strategic principles, goals and indicators,

participation mechanisms, implementation technologies, conversion mechanisms, and monitoring. Their interaction can be represented as a continuous development cycle. Existing social resources are first assessed; identified weaknesses and opportunities determine strategic priorities; selected instruments activate cooperation; successful cooperation generates tangible territorial outcomes; and these outcomes reinforce trust and stimulate further participation.

The expected effect of such a model is cumulative. Increased transparency can strengthen institutional trust; greater trust can encourage participation; participation can expand social networks; stronger networks can facilitate joint projects; successful projects can improve economic and social conditions; and visible improvements can further reinforce trust. Thus, social capital development should be viewed as a self-reinforcing process in which institutional and community-level interventions interact.

The proposed approach also supports a broader understanding of territorial resilience. Mountain communities face multiple risks, including demographic decline, migration, limited accessibility, economic vulnerability, environmental pressures, and institutional capacity constraints. Stronger social capital can improve their ability to mobilize local resources, coordinate responses, exchange information, support vulnerable residents, and maintain collective action during periods of uncertainty.

The findings therefore suggest that the strategic development of social capital should become an integral element of local development strategies rather than a separate social policy measure. Local authorities should establish measurable social capital objectives, allocate resources for participatory and community initiatives, support civil society organizations, strengthen communication, and create mechanisms for regular monitoring. At the same time, residents, businesses, educational institutions, and civil society organizations should be treated as active co-producers of territorial development rather than passive beneficiaries of public policy.

The strategic approach proposed in this study ultimately shifts the focus from the spontaneous existence of social relationships toward their conscious strengthening and productive use. The objective is not to regulate social relations artificially but to create institutional and socio-economic conditions in which trust, reciprocity, participation, and cooperation can develop naturally and contribute to common territorial goals. For mountain

territorial communities of a multi-ethnic region, such an approach offers a basis for combining social cohesion with economic modernization, cultural diversity with inclusive territorial identity, and local initiative with effective governance.

Consequently, social capital should be incorporated into the strategic architecture of mountain territorial development. Its accumulation requires long-term commitment, but its effects extend beyond the social sphere. Stronger social capital can increase institutional legitimacy, improve the quality of local governance, facilitate collective investment, support entrepreneurship and tourism, strengthen environmental responsibility, and enhance the resilience of communities to demographic and economic shocks. The strategic challenge is therefore to establish an institutional environment in which these effects can emerge and reinforce one another over time.

CONCLUSIONS

The study demonstrates that social capital is an important strategic resource for the sustainable development of mountain territorial communities in a multi-ethnic region. The empirical analysis of mountain settlements in the Zakarpattia region confirms that the capacity of communities to respond to socio-economic challenges depends not only on their financial, natural, and infrastructural resources but also on the quality of interpersonal and institutional relationships, the level of trust, civic participation, reciprocity, and the ability of residents to cooperate around common interests.

The findings indicate that the development of social capital in mountain territorial communities remains constrained by a combination of institutional and socio-economic factors. The most significant barriers include low trust in local authorities, insufficient transparency of decision-making, weak civic participation, limited development of public associations, economic insecurity, labor migration, and insufficient communication between authorities and residents. These factors reinforce one another and may create a self-perpetuating cycle in which low trust reduces participation, weak participation limits collective action, and the absence of visible collective results further undermines trust.

At the same time, the study identifies significant opportunities for strengthening social capital. Local identity, interpersonal reciprocity,

volunteerism, community initiatives, social infrastructure, environmental cooperation, external networks, and participatory mechanisms can provide a basis for expanding horizontal interactions and collective responsibility. Particularly important are mechanisms that produce visible and tangible results. Successful community projects, transparent decision-making, participatory budgeting, and responsive local governance can demonstrate the practical value of cooperation and gradually strengthen institutional and interpersonal trust.

The research substantiates the need to move from a predominantly spontaneous model of social capital formation toward a strategic approach to its development. Such an approach should be based on evidence-based planning, socio-economic realism, anticipatory development, strategic alternatives, expert evaluation, inclusive participation, and coordination between different levels of governance. Social capital objectives should be incorporated into local development strategies and supported by measurable indicators that allow communities to monitor changes in trust, participation, communication, civic activity, and institutional responsiveness.

A particularly important conclusion concerns the relationship between social and economic development. The study confirms that social capital cannot be considered independently of material well-being. Poverty, unstable employment, and migration reduce residents' capacity and motivation to participate in community life, while successful collective initiatives can contribute to employment, entrepreneurship, tourism, investment, and improved public services. Therefore, economic modernization and social capital development should be treated as mutually reinforcing components of territorial development policy.

For multi-ethnic mountain communities, the strategic approach should additionally emphasize inclusive participation and the development of shared territorial identity. Cultural diversity can become a source of social and economic potential when different groups have equal opportunities to participate in community life and cooperate around common territorial interests. Supporting cultural, educational, environmental, and community-based initiatives can strengthen bridging social capital and contribute to greater territorial cohesion.

The practical significance of the study lies in the possibility of applying the proposed strategic principles and mechanisms by local authorities, civil

society organizations, businesses, educational institutions, and community leaders. Priority should be given to participatory budgeting, community-driven projects, transparent communication, support for civic associations, youth engagement, local entrepreneurship, environmental initiatives, and systematic monitoring of social capital indicators. The implementation of these measures should be phased, beginning with diagnostics and priority setting and continuing through pilot projects, evaluation, and adaptation.

The scientific contribution of the research consists in integrating the social capital perspective with strategic territorial development and adapting it to the specific conditions of mountainous and multi-ethnic communities. The proposed approach expands the understanding of social capital from an intangible characteristic of social relations to a dynamic territorial resource that can be strengthened through purposeful institutional, economic, and participatory interventions.

Further research should focus on developing quantitative indicators for measuring social capital at the level of individual territorial communities, assessing differences between communities, and evaluating the long-term effects of specific participatory and institutional interventions. Particular attention should also be given to the influence of migration, demographic change, digitalization, and cross-border cooperation on the transformation of social networks in mountain regions.

Overall, sustainable development of mountain territorial communities requires an integrated approach in which economic modernization is accompanied by systematic strengthening of trust, cooperation, civic participation, and institutional capacity. Social capital should therefore be positioned as a core component of territorial development strategies and as one of the key resources for enhancing the resilience, inclusiveness, and long-term competitiveness of multi-ethnic mountain communities.

References:

1. Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94*, S95–S120. DOI: https://doi.org/10.1086/228943

2. Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology, 91*(3), 481–510. DOI: https://doi.org/10.1086/228311

3. Portes, A. (2000). Social capital: Its origins and applications in modern sociology. In E. L. Lesser (Ed.), *Knowledge and social capital: Foundations and applications* (pp. 43–67). Butterworth-Heinemann.

4. Skocpol, T. (2008). Bringing the state back in: Retrospect and prospect. *Scandinavian Political Studies, 31*(2), 109–124. DOI: https://doi.org/10.1111/j.1467-9477.2008.00204.x

5. Skocpol, T., Ganz, M., & Munson, Z. (2000). A nation of organizers: The institutional origins of civic voluntarism in the United States. *American Political Science Review, 94*(3), 527–546. DOI: https://doi.org/10.2307/2585829

6. Woolcock, M. (1998). Social capital and economic development: Toward a theoretical synthesis and policy framework. *Theory and Society, 27*(2), 151–208. DOI: https://doi.org/10.1023/A:1006884930135

7. Hanifan, L. J. (1916). The rural school community center. *The Annals of the American Academy of Political and Social Science, 67*(1), 130–138. DOI: https://doi.org/10.1177/000271621606700118

8. Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). Greenwood Press.

9. Polanyi, K. (1957). The economy as instituted process. In K. Polanyi, C. M. Arensberg, & H. W. Pearson (Eds.), *Trade and market in the early empires: Economies in history and theory* (pp. 243–270). Free Press.

PROBLEMS AND DIRECTIONS FOR IMPROVING THE EFFICIENCY OF BUDGET FINANCING FOR UKRAINE'S POST-WAR RECOVERY

Nataliia Sokrovolska[1]
Alina Korbutiak[2]

DOI: https://doi.org/10.30525/978-9934-26-715-4-15

Abstract. The subject of the study is the theoretical, methodological and applied foundations of budget financing for the post-war recovery of Ukraine's national economy and social infrastructure, including the formation, allocation and administration of state budget resources and international financial assistance. The empirical analysis covers 2022–2025 and is supplemented by updated 2026 assessments and a medium-term outlook for 2026–2029. The purpose of the research is to identify the main constraints on recovery financing and to substantiate directions for improving the efficiency, transparency and results-based orientation of public expenditure under wartime and post-war conditions. The methodological framework combines analysis and synthesis, induction and deduction, comparison, statistical and structural analysis, systematisation and generalisation. Budget revenue, expenditure, deficit and external-financing indicators were compared over the research period; institutional arrangements, special funds and international support mechanisms were assessed in terms of their ability to transform available resources into measurable recovery outcomes. The study shows that the state budget performs a dual function: it finances defence, social protection and the continuity of essential public services, while simultaneously coordinating emergency repair, reconstruction and longer-term modernisation. The fiscal capacity of the state remains constrained by the predominance of security and defence expenditure, a persistent budget deficit, limited domestic revenue,

[1] Candidate of Economic Sciences, Associate Professor,
Yuriy Fedkovych Chernivtsi National University, Ukraine
ORCID: https://orcid.org/0000-0001-8778-7317
[2] Candidate of Economic Sciences, Associate Professor,
Yuriy Fedkovych Chernivtsi National University, Ukraine
ORCID: https://orcid.org/0000-0002-9330-7145

© Nataliia Sokrovolska, Alina Korbutiak

growing debt risks and strong dependence on external support. At the same time, grants, concessional loans, the Ukraine Facility, ERA Loans, World Bank programmes and other partner instruments have become integral components of Ukraine's budgetary architecture. The analysis identifies a substantial and widening gap between recovery needs and available resources, uneven territorial needs, fragmented programmes, limited project-preparation capacity in some public authorities and communities, and risks related to prioritisation, procurement, monitoring and accountability. The proposed approach is based on medium-term budget planning, a unified public investment management system, transparent criteria for selecting projects, mandatory digital disclosure through DREAM, stronger internal and external audit, coordination of state and local budgets with donor resources, and an appropriate balance between grants, loans and private capital. Social and humanitarian programmes should rely primarily on grants and compensation mechanisms, whereas concessional lending and blended finance should support projects capable of generating long-term economic value. The practical significance of the results lies in their applicability to budget programme design, selection of recovery projects, intergovernmental fiscal support and donor coordination. The originality of the study lies in the development of an integrated approach to recovery financing that combines financial, institutional, territorial and accountability dimensions; differentiates financing instruments according to the socio-economic nature of recovery projects; and links budget allocation with unified public investment management, digital monitoring through DREAM and measurable recovery outcomes. It is concluded that the effectiveness of Ukraine's reconstruction depends not only on the volume of mobilised funds but also on transparent prioritisation, institutional capacity, public accountability and measurable economic and social effects.

INTRODUCTION

Amid the full-scale war and extensive destruction of production capacity, housing stock, energy, transport, educational, healthcare, and social infrastructure, the study of the role of the state budget in financing the recovery of Ukraine's national economy and social infrastructure has become particularly relevant. Under current conditions, the state budget performs not only its traditional function of centralising and redistributing

financial resources, but also serves as a key instrument for ensuring national defence capability, social stability, supporting critically important sectors of the economy, and creating the financial foundation for post-war reconstruction.

The relevance of the topic is determined by the fact that in 2022–2026 Ukraine's budgetary system has been operating under unprecedented pressure. A significant share of budgetary resources has been directed to the security and defence sector, social protection of the population, support for internally displaced persons, healthcare, education, and ensuring the functioning of public authorities. At the same time, the state has financed priority measures aimed at restoring infrastructure, supporting economic activity, strengthening energy resilience, and maintaining essential services for territorial communities. In 2024, revenues of the State Budget of Ukraine amounted to UAH 3.12 trillion, expenditures to UAH 4.49 trillion, while grants from international partners included in budget revenues reached UAH 473.9 billion [18].

The issue of budget financing for recovery is complex, as it combines the challenges of fiscal sustainability, budgetary security, efficient allocation of expenditures, transparency in the use of funds, attraction of international financial assistance, and coordination of current wartime needs with long-term modernisation objectives. According to estimates by the World Bank, the Government of Ukraine, the European Commission, and the United Nations, recovery and reconstruction needs under RDNA4 amounted to USD 524 billion over the next decade [38]. The state budget cannot be the sole source of financing; however, it is largely through the budget that the resources required to support the economy and social infrastructure are accumulated, allocated, and administered.

The theoretical and practical aspects of the functioning of the state budget, budget policy, public finance, and financial support for economic development have been studied by I. O. Lunina, I. Ya. Chuhunov, V. D. Makohon, V. P. Kudriashov, I. Z. Storonianska, and other scholars. I. O. Lunina examines public finance in the context of macroeconomic growth policy and the long-term sustainability of public finances [14]. I. Ya. Chuhunov and V. D. Makohon investigate fiscal and tax policy under conditions of uncertainty [5]. V. P. Kudriashov substantiates the components of the recovery plan, sources of financial support, and mechanisms for

coordinating resources [12; 13]. Approaches to assessing the consequences of the war and the financial needs of recovery are highlighted in the works of K. V. Klymenko and M. V. Savostianenko [11]. Comprehensive directions for post-war recovery are systematised in the monograph edited by V. Ye. Khaustova [10], the role of international financial assistance is examined by V. A. Panchenko [28], while institutional barriers to public investment management are analysed by I. Z. Storonianska, Kh. O. Patytska, and O. O. Ivashko [30].

Despite the considerable number of existing studies, the efficiency of budget financing for recovery in 2022–2025 requires more in-depth analysis. This is due to the dynamic nature of budget indicators, Ukraine's high dependence on international support, changes in the expenditure structure, and the need to assess the capacity of the state budget to simultaneously meet current wartime needs and create the financial foundation for post-war development.

The purpose of the study is to identify key problems and substantiate directions for improving the efficiency of budget financing for Ukraine's post-war recovery, based on an analysis of the role of the state budget, its indicators in 2022–2025, and international financial assistance in supporting the recovery of the national economy and social infrastructure. The empirical analysis covers 2022–2025 and is supplemented by updated 2026 assessments and a medium-term outlook for 2026–2029.

To achieve this purpose, the following objectives have been defined:

– to reveal the economic essence and theoretical foundations of budget financing for Ukraine's post-war recovery;

– to characterise the directions and instruments for financing the recovery of the national economy and social infrastructure;

– to assess budget expenditures and international financial assistance in 2022–2025;

– to systematise the main financial, institutional, territorial, and control-related problems;

– to substantiate directions for improving the efficiency of the use of budget funds and international assistance.

The object of the study is the process of budget financing for the post-war recovery of Ukraine's national economy and social infrastructure.

The subject of the study comprises the theoretical, methodological, and applied aspects of the formation, allocation, and use of state budget funds and international financial assistance for financing the recovery of Ukraine's national economy and social infrastructure in 2022–2025.

The methodological framework of the study is based on the provisions of economic theory, public finance theory, budget policy, and financial support for socio-economic development. The methods used include analysis and synthesis, induction and deduction, comparison, statistical and structural analysis, as well as graphical and tabular methods and generalisation. The core statistical analysis covers 2022–2025, while 2026 institutional, regulatory and analytical updates are used to assess the medium-term financing outlook for 2026–2029.

The information base of the study consists of the provisions of the Budget Code of Ukraine, the Laws of Ukraine on the State Budget for 2022–2025, the Law of Ukraine "On Public-Private Partnership", relevant resolutions and orders of the Cabinet of Ministers of Ukraine, and official materials of the Ministry of Finance of Ukraine, the National Bank of Ukraine, the IMF, the European Commission, the United Nations, the OECD, and the World Bank, including the RDNA4 and RDNA5 assessments [3; 4; 9; 18; 22; 27; 32–39].

1. Principles of Budget Financing

Budget financing for the recovery of the national economy and social infrastructure is one of the key forms of implementing state financial policy amid wartime and post-war challenges. Its essence lies in the targeted allocation of funds from the state budget, local budgets, interbudgetary transfers, international financial assistance, and other public resources to restore economic capacity, ensure the provision of essential public services, reconstruct destroyed facilities, and create the preconditions for the country's long-term development.

In a broad sense, budget financing for recovery should be viewed as a system of financial relations arising among the state, local self-government bodies, budget fund administrators, business entities, international partners, and the population in the process of forming, allocating, and using budgetary resources to overcome the consequences of war. This approach makes

it possible to consider the budget not merely as a source of expenditure, but as an institutional mechanism for coordinating recovery policy.

The regulatory framework for budget financing is established by the Budget Code of Ukraine, according to which a budget is a plan for the formation and use of financial resources intended to ensure the performance of tasks and functions carried out by state authorities and local self-government bodies during a budget period. Through budget appropriations, budget programmes, interbudgetary transfers, the reserve fund, and public debt mechanisms, the state finances priority areas of public policy, including measures aimed at restoring the economy and social infrastructure [32].

A distinctive feature of budget financing for recovery is that it combines short-term and long-term objectives. Short-term objectives include addressing the consequences of destruction, ensuring the continuity of educational, healthcare, and social services, supporting internally displaced persons, and carrying out emergency restoration of critical infrastructure, housing and communal services, and energy facilities. Long-term objectives encompass modernisation of the economy, restoration of production capacity, development of human capital, improvement of energy efficiency, digitalisation of public services, and the creation of resilient social infrastructure.

In the academic literature, financial support for Ukraine's economic recovery is regarded as a multi-component process requiring a combination of budgetary resources, international financial support, private investment, guarantee instruments, and effective public administration. V. P. Kudriashov emphasises that recovery financing should be based not only on the volume of resources mobilised, but also on the efficiency of their allocation, the coherence of managerial decisions, the transparency of procedures, and the availability of mechanisms for monitoring the results of fund utilisation. Therefore, budget financing for recovery cannot be reduced solely to an increase in expenditures; it also involves setting priorities, assessing needs, selecting projects, and monitoring performance [12].

An important benchmark for determining the scale of Ukraine's financial needs is provided by assessments conducted by international institutions. According to the World Bank, the Government of Ukraine, the European Commission, and the United Nations, under the Fourth Rapid Damage and Needs Assessment (RDNA4), the total cost of Ukraine's

recovery and reconstruction as of 31 December 2024 was estimated at USD 524 billion over the next decade. The scale of these needs demonstrates that the state budget is a fundamental, but not the sole, source of financing for reconstruction. Its role is to combine domestic budgetary resources with external assistance, loans, grants, resources from international funds, and potential private investment [38].

The main areas of budget financing for the recovery of the national economy include support for economic activity, infrastructure development, ensuring energy resilience, restoration of transport and logistics systems, support for entrepreneurship, restoration of production capacities, and stimulation of employment. In the social sphere, priority areas include financing education, healthcare, social protection, housing provision, restoration of social infrastructure facilities, support for territorial communities, and ensuring access to essential services for the population.

International financial assistance is of particular importance in the recovery process. It may be provided in the form of grants, loans, budget support, targeted project financing, technical assistance, and guarantees. In particular, the Ukraine Facility provides for European Union financial support to Ukraine for 2024–2027 in a total amount of EUR 50 billion, a significant share of which is directed toward direct support of the state budget, investment stimulation, and technical assistance. This demonstrates that under wartime and recovery conditions, international assistance is effectively integrated into the state's budgetary mechanism, strengthening its financial capacity [6; 7; 31].

To reveal the practical content of budget financing for the recovery of the national economy and social infrastructure, it is appropriate to systematise the main instruments through which the state accumulates, allocates, and directs financial resources toward the relevant objectives.

These instruments have different economic purposes; however, taken together, they form the financial mechanism of recovery. Budget expenditures and budget programmes provide direct financing for state priorities. Interbudgetary transfers make it possible to support the financial capacity of territorial communities that directly face the consequences of destruction and require resources to restore essential services. The reserve fund of the state budget is used for prompt response to unforeseen situations,

while capital expenditures and public investments are directed toward long-term recovery and modernisation.

Given the limited own revenues of the state budget, public borrowing and international financial assistance are of particular importance. They make it possible to bridge the gap between high expenditure needs and the insufficient volume of domestic budgetary resources. However, the use of such instruments requires a prudent debt policy, transparent planning, and proper oversight, since excessive dependence on external financing may create risks to budget sustainability in the medium and long term.

An important feature of the current stage is the gradual transition from financing immediate response measures to financing recovery based on the principles of prioritisation and effectiveness. This means that budgetary resources should be directed primarily toward areas that generate the greatest social impact: restoration of critical infrastructure, support for the functioning of territorial communities, creation of conditions for the return of the population, preservation of human capital, restoration of economic activity, and strengthening the state's resilience to future risks.

Social infrastructure is of particular importance in the process of budget financing for recovery, as it directly affects the quality of life of the population, access to essential services, and social cohesion. The destruction of schools, hospitals, social protection institutions, housing and communal facilities, and public infrastructure not only causes material losses but also worsens living conditions and opportunities for education, healthcare, and employment. Therefore, financing social infrastructure is not a secondary area of budget policy, but a necessary prerequisite for the stabilisation and recovery of the country.

Thus, budget financing for the recovery of the national economy and social infrastructure is a complex, multi-level process encompassing direct budget expenditures, programme-based financing, capital investment, interbudgetary transfers, reserve resources, public borrowing, international financial assistance, and instruments of partnership with the private sector. Its effectiveness depends on realistic planning, prioritisation of expenditures, transparency of procedures, effective oversight, and coordinated actions by the state, local self-government bodies, and international partners. In the context of Ukraine's post-war recovery, the state budget serves not only as a source of financing but also as the principal financial coordinator of the reconstruction of the economy and social infrastructure.

Table 1

Main Instruments of Budget Financing for the Recovery of the National Economy and Social Infrastructure

Instrument	Economic Content	Areas of Application in the Recovery Process
1	2	3
Budget expenditures	Direct financing of the tasks and functions of the state from the State Budget.	Financing of education, healthcare, social protection, housing and communal services, infrastructure facilities, and support for economic activity.
Budget programmes	Targeted allocation of budget funds for the implementation of specific public policy objectives.	Implementation of programmes for the restoration of damaged facilities, business support, compensation payments, social benefits, and infrastructure modernisation.
State capital expenditures	Budget expenditures aimed at the creation, reconstruction, modernisation, or acquisiti on of fixed assets.	Reconstruction of roads, bridges, educational institutions, hospitals, energy facilities, water supply systems, and housing stock.
Subventions to local budgets	Interbudgetary transfers provided from the State Budget to local budgets for specific purposes.	Financing the restoration of community social infrastructure, educational and healthcare institutions, shelters, and municipal infrastructure.
Grants to local budgets	Funds transferred from the State Budget to balance the financial capacity of local budgets.	Support for communities that have lost part of their revenues due to the war and ensuring the provision of essential services to the population.
Reserve Fund of the State Budget	A financial resource intended to cover unforeseen and urgent expenditures.	Addressing the consequences of destruction, emergency restoration of infrastructure, and response to emergencies.
Special Fund of the Budget	A separate component of the budget whose funds have specified sources of revenue and designated purposes.	Financing specific areas of recovery, social protection, road infrastructure, and energy resilience.
Public borrowing	Raising funds on domestic or external markets to cover the budget deficit and finance public needs.	Covering shortages in the budget's own revenues, financing social and economic expenditures, and supporting macro-financial stability.

Instrument	Economic Content	Areas of Application in the Recovery Process
International financial assistance	Grants, loans, and other forms of financial support provided by international partners.	State budget support, financing of social payments, infrastructure restoration, and implementation of reconstruction and reform programmes.
State guarantees	Commitments undertaken by the state to ensure the fulfilment of debt obligations of entities raising funds for designated purposes.	Mobilising financing for infrastructure, energy, transport, and socially significant projects.
Public investment	Allocation of budgetary resources to projects with long-term economic or social effects.	Modernisation of the economy, development of critical infrastructure, and creation of conditions for employment and economic growth.
Public-private partnership [33]	Cooperation between the public and private sectors in implementing projects of public importance.	Restoration of transport, energy, housing, healthcare, and educational infrastructure with the involvement of private capital.

Source: compiled by the authors based on the research materials

2. Expenditures and International Assistance

Financing the recovery of Ukraine's national economy and social infrastructure in 2022–2025 took place under an exceptionally complex combination of budgetary priorities. On the one hand, the state budget was primarily focused on ensuring defence capability, security, social support for the population, and the stable functioning of the state. On the other hand, even during the war, an objective need emerged to finance the urgent restoration of destroyed facilities and to support critical infrastructure, energy resilience, housing stock, educational institutions, healthcare, social protection, and transport infrastructure.

In this context, the state budget performed a dual function: first, it financed current expenditures without which the functioning of the state under wartime conditions would be impossible; second, it created the financial foundation for recovery processes. It was through the state budget that domestic revenues, grants from international partners, concessional

loans, funds from international financial institutions, and other resources were accumulated and directed toward supporting the economy, the social sphere, and infrastructure.

A key feature of budget expenditures in 2022–2025 was the predominance of defence and security needs. This was an objective consequence of the full-scale war, as financing the security and defence sector became a key condition for preserving statehood. At the same time, significant amounts of expenditure continued to be directed toward social protection, education, healthcare, support for regions, and capital expenditures related to recovery. According to the Ministry of Finance of Ukraine, in 2024 total expenditures of the State Budget of Ukraine amounted to UAH 4.49 trillion, of which UAH 2.97 trillion was allocated to the security and defence sector. Social expenditures in 2024 were financed in the amount of UAH 579.2 billion, while capital expenditures related to addressing the consequences of armed aggression, construction, and infrastructure restoration increased to UAH 306 billion [18].

The data presented in Table 2 indicate that budget financing for recovery is not limited solely to direct capital expenditures on the reconstruction of destroyed facilities. It has a much broader scope, as it also encompasses financing social stability, human capital, the functioning of territorial communities, support for economic activity, and the mobilisation of international resources. Therefore, the role of the state budget in the recovery process should be assessed comprehensively, taking into account not only expenditures on construction or repairs, but also those budget programmes that ensure the viability of the economy and the social sphere under wartime conditions.

Social expenditures occupy an important place in recovery financing. Under wartime conditions, they perform not only the traditional function of supporting the population but also a social stabilisation function. The increase in the number of internally displaced persons, destruction of housing, job losses, declining household incomes, and growing social vulnerability have created the need to maintain substantial budget expenditures on social protection. In 2024, social expenditures were financed in a timely manner and in full, including through grant assistance provided by international partners.

Table 2

Main Areas of Budget Financing for the Recovery of Ukraine's Economy and Social Infrastructure in 2022–2025

Area of Financing	Economic Content	Significance for Recovery
Security and defence expenditures	Financing of the Armed Forces of Ukraine, the security sector, defence procurement, and monetary allowances for military personnel.	Provides the fundamental prerequisite for recovery: preserving statehood, territorial integrity, and citizens' security.
Social protection and social security	Pension payments, social benefits, support for vulnerable population groups and internally displaced persons.	Support social stability, reduce poverty risks, and ensure the basic needs of the population.
Education	Financing of educational institutions, remuneration of teaching staff, educational subventions, and the creation of a safe educational environment.	Contributes to preserving human capital and ensuring continuity of the educational process.
Healthcare	Financing of medical services, hospitals, the Medical Guarantees Programme, and the restoration of damaged healthcare facilities.	Ensures public access to healthcare and supports social resilience.
Economic activity	Support for selected sectors of the economy, infrastructure projects, entrepreneurship, transport, and energy.	Creates conditions for the recovery of production, employment, and economic activity.
Capital expenditures for recovery	Expenditures on construction, reconstruction, repair, elimination of the consequences of destruction, and infrastructure restoration.	Directly aimed at the physical restoration of economic and social infrastructure facilities.
Interbudgetary transfers	Transfer of funds from the State Budget to local budgets in the form of subventions and grants.	Support the financial capacity of territorial communities, particularly those affected by the war.
International financial assistance	Grants, concessional loans, budget support, and investment instruments provided by international partners.	Compensates for the shortage of domestic resources and ensures financing of social and recovery-related needs.

Source: compiled by the authors based on the research materials

A separate area is the financing of education and healthcare as key components of social infrastructure. Expenditures in these areas are of long-term importance because they ensure the preservation of human capital, access of the population to essential services, and support for social cohesion. During the war, educational and healthcare infrastructure suffered significant destruction; therefore, budget financing of these sectors has both a current and a recovery-oriented nature. It includes remuneration of public-sector employees, financing of services, construction and equipping of shelters, repair of damaged premises, procurement of equipment, and support for the functioning of institutions in territorial communities.

The scale of recovery needs significantly exceeds the capacity of the state budget. According to estimates by the World Bank, the Government of Ukraine, the European Commission, and the United Nations, the total cost of Ukraine's recovery and reconstruction as of 31 December 2024 was estimated at USD 524 billion over the next decade. In 2025, the Government of Ukraine, with donor support, allocated USD 7.37 billion to priority recovery areas, while the financing gap for recovery and reconstruction needs in 2025 was estimated at USD 9.96 billion. This confirms that the State Budget of Ukraine cannot independently provide full financing for recovery and therefore requires a systematic combination of domestic resources and international support [38].

The presented data show that in 2022–2025 Ukraine attracted approximately USD 167.6 billion in external budget financing to the state budget. The largest amount of support during the analysed period was received in 2025, totaling USD 52.4 billion. At the same time, the structure of financing in 2025 differed significantly from that of previous years: more than 70% of the support was provided under the ERA Loans mechanism, which envisages the use of proceeds generated from frozen Russian assets to service the corresponding obligations [20; 21].

In 2022, the share of grants was the highest, at 45.8%, which played an important role in reducing the debt burden during the first year of the full-scale war. In 2023–2024, the grant component remained significant but gradually declined to 27.4% and 27.8%, respectively. In 2025, the share of grants fell sharply to 1.3%, which is explained by the predominance of the ERA Loans mechanism and credit-based budget support. Therefore, in the long term, the issues of debt sustainability and the efficient use of external resources are becoming increasingly important [19; 20].

Table 3

External Budget Financing of Ukraine in 2022–2025, USD billion

Year	Concessional loans and other credit financing	Grants	ERA Loans / financing backed by extraordinary revenues from immobilised Russian sovereign assets [20]	Total	Share of grants in the total amount, % [19]
2022	16.862	14.224	-	31.086	45.8
2023	30.855	11.621	-	42.476	27.4
2024	29.090	11.572	1.000	41.662	27.8
2025	13.782	0.670	37.930	52.382	1.3
Total	90.589	38.087	38.930	167.606	22.7

Source: compiled by the authors based on the Ministry of Finance of Ukraine [21]

International financial assistance not only compensated for the shortfall in domestic revenues but also enabled the state to finance social and humanitarian expenditures in a timely manner. The Ministry of Finance of Ukraine explicitly notes that international support in 2025 made it possible to fully finance key social and humanitarian expenditures, including pension payments, salaries of employees in the education and healthcare sectors, social protection of the population, and humanitarian programmes. Thus, external budget support effectively performed the function of a financial stabiliser for social infrastructure.

As shown in Table 4, the European Union was the leading source of external budget financing in 2022–2025, with the total volume of support amounting to approximately USD 56.9 billion. The United States, the IMF, Japan, the World Bank, and Canada also played a significant role. The ERA Loans mechanism should be highlighted separately, since in 2025 it became the largest source of budget support and effectively changed the structure of external financing [20; 9].

The Ukraine Facility programme for 2024–2027 is of particular importance for combining budget support with recovery objectives. The total volume of the programme amounts to EUR 50 billion, of which EUR 38.27 billion is envisaged as direct support to the state budget, while an investment component is also provided to mobilise public and private investment. In 2025, Ukraine received USD 12.1 billion under the Ukraine

Facility, of which approximately USD 669 million was provided in the form of grants. This indicates that international assistance is gradually acquiring not only a stabilisation function but also an investment- and recovery-oriented character [6; 7; 31].

Table 4

Main International Partners and Financing Mechanisms of External Budget Financing for Ukraine in 2022–2025

Partner / Financing Mechanism	Amount in 2022–2025, USD billion	Brief Description of Financing
European Union	56.935	Concessional loan and grant financing, including macro-financial assistance and the Ukraine Facility [6; 7; 31].
ERA Loans [20]	38.930	G7 mechanism using proceeds generated from frozen Russian assets [20].
United States	30.240	Predominantly grant support provided through World Bank mechanisms and directed toward social and humanitarian needs.
IMF [9]	13.357	Loan financing under the Extended Fund Facility programme and related mechanisms.
Japan	8.980	Concessional loans and grants, including financing provided through World Bank projects.
World Bank	6.020	Loan and grant financing for programmes in healthcare, education, public finance, and private-sector support.
Canada	5.405	Concessional loan financing for the state budget.
United Kingdom	3.034	Guarantees and related budget support.
Germany	1.687	Predominantly grant support and targeted assistance.
Other partners	3.018	Norway, Council of Europe Development Bank (CEB), European Investment Bank (EIB), France, Italy, the Netherlands, Spain, other countries and institutions.

Source: compiled by the authors based on the Ministry of Finance of Ukraine [21]. Totals may differ slightly due to rounding

Certain programmes of international partners were directly linked to social infrastructure. Thus, in 2022, under the PEACE in Ukraine project implemented through World Bank mechanisms, Ukraine received UAH 495.2 billion in external financing to cover priority expenditures,

including pension payments, assistance to internally displaced persons, housing subsidies, childbirth benefits, as well as salaries of healthcare workers, school teachers, and academic staff of higher education institutions. This confirms that international support was directed not only toward covering the overall budget deficit but also toward ensuring the functioning of key social services [15].

At the same time, dependence on international assistance creates certain risks. The main risks include the dependence of budget stability on decisions made by external partners, the need to comply with financing conditions, the risk of delays in the receipt of funds, an increase in the debt burden in the case of loan-based support, as well as the need to ensure a high level of transparency and accountability in the use of resources. Therefore, an important objective of state budget policy is to gradually strengthen the domestic revenue base of the budget, improve expenditure management, and ensure the effectiveness of every budget programme related to recovery.

To provide a more in-depth assessment of the role of international assistance in financing the recovery of the economy and social infrastructure, it is appropriate to distinguish three interrelated components: state budget support, humanitarian financing, and targeted recovery programmes.

Budget support was provided either directly to the state budget or through the mechanisms of the World Bank, the European Union, the IMF, and other partners and was used to cover priority non-military expenditures. Humanitarian assistance was largely channelled through UN agencies, international organisations, and humanitarian funds. Targeted recovery programmes were related to housing, energy, transport, healthcare, education, social protection, business support, and public investment management [9].

In 2022–2025, international support performed not only the function of covering the state budget deficit but also the function of stabilizing the social and humanitarian sectors. Under conditions in which domestic state revenues were largely directed to the security and defence sector, funds from international partners made it possible to finance pension payments, assistance to internally displaced persons, housing subsidies, social benefits, remuneration of employees in the education and healthcare sectors, as well as the implementation of individual recovery projects.

Table 5

International Budget and Humanitarian Financing of Ukraine in 2022–2025

Year	External Budget Financing	Humanitarian Financing Recorded by OCHA FTS [23; 24; 25; 26]	Main Focus of Support
2022	approximately USD 31.1 billion; in 2022, UAH 495.2 billion of priority expenditures were financed through PEACE in Ukraine [15].	USD 4.55 billion in total humanitarian financing	Emergency budget stabilisation; pensions, social benefits, support for internally displaced persons, housing subsidies, salaries of healthcare workers and educators
2023	USD 42.6 billion, including USD 11.5 billion in grants [16].	USD 3.61 billion in total humanitarian financing	Regular budget support; financing of social protection, education, healthcare, humanitarian needs; initial strengthening of the recovery component
2024	more than USD 41 billion in budget support; according to the Ministry of Finance – USD 41.7 billion in external financing [17].	USD 2.66 billion in total incoming humanitarian financing	Full coverage of social and humanitarian expenditures through partner support; development of projects in housing, healthcare, education, agriculture, and the private sector
2025	USD 52.4 billion, of which more than 70% was provided through ERA Loans; USD 12.1 billion from the EU under the Ukraine Facility [6; 7; 31; 20].	USD 1.86 billion in total humanitarian financing	Stronger linkage between budget support and recovery; roads, bridges, public investment, social protection, internally displaced persons, education, and healthcare

Source: compiled by the authors based on the research materials

In 2022, international assistance was predominantly of an emergency stabilisation nature. The main objective of partner support was to prevent disruptions in the financing of essential social expenditures amid a sharp

decline in economic activity, the loss of part of the budget revenue base, and rising military expenditures. An important role was played by the World Bank's PEACE in Ukraine project, through which priority expenditures amounting to UAH 495.2 billion were financed in 2022. According to the Ministry of Finance of Ukraine, these funds were directed, in particular, to pensions for more than 9 million pensioners, assistance to internally displaced persons, housing subsidies, childbirth benefits, as well as remuneration of healthcare workers, school teachers, and academic staff of higher education institutions [15].

Thus, in 2022, international financing was not primarily directed toward conventional post-war reconstruction. Its main purpose was to preserve the social function of the state, support the population, and ensure a minimum level of stability of the budget system. At the same time, such support created the preconditions for a subsequent transition to more systematic recovery measures, since without stable financing of social payments, healthcare, and educational services, the state would not have been able to ensure basic social resilience.

In 2023, external financing became more regular and systematic. The State Budget of Ukraine received USD 42.6 billion in external financing, of which USD 11.5 billion was provided in the form of grants, accounting for approximately 27% of the total amount. The largest partners were the European Union, the United States, the IMF, Japan, Canada, the United Kingdom, and the World Bank. The Ministry of Finance of Ukraine emphasised that the funds attracted made it possible to cover priority expenditures, including pensions, salaries of employees in the education and healthcare sectors, social protection, and humanitarian support [16; 9].

In economic terms, 2023 can be regarded as a transitional year. International assistance continued to perform a stabilisation function, while at the same time becoming increasingly linked to early recovery needs. Japan, for example, financed World Bank projects related to social protection, agricultural recovery, housing repairs, and healthcare. This indicates a gradual expansion of international support from covering current social expenditures toward financing sectors that directly affect economic activity and the quality of life of the population.

In 2024, Ukraine attracted more than USD 41 billion in budget support from international partners. The Ministry of Finance explicitly stated that

international support made it possible to fully cover social and humanitarian expenditures, while all domestic financial resources were directed to the security and defence sector. The largest partners were the European Union, the United States, the IMF, Japan, the World Bank, Canada, the United Kingdom, Norway, the Republic of Korea, the Council of Europe Development Bank, and Spain [17; 9].

A distinctive feature of 2024 was the strengthening of the project-oriented nature of international financing. The United States provided substantial grant support through PEACE in Ukraine to compensate for social expenditures, while Japan financed a number of World Bank projects, including SURGE for recovery and public investment management, ARISE for agricultural development, RISE for private sector support, THRIVE for healthcare, LEARN for improving the educational process, HOPE for compensating homeowners for repairs to damaged apartments and houses, and HEAL Ukraine to support the medical guarantees programme [17].

Thus, in 2024, international assistance increasingly acquired not only a compensatory but also a recovery-oriented character. It remained essential for maintaining social stability, while simultaneously being directed toward areas that form the foundation of post-war development: human capital, housing, healthcare, education, the private sector, agricultural production, and the public investment system.

In 2025, international financing for Ukraine increased to USD 52.4 billion. The largest share consisted of funds provided under the ERA Loans mechanism, amounting to USD 37.9 billion, or more than 70% of total external financing. In addition, Ukraine received USD 12.1 billion from the EU under the Ukraine Facility, USD 912 million from the IMF, USD 733 million from the World Bank, approximately USD 454 million from Japan, and USD 232 million from the Council of Europe Development Bank [6; 7; 31; 20; 9].

In 2025, the link between international assistance and recovery became significantly stronger. Japan provided USD 453 million through three World Bank projects: DRIVE – USD 190 million to strengthen the resilience of the national road network, modernize infrastructure, and restore bridges; SURGE – USD 183 million to develop the public investment management system under wartime and post-war recovery conditions; and RISE – USD 80 million to address constraints to resilience, growth, and private

sector development. The Council of Europe Development Bank financed payments to internally displaced persons, including support for housing, food, healthcare, and children's education.

The Ukraine Facility is of particular importance as an EU financial instrument for 2024–2027 with a total volume of EUR 50 billion. Its first pillar provides EUR 38.27 billion in direct budget support, including EUR 33 billion in concessional loans and EUR 5.27 billion in grants. At the same time, 20% of the grant funding under the first pillar is to be allocated to regional needs, while the financing cannot be used to cover military expenditures. This makes the Ukraine Facility one of the key instruments for financing not only current budgetary stability, but also recovery, modernisation, and European integration reforms [6; 7; 31].

Alongside budget support, humanitarian assistance also played an important role. Although it was not always channelled through the state budget, it directly contributed to the social resilience of the population. According to the OCHA Financial Tracking Service, total humanitarian financing for Ukraine amounted to USD 4.55 billion in 2022, USD 3.61 billion in 2023, USD 2.66 billion in 2024, and USD 1.86 billion in 2025. Thus, during the analysed period, humanitarian financing gradually declined, which increased the need to prioritize assistance for the most vulnerable groups of the population and frontline territories [23; 24; 25; 26].

The humanitarian component included food assistance, support for internally displaced persons, water, sanitation and hygiene services, medical assistance, educational support, child protection, psychological assistance, support for older persons, and assistance to other vulnerable groups. Unlike budget support, these funds were mainly implemented through UN agencies, international non-governmental organisations, humanitarian funds, and local partner organisations. However, in economic terms, they complemented public expenditure by reducing pressure on social infrastructure and supporting populations affected by the war.

The data presented in Table 7 show that even with substantial international support, Ukraine's recovery needs remain significantly higher than the resources currently available. In 2025, the largest sectoral financing gaps persisted in energy and mining and in housing, reflecting the extensive destruction of energy infrastructure and residential property. Social sectors – education and science, health, and social protection – also

required substantial additional financing because they directly affect human capital, access to essential services, and quality of life.

Table 6

Key Partners and Mechanisms of International Financing for Ukraine in 2022–2025

Year	Main Partners / Mechanisms	Amount of Financing	Allocation / Purpose
2022	World Bank, United States, EU, United Kingdom, Germany, Spain, Finland, Ireland, Switzerland, and other PEACE donors [15].	UAH 495.2 billion through PEACE; total external financing – approximately USD 31.1 billion [15].	Pensions, support for internally displaced persons (IDPs), subsidies, social assistance, and salaries of healthcare and education workers
2023	EU, United States, IMF, Japan, Canada, United Kingdom, World Bank [9].	USD 42.6 billion, including USD 11.5 billion in grants [16].	Social protection, humanitarian support, education, healthcare, agricultural recovery, and housing repairs
2024	EU, United States, IMF, Japan, World Bank, Canada, United Kingdom, Norway, Republic of Korea, Council of Europe Development Bank (CEB) [9].	More than USD 41 billion; according to separate data from the Ministry of Finance – USD 41.7 billion [17].	Coverage of social and humanitarian expenditures, housing, healthcare, education, agriculture, the private sector, and public investment
2025	ERA Loans, EU / Ukraine Facility, IMF, World Bank, Japan, Council of Europe Development Bank [6; 7; 31; 20; 9].	USD 52.4 billion, including USD 37.9 billion under ERA Loans and USD 12.1 billion under the Ukraine Facility [6; 7; 31; 20].	Social expenditures, support for IDPs, the road network, bridges, public investment, the private sector, and regional recovery

Source: compiled by the authors based on the research materials

Thus, an analysis of international financing by year demonstrates a gradual change in its functional role. In 2022, it was predominantly emergency, stabilisation-oriented, and humanitarian in nature; in 2023, it became more regular and predictable; in 2024, it increasingly combined

budget support with recovery projects; and in 2025, the key mechanisms were ERA Loans, the Ukraine Facility, and World Bank projects aimed at infrastructure, social protection, support for internally displaced persons, public investment, and the private sector. Therefore, in 2022–2025, international assistance became not only a source of financing for the state budget deficit, but also an important financial basis for supporting social infrastructure, humanitarian resilience, and Ukraine's gradual post-war recovery [6; 7; 31; 20].

Table 7

Ukraine's Recovery and Reconstruction Priorities for 2025 According to RDNA4

Recovery Area	2025 Need, USD million	Available Financing, USD million	Financing Gap, USD million
Total recovery and reconstruction priorities in 2025	17,320	7,370	9,960
Public investment projects	11,880	5,460	6,430
Priority non-investment programmes	5,440	1,910	3,530
Housing	4,025	608	3,417
Education and science	1,225	465	760
Health	860	317	543
Social protection and livelihoods	2,020	1,449	571
Energy and mining	4,802	1,292	3,510
Transport	2,992	2,262	730
Water supply and sanitation	730	541	189
Emergency response and civil protection	78	43	35
Explosive hazards management	236	31	205

Source: compiled by the authors based on RDNA4 [38]. Note: USD 352 million in fully funded multi-sectoral priorities is included in the overall total but is not allocated to the sector rows

In summary, during 2022–2025 the State Budget of Ukraine became the principal financial mechanism for supporting the economy, social infrastructure, and priority recovery measures. Its role was reflected in financing defence, social protection, education, healthcare, regional

support, capital expenditures, and the restoration of critical infrastructure. At the same time, the scale of destruction and reconstruction needs significantly exceeded the state's domestic financial capacity, which made international financial assistance critically important. It is the combination of budgetary resources, grants, concessional loans, investment instruments, and technical assistance that forms the financial basis for the post-war recovery of Ukraine's national economy and social infrastructure.

3. Problems of Financing Recovery

Budget financing for the recovery of Ukraine's national economy and social infrastructure under wartime and post-war challenges is complex and systemic in nature. The problems associated with it are related not only to the shortage of financial resources but also to the need to simultaneously ensure the country's defence capability, social stability, support for critical infrastructure, fulfilment of debt obligations, continuation of reforms, and preparation for post-war modernisation. Under such conditions, the state budget remains the central financial instrument of recovery; however, its capacity is limited compared with the scale of the tasks facing the state.

Current analytical assessments for 2025–2029 indicate that the challenge of financing recovery is gradually shifting from the stage of emergency support to the stage of medium-term budget planning, institutional capacity building, and prioritisation of public investment. According to an updated assessment by the World Bank, the Government of Ukraine, the European Commission, and the United Nations, published in 2026, the total cost of Ukraine's recovery and reconstruction is now estimated at nearly USD 588 billion over the next decade. This indicates an increase in needs compared with the RDNA4 assessment, which estimated recovery needs at USD 524 billion as of the end of 2024. Thus, each additional year of war not only increases physical destruction but also complicates budget planning, as the volume of needs is growing faster than the capacity of domestic financing [38; 39].

A key challenge for the state budget is the mismatch between the scale of recovery needs and the resources available. In 2025, the Government of Ukraine, together with donors, allocated USD 7.37 billion to priority recovery areas, including housing, education, healthcare, social protection, energy, transport, water supply, demining, and civil protection.

At the same time, the financing gap for recovery needs in 2025 remained at USD 9.96 billion. This proportion demonstrates that even substantial international inflows are insufficient to cover priority reconstruction needs, forcing the state budget to operate under conditions of strict prioritisation among the most essential areas of financing.

Expenditure pressures on the state budget are intensified by the fact that a significant share of resources is directed to the security and defence sector. This is an objective prerequisite for preserving statehood, but at the same time it restricts fiscal space for civilian recovery, capital expenditures, and long-term investment in social infrastructure. Analysis by the European Parliament in 2026 emphasises that, if the war continues, the need for military and financial assistance to ensure defence and basic public services will remain dominant, while large-scale reconstruction is considered rational mainly after the end of the active phase of the war; during wartime, priority should be given to repairs of energy, transport, and social infrastructure [2].

Dependence on international financial assistance has become one of the defining features of Ukraine's budget policy. In 2025, the Ministry of Finance of Ukraine attracted USD 52.4 billion in external financing, with more than 70% of this amount provided through the ERA Loans mechanism linked to proceeds generated from frozen Russian assets. Such financing helps maintain budgetary capacity; however, it creates risks associated with dependence on decisions by external partners, political cycles in donor countries, delays in meeting programme conditions, and possible changes in access to financial resources [20].

The medium-term horizon of 2026–2029 further increases the relevance of this problem. According to the IMF's first review of the new Extended Fund Facility arrangement, published in July 2026, Ukraine's cumulative baseline financing gap for 2026–2029 increased to USD 140.3 billion, including USD 55.4 billion in 2026. The four-year EFF arrangement approved in 2026 amounts to approximately USD 8.1 billion and is intended not only to provide direct IMF financing but also to catalyse broader official support. This means that budget financing for recovery in the coming years will depend on Ukraine's ability to fulfil reform commitments, maintain partners' confidence, and preserve macro-financial discipline [22; 46].

The debt burden represents another significant constraint. A substantial share of external support is provided in the form of concessional loans.

Although these are more favourable than market-based borrowing, they still create future debt obligations. In this context, the problem does not lie in borrowing itself, but in the need to ensure a financing structure that does not undermine the state's long-term solvency. I. O. Lunina emphasises that public finance should be assessed not only from the perspective of covering current expenditures but also in terms of long-term sustainability and the state's capacity to support economic growth [14].

The quality of expenditure prioritisation remains a serious problem. Recovery requires financing for housing, energy, transport, education, healthcare, social protection, water supply, demining, business support, and local communities. Each of these areas is important; however, available budgetary resources do not make it possible to finance them all in full simultaneously. The risk is that, in the absence of a clear project selection methodology, resources may be directed away from those areas where the expected socio-economic impact is greatest. For this reason, Ukraine is gradually reforming its public investment management system, while the Ukraine Plan under the Ukraine Facility defines the principles of integrity, accountability, sustainability, subsidiarity, efficiency, and transparency in the recovery process [6; 7; 31].

The institutional capacity of the state and territorial communities constitutes a separate systemic challenge. Large-scale recovery is impossible without high-quality project preparation, reliable needs assessment, transparent procurement, digital monitoring, independent auditing, and coordination among central government authorities, local self-government bodies, international financial institutions, donors, and the private sector. Studies of the reform of Ukraine's public investment management system demonstrate that the main barriers continue to include institutional fragmentation, a shortage of well-prepared projects, limited managerial capacity, and the need to adapt European practices to national conditions [30].

The territorial unevenness of recovery needs also complicates budget financing. The greatest burden falls on communities that have suffered direct destruction, are located close to the frontline, or have received large numbers of internally displaced persons. At the same time, the financial capacity of such communities is often lower due to the loss of the tax base, destruction of enterprises, reduced employment, and increased social needs.

This creates a need for differentiated interbudgetary transfers, targeted subventions, compensation mechanisms, and a stronger role for the local level in determining recovery priorities.

Another important problem is the risk of inefficient or non-transparent use of funds. Recovery involves a large number of financing sources, including the state budget, local budgets, grants, concessional loans, funds from international organisations, private investment, and charitable assistance. Such a multi-channel financing structure increases the risks of programme duplication, fragmentation of resources, weak coordination, and difficulties in oversight. Scholars I. Ya. Chuhunov and V. D. Makohon emphasise that under conditions of uncertainty, fiscal and tax policy should ensure adaptability, macroeconomic stability, and effective use of financial resources [5].

An additional challenge is the conditional nature of international support. The Ukraine Facility for 2024–2027 provides up to EUR 50 billion in stable and predictable financial support, of which EUR 38.27 billion constitutes direct support to the state budget. However, access to these funds is linked to the implementation of reforms set out in the Ukraine Plan, as well as compliance with requirements concerning transparency, the rule of law, public investment management, and anti-corruption measures. Therefore, the state's budgetary capacity in 2025–2029 will depend not only on decisions made by international partners but also on the domestic quality of reforms [6; 7; 31].

Taken together, these problems demonstrate that budget financing for recovery should be viewed as a comprehensive system of risks, constraints, and opportunities. It is appropriate to summarize them in the form of an analytical matrix showing the nature of the main problems, their impact on recovery, and possible management priorities.

The systematisation of the problems presented in Table 8 confirms that the main constraint on budget financing for recovery lies in the combination of resource shortages, a high wartime expenditure burden, and the institutional complexity of project implementation. Recovery cannot be made effective solely by increasing the volume of financing. Equally important are the quality of governance, project prioritisation, the capacity of territorial communities, transparency of procedures, and the state's ability to maintain the confidence of international partners.

Table 8

Key Problems of Budget Financing for Ukraine's Recovery in the Medium Term, 2025–2029

Problem	Nature of the Problem	Consequences for Recovery	Management Priority
Gap between needs and resources	Recovery needs are estimated at hundreds of billions of US dollars, while available financing covers only part of the priorities.	Postponement of some projects, competition among sectors, and the risk of deepening infrastructure losses.	Strict prioritisation, project selection based on socio-economic impact, and concentration of resources on critical needs.
High expenditure pressure	Predominance of defence and security needs in the budget structure.	Constraints on capital expenditures and civilian recovery during the active phase of the war.	Combining short-term repairs with the preparation of long-term reconstruction projects.
Dependence on external financing	Key role of the EU, IMF, G7, World Bank, ERA Loans, and other partners [20; 9].	Risks of delays in disbursements, political conditionality of support, and instability of medium-term planning.	Diversification of funding sources, implementation of reforms, and strengthening of the domestic revenue base.
Debt risks	Part of the support is provided in the form of concessional loans.	Growth of future government liabilities and restrictions on fiscal space after the war.	Preference for grants and concessional financing, and monitoring of debt sustainability.
Institutional capacity	Insufficient quality of project preparation, fragmented governance, and weak coordination.	Slow absorption of funds, risk of low-quality projects, and loss of partners' confidence.	Reform of public investment management, digital monitoring, and unified project selection criteria.
Territorial disparities	Different levels of destruction and financial capacity among territorial communities.	Unequal access to resources and deepening regional disparities.	Targeted subventions, consideration of destruction indices, and community participation in prioritisation.
Transparency and oversight	The multi-channel financing structure complicates auditing and monitoring.	Risks of duplication, misuse of funds, and low effectiveness.	Open project registries, auditing, public reporting, and evaluation of budget programme results.

Source: compiled by the authors based on the research materials

For a comprehensive assessment of the problems of budget financing, it is appropriate to use a SWOT model. It makes it possible not only to identify weaknesses but also to demonstrate the potential that can be used to improve the efficiency of financing recovery.

Table 9

SWOT Model of Budget Financing for the Recovery of Ukraine's National Economy and Social Infrastructure

Strengths	Weaknesses
A functioning budget system even under martial law. The capacity of the state budget to finance defence, social protection, education, healthcare, and essential public services. Established cooperation with the EU, the IMF, the World Bank, the G7, and other partners. The availability of programme-based support mechanisms, including the Ukraine Facility, ERA Loans, PEACE in Ukraine, and World Bank instruments. The gradual implementation of public investment management reforms and digital monitoring tools.	A substantial state budget deficit and a limited domestic revenue base. High dependence on external financing. Debt risks resulting from the significant share of loan-based support. Insufficient institutional capacity for the rapid preparation and implementation of high-quality projects. Risks of programme duplication, weak coordination, and uneven financing across regions.
Opportunities	**Threats**
Attracting long-term international support in 2025–2029. Using the Ukraine Facility to combine budget support, reforms, and investment. Mobilising resources from frozen Russian assets. Developing the Ukraine Investment Framework and public-private partnerships. Strengthening the role of territorial communities in determining recovery priorities. Increasing transparency through digital platforms, open registries, and audits The updated IMF programme framework for 2026–2029 provides an additional anchor for mobilising official financing [46].	Continuation of the war and further destruction of infrastructure. Recovery needs growing faster than the volume of available resources. Delays or reductions in external assistance due to political changes in partner countries. Deterioration of debt sustainability. Corruption risks, inefficient procurement, and low effectiveness of individual programmes. Deepening territorial disparities in the event of uneven allocation of resources.

Source: compiled by the authors based on the research materials

The SWOT model shows that budget financing for Ukraine's recovery has considerable potential, but its realisation depends on the state's ability to transform international support into effective projects. The main strengths

remain the functionality of the budget system, the confidence of international partners, and the availability of major financial instruments. The weaknesses are associated with the budget deficit, debt risks, institutional fragmentation, and the uneven distribution of needs among territorial communities.

The opportunities of the medium-term period 2025–2029 are related to the expansion of financing instruments. The Ukraine Facility provides predictable support through 2027, the new IMF programme for 2026–2029 is expected to catalyse broader financing from international partners, and mechanisms linked to revenues generated from frozen Russian assets may become an important source for covering budgetary needs. At the same time, these opportunities do not eliminate the risks: the duration of the war, further destruction, potential delays in assistance, and the debt burden may significantly constrain the pace of recovery [6; 7; 31; 20; 46].

In view of current analytical assessments, budget financing for recovery in 2025–2029 should develop according to a model combining three components. The first component is related to ensuring current social and humanitarian expenditures, without which social stability is impossible. The second component covers the rapid restoration of critical infrastructure, primarily energy, transport, housing, education, healthcare, and water supply. The third component involves the preparation of high-quality investment projects for post-war modernisation, the attraction of private capital, and Ukraine's integration into the European economic area.

Thus, the problems of budget financing for the recovery of the national economy and social infrastructure are not only financial but also managerial in nature. The most significant challenges remain the gap between needs and resources, high dependence on external financing, expenditure pressure on the budget, debt risks, insufficient institutional capacity, territorial disparities in recovery needs, and the risks of inefficient use of funds. Addressing these problems requires strengthening the domestic revenue base, improving public investment management, ensuring transparent project prioritisation, more active involvement of territorial communities and the private sector, and maintaining the confidence of international partners through reforms, accountability, and the effective use of every hryvnia of budget funds.

OECD assessments confirm that insufficient integration of public investment with medium-term budget planning, limited project preparation capacity, and weak execution of investment expenditures reduce the

effectiveness of recovery. Therefore, public investment management reform should cover the entire project cycle – from preliminary selection and appraisal to financing, audit, and verification of achieved results [27].

4. Directions for Improving Efficiency

Improving the efficiency of using state budget funds and international assistance in the process of Ukraine's post-war recovery requires not so much an increase in the number of individual programmes as the creation of an integrated financial architecture for reconstruction. This involves coordinating budget planning, special funds, international instruments, local budgets, private investment, and digital monitoring within a unified recovery management system. Such a system should ensure not only the financing of projects but also measurable economic and social outcomes.

A distinctive feature of recovery financing in Ukraine is the mixed nature of its resource base. The state budget remains the primary coordinator of financial flows; however, actual reconstruction capacity depends on combining domestic revenues, balances and receipts of the special fund, international budget support, grants, concessional loans, extraordinary revenues generated by immobilised Russian sovereign assets, resources of international financial institutions, and private capital. Therefore, the effectiveness of recovery is determined not only by the amount of resources mobilised but also by the quality of the mechanisms used to allocate them.

The Ukrainian financing model has another important feature: under martial law, a significant share of the state budget's own revenues is directed to the security and defence sector, while civilian, social, and recovery-related areas are supported to a considerable extent by international partners and special mechanisms. This objectively increases the requirements for transparency, prioritisation, and accountability, since external resources cannot compensate for shortcomings in public project management.

In this context, improving efficiency should be viewed as a transition from allocating funds according to formal budget appropriations toward managing a portfolio of recovery projects. Each project should have a verified need, a justified cost estimate, an identified source of financing, a designated implementing entity, realistic deadlines, performance indicators, and a mechanism for the subsequent maintenance of the created or restored facility.

For Ukraine, the availability of state and public funds and mechanisms that are already used or have been established to finance post-war recovery is particularly important. They differ in their legal nature, sources of funding, and designated purposes; however, taken together, they form the financial infrastructure for reconstruction.

The mechanisms presented above should not operate in isolation. Their effectiveness depends on the extent to which planning, project selection, allocation of funds, procurement, implementation of works, reporting, and auditing are coordinated. If each fund or programme develops its own logic for distributing resources, this creates risks of duplication, uneven territorial financing, and loss of overall manageability of the recovery process.

The Fund for the Elimination of the Consequences of Armed Aggression is one of the most illustrative examples of a special budgetary recovery mechanism. Its importance lies in the fact that it is directly linked to the consequences of the war and has a clearly targeted purpose. In 2023, the Ministry of Finance reported that UAH 35.5 billion had been allocated to this fund in the State Budget of Ukraine, with resources directed toward the construction, reconstruction, restoration, and capital repair of public buildings, civil protection shelters, critical infrastructure, as well as housing for internally displaced persons and citizens who had lost their homes as a result of the war [47].

At the same time, data from the Accounting Chamber audit show that the actual financial scale of the fund in 2023 was significantly broader than initially envisaged in the budget. According to the audit results, UAH 61.9 billion was accumulated in the fund in 2023, of which the Cabinet of Ministers of Ukraine allocated UAH 56.6 billion, or 91.4%. Actual cash expenditures amounted to only UAH 38.1 billion, while accounts receivable at the end of the year reached UAH 13.6 billion. This indicates that the problem of efficiency concerns not only the availability of resources but also the ability to transform budget appropriations rapidly and effectively into completed recovery outcomes [1].

The audit also identified significant management shortcomings, including insufficient transparency in the allocation of funds, discretionary procedures, the absence of clearly defined objectives and results, the lack of a unified prioritisation methodology at the time when a substantial share of resources was distributed, and weak monitoring of resource utilisation.

Table 10

Financial and Institutional Mechanisms Supporting Ukraine's Recovery

Fund / Mechanism	Legal and Organisational Nature	Sources of Funding	Main Purpose for Recovery
Fund for the Elimination of the Consequences of Armed Aggression	A special fund within the State Budget of Ukraine	Special fund resources, balances carried over from previous years, proceeds from seized or sanctioned assets, and other revenues specified by law	Financing compensation for damaged/destroyed housing, completion of recovery projects, and restoration of critical and social infrastructure
Fund for the Restoration of Destroyed Property and Infrastructure	An account for accumulating voluntary contributions for recovery	Voluntary contributions from individuals and legal entities, funds in national and foreign currencies	Financing the restoration of property and infrastructure damaged as a result of hostilities, terrorist acts, and sabotage
Reserve Fund of the State Budget	A budget mechanism for an immediate response to unforeseen events	State budget funds	Emergency financing of urgent reconstruction, elimination of the consequences of emergencies, and crisis response
State Fund for Regional Development	An instrument for supporting regional development	State budget funds	Financing regional development projects and the social, municipal, and economic infrastructure of territorial communities
eRecovery	A state compensation programme for damaged or destroyed housing	State budget funds, the Fund for the Elimination of the Consequences of Armed Aggression, and international assistance	Compensation to citizens for repairing damaged housing or purchasing new housing to replace destroyed property
Ukraine Facility [6; 7; 31]	A European Union financial instrument for Ukraine for 2024–2027	Budget support, grants, concessional loans, investment instruments, and EU technical assistance	Supporting the state budget, reforms, investment, European integration, and recovery
Ukraine Investment Framework	The investment component of the Ukraine Facility [6; 7; 31]	Guarantees, grants, blended finance, resources of international financial institutions, and private-sector capital	Mobilising public and private investment for reconstruction and modernisation

Fund / Mechanism	Legal and Organisational Nature	Sources of Funding	Main Purpose for Recovery
United States–Ukraine Reconstruction Investment Fund [45]	A bilateral investment fund established by Ukraine and the United States	Capital contributions, reinvested returns, and agreed shares of future revenues associated with eligible new natural-resource projects under the bilateral framework	Mobilising long-term investment for reconstruction and economic recovery, including infrastructure and eligible natural-resource projects
DREAM [4]	A digital ecosystem for public investment management and recovery projects	It is not a fund but provides project registration, selection, monitoring, and transparency	Coordination, transparency, accountability, analytics, and public oversight of recovery projects

Source: compiled by the authors based on the research materials and [3; 4; 6; 7; 31; 33; 45]

These findings are fundamentally important for developing directions for improving efficiency, since they demonstrate that the existence of a special fund alone does not guarantee effective recovery without proper selection, control, and evaluation procedures.

In 2025, the procedure for using the fund's resources was amended by Resolution of the Cabinet of Ministers of Ukraine No. 180 of 21 February 2025. The amendments provided that the fund, as a component of the special fund of the State Budget, is used to address the humanitarian, social and economic consequences of the Russian Federation's armed aggression, with resources directed primarily toward compensation for destroyed or damaged residential property and the completion of projects financed in previous budget periods. The procedure was subsequently updated in 2026; therefore, the analysis in this section distinguishes the 2025 amendments from the current regulatory framework. This change in approach strengthened the fund's social and housing orientation and reduced the scope for financing new, insufficiently prepared projects [3].

According to the Ministry for Development of Communities and Territories of Ukraine, in 2025 the fund's resources are to be used for two main purposes: compensation to individuals whose homes were destroyed or damaged, and completion of projects that had already been launched and financed through the fund but require additional financing.

This model is more manageable, as it reduces the risk of including new, insufficiently prepared projects and concentrates resources on socially sensitive areas.

Independent analysis by Fiscal Center supplements official data by structuring actual recovery expenditures financed through the fund in 2023–2025. According to the open dataset, it covers 11,118 transactions, 19 regions, 71 responsible authorities, and UAH 29.724 billion in verified expenditures. The Fiscal Center interactive dashboard records UAH 48.1 billion in planned financing, UAH 29.7 billion in utilised funds, 629 facilities, and 18 regions; however, these indicators do not include expenditures on critical infrastructure, the eRecovery programme, or the security and defence sector. Therefore, these data should not be treated as comprehensive budget reporting, but rather as a tool for assessing the transparency and actual implementation of individual recovery projects [8].

The analysis of financing through the Fund for the Elimination of the Consequences of Armed Aggression makes it possible to identify several management-related conclusions. The fund is a necessary instrument of targeted budget financing for recovery, but its effectiveness depends on the transparency of procedures and the capacity of spending units to bring projects to completion. The main problem is not the existence of the fund itself, but the weakness of its institutional support: the absence of a comprehensive prioritisation methodology at the initial stage, risks of discretionary allocation, significant advance payments, accounts receivable, and an insufficient link between allocated resources and actual outcomes.

To improve the efficiency of using the fund's resources, it is advisable to apply a unified digital management approach through DREAM. Projects applying for financing should contain data on the damage incurred, justification of the need, cost estimates, the level of project documentation readiness, expected social impact, sources of co-financing, implementation deadlines, and the responsible contracting authority. This would help prevent the financing of facilities that are not directly related to the consequences of the war or do not correspond to recovery priorities [4].

Table 11

Analytical Characteristics of Financing of the Fund for the Elimination of the Consequences of Armed Aggression

Period / Data Source	Indicator	Amount	Purpose / Coverage	Analytical Conclusion
2023, Ministry of Finance [47]	Funding envisaged in the State Budget	UAH 35.5 billion [47]	Restoration of public buildings, protective structures, critical infrastructure, housing for IDPs and persons who lost their homes	Initial budget planning created a targeted recovery resource, but subsequent accumulation in the fund exceeded the initial appropriations
2023, Accounting Chamber [1]	Accumulated in the fund	UAH 61.9 billion [1]	Fund resources accumulated to eliminate the consequences of aggression	The actual scale of the fund was substantial, but represented only a small share of total recovery needs
2023, Accounting Chamber [1]	Allocated by the Cabinet of Ministers of Ukraine	UAH 56.6 billion, or 91.4% [1]	Allocation among chief spending units and projects	A high allocation rate did not mean full and timely utilisation of the funds
2023, Accounting Chamber [1]	Cash expenditures	UAH 38.1 billion	Actually financed expenditures	The gap between allocations and cash execution indicates problems with project implementation
2023, Accounting Chamber [1]	Accounts receivable	UAH 13.6 billion	Advance payments and outstanding obligations	Requires stronger control over advance payments, work completion deadlines, and contractor accountability
2023–2025, Fiscal Center [8]	Verified expenditures in the open dataset	UAH 29.724 billion; 11,118 transactions	Recovery expenditures across selected sectors and regions	The data are useful for public oversight but have limited coverage and do not replace comprehensive budget reporting

Period / Data Source	Indicator	Amount	Purpose / Coverage	Analytical Conclusion
2023–2025, Fiscal Center dashboard [8]	Plan / utilisation in the dashboard	UAH 48.1 billion planned; UAH 29.7 billion utilised	629 facilities in 18 regions, excluding critical infrastructure, eRecovery, and the security and defence sector	Shows the gap between planning and implementation and the need to strengthen implementation capacity
2025, Cabinet of Ministers Resolution No. 180 [3]	Targeted allocation of funds	Housing compensation and completion of previously launched projects	Social and housing support and completion of projects from previous periods	Concentrating resources improves manageability but requires a clear order of priority and transparent selection

Source: compiled by the authors based on [1; 3; 8; 47]

A separate priority is to tighten controls over advance payments and strengthen financial safeguards. The 2025 amendments introduced the possibility of advance payment for the completion of projects in an amount of up to 30% of the cost of works for a period not exceeding six months. Compared with earlier practices under which advance payments for individual contracts could be substantially higher, this approach provides stronger risk control. To minimise implementation risks, advance payments should be combined with bank guarantees, phased execution of works, milestone-based verification, and automatic public disclosure of contract status [3].

It is also important to ensure regular public reporting on the receipt, allocation, and use of the fund's resources. The regulatory framework provides for periodic reporting by chief spending units to the Treasury and for consolidated reporting on the receipt and use of the fund's resources to the competent public authorities. Given subsequent amendments to the procedure in 2026, reporting requirements should be interpreted according to the current version of the regulatory act. For practical effectiveness, these reports should not only be formally submitted but also published in a machine-readable and analytically convenient format [3].

Overall, the effective use of state budget funds and international assistance in the recovery process should be based on several interrelated

directions: strategic prioritisation of expenditures, integration of funds into the public investment system, digital monitoring, clear accountability of spending units, transparency of procurement, auditing of results, and involvement of communities in identifying needs.

A distinctive feature of financing in Ukraine should be the transition from the logic of restoring what was destroyed to the logic of modernisation-oriented reconstruction. State budget funds and international assistance should be directed not only toward returning facilities to their pre-war condition but also toward ensuring their safety, energy efficiency, accessibility, digital readiness, and resilience to future risks. This approach is particularly important for schools, hospitals, housing, energy facilities, transport infrastructure, and water supply systems.

Improving the efficiency of international assistance requires its integration into the national budget process. Donor resources should not create a parallel management system detached from national and local priorities. International programmes should be linked to medium-term budget planning, the public investment system, regional development strategies, and the DREAM digital ecosystem. This will help avoid project duplication, uneven territorial financing, and loss of control over the overall recovery framework [4].

For the social dimension of recovery, strengthening the targeting of assistance is particularly important. Support for internally displaced persons, households that have lost their homes, veterans, persons with disabilities, children, and other vulnerable groups should be combined with housing programmes, employment measures, retraining, and medical and psychological rehabilitation. Such an approach reduces the population's long-term dependence on transfers and contributes to the restoration of human capital.

Strengthening the capacity of territorial communities also remains an important task. It is at the local level that the actual consequences of destruction and the needs of the population are most clearly visible; however, not all communities have sufficient human and technical capacity to prepare high-quality projects. Therefore, the state should develop methodological support for communities, training in public investment management, standard project solutions, advisory support, and co-financing mechanisms.

Table 12

Directions for Improving the Efficiency of Fund and Recovery Programme Resource Utilisation

Direction	Practical Content	Expected Result
Unified digital coordination	Registration of recovery projects in DREAM, specifying financing sources, implementing entities, deadlines, and expected results [4].	Reduced duplication and improved transparency, traceability and oversight of financing
Financing prioritisation	Directing resources primarily toward housing, critical infrastructure, energy, social facilities, demining, and communities with the greatest losses	Concentration of resources on areas with the greatest social impact
Project selection based on unified criteria	Assessment of projects by readiness level, cost, social impact, risks, and alignment with strategies	Reduced risk of financing random or insufficiently prepared projects
Synchronization of funds and programmes	Coordination of the Fund for the Elimination of the Consequences of Armed Aggression, the Fund for the Restoration of Property, the Ukraine Facility, local budgets, and donor programmes [6; 7; 31].	Comprehensive financing without duplication of sources or gaps in implementation
Public reporting	Regular disclosure of information on the receipt, allocation, and use of funds	Increased trust among citizens, communities, and international partners
Performance control	Assessment not only of the absorption of funds but also of the project's actual impact on the community, the economy, and social infrastructure	Transition from formal financing to measurable outcomes
Private-sector involvement	Use of guarantees, public-private partnerships, risk insurance, and blended finance [33].	Reduced burden on the state budget and increased investment resources

Source: compiled by the authors based on the research materials and [4; 6; 7; 31; 33]

Overall, improving the efficiency of state budget funds and international assistance in Ukraine's recovery requires the systematic integration of medium-term budget planning, special funds, international programmes, public investment management, digital monitoring, community participation, and private-sector involvement. Recovery funds and programmes should operate as elements of a unified financial architecture

in which project selection, financing, implementation, reporting, and audit are linked to measurable results. Digital expenditure control should also align Treasury servicing with public investment registers and DREAM project data; the authors' previous research confirms that the completeness, timeliness, and interoperability of information directly affect the quality of budgetary control and management decisions [29; 40].

CONCLUSIONS

The study examines the role of the state budget in financing the post-war recovery of Ukraine's national economy and social infrastructure. The research established that under conditions of full-scale war, the state budget has acquired particular importance not only as the country's principal financial plan but also as a key instrument for ensuring the resilience of the economy, the social sphere, public services, critical infrastructure, and the creation of financial preconditions for future post-war reconstruction.

In examining the theoretical foundations, it was established that the state budget is the central element of the national financial system through which centralised financial resources are accumulated, allocated, and utilised. Its economic essence lies in the formation of monetary relations among the state, business entities, and the population concerning the mobilisation and use of funds for performing the tasks and functions of the state. The state budget performs distributive, control, regulatory, and stabilisation functions, while under wartime conditions its role increases substantially, since it is through the budget that financing is provided for defence capability, social protection, education, healthcare, support for territorial communities, and priority recovery measures.

The study substantiates that budget financing for the recovery of the national economy and social infrastructure is comprehensive in nature. It is not limited solely to direct expenditures on the reconstruction of destroyed facilities, but encompasses a much broader range of financial instruments, including budget programmes, capital expenditures, interbudgetary transfers, the reserve fund, special funds, public borrowing, international financial assistance, public investment, and public-private partnership mechanisms. This approach makes it possible to view the state budget not only as a source of financing but also as an organisational and financial mechanism for coordinating recovery processes [33].

An analysis of the final annual budget execution reports for 2022–2025 demonstrates a substantial increase in both revenues and expenditures of the State Budget of Ukraine. Revenues rose from UAH 1,787.7 billion in 2022 to UAH 3,841.0 billion in 2025, while expenditures increased from UAH 2,705.7 billion to UAH 5,480.5 billion. Throughout the period, the state budget was executed with a substantial deficit: UAH 914.9 billion in 2022, UAH 1,336.9 billion in 2023, UAH 1,359.4 billion in 2024, and UAH 1,635.8 billion in 2025. These figures confirm a persistent imbalance between budget revenues and expenditures resulting from the exceptional wartime burden on public finances [41–44].

Under wartime conditions, the substantial state budget deficit also reflects the stabilisation role of fiscal policy, as deficit financing enabled the government to maintain critically important expenditures on defence, social protection, healthcare, education, support for internally displaced persons, the functioning of public authorities, and priority infrastructure recovery. At the same time, the persistence of a significant deficit creates risks to debt sustainability, increases Ukraine's dependence on external financing, and limits the state's ability to independently finance large-scale post-war recovery.

International financial assistance played a particularly important role in ensuring Ukraine's budgetary capacity in 2022–2025. The study established that support from international partners not only contributed to covering the state budget deficit but also ensured the financing of social, humanitarian, and recovery-related expenditures. In 2022, international support was predominantly of an emergency stabilisation nature and was directed toward maintaining social payments, pensions, assistance to internally displaced persons, and salaries of employees in the education and healthcare sectors. In 2023, external financing became more systematic and larger in scale, enabling the regular financing of priority expenditures. In 2024, international assistance became increasingly linked to recovery support through individual projects in the areas of housing, education, healthcare, agricultural development, the private sector, and public investment. In 2025, the ERA Loans mechanism, the Ukraine Facility, World Bank projects, as well as financing related to the restoration of roads, bridges, social infrastructure, support for internally displaced persons, and

the development of the public investment management system became particularly important.

The study showed that the State Budget of Ukraine cannot independently provide full financing for post-war recovery. The scale of destruction and reconstruction needs significantly exceeds the state's domestic financial capacity. Therefore, international assistance, grants, concessional loans, guarantees, investment instruments, proceeds from frozen Russian assets, and private capital should be regarded as essential components of the financial architecture of recovery. At the same time, the state budget remains the central coordinator of these processes, since it is through the budget that priorities are determined, resources are allocated, co-financing is ensured, and control over the use of funds is exercised.

The study identified the main problems of budget financing for recovery as the substantial gap between needs and available resources, high dependence on international assistance, debt risks, the limited domestic revenue base of the budget, territorial disparities in the scale of destruction, insufficient financial capacity of individual communities, difficulties in determining financing priorities, and risks of inefficient use of funds. Particular attention should be paid to institutional capacity, since large-scale recovery requires not only the availability of financial resources but also high-quality project management, transparent selection procedures, efficient procurement, digital monitoring, independent auditing, and public reporting.

The SWOT analysis of budget financing for recovery demonstrated that Ukraine's strengths include maintaining the functionality of the budget system under martial law, accumulated experience of cooperation with international partners, the establishment of special funds, and the introduction of digital tools for managing recovery projects. At the same time, the main weaknesses remain the budget deficit, limited domestic revenues, dependence on external financing, high debt risks, and unequal capacity of territorial communities to prepare and implement projects. Opportunities are associated with attracting long-term support from the European Union and international financial institutions, using the Ukraine Facility, the Ukraine Investment Framework, DREAM, proceeds from frozen Russian assets, and developing public-private partnerships. The main threats remain the continuation of the war, further destruction, delays

in international assistance, increasing debt burdens, corruption risks, and uneven recovery across regions.

The study substantiates that Ukraine has already established a number of state and public mechanisms for financing recovery. These include the Fund for the Elimination of the Consequences of Armed Aggression, the Fund for the Restoration of Destroyed Property and Infrastructure, the Reserve Fund of the State Budget, the State Fund for Regional Development, the eRecovery programme, the Ukraine Facility, the Ukraine Investment Framework, the United States–Ukraine Reconstruction Investment Fund and the DREAM digital ecosystem. The importance of these mechanisms lies in their ability to accumulate resources from various sources and direct them toward the restoration of housing, critical infrastructure, social facilities, support for territorial communities, investment projects, and monitoring of the implementation of recovery measures [6; 7; 31; 4; 45].

The Fund for the Elimination of the Consequences of Armed Aggression was examined separately as a special budgetary instrument aimed at financing measures to address the destruction caused by the war. The analysis demonstrated that this fund plays an important role in restoring housing, critical infrastructure, social infrastructure, shelters, and other facilities necessary for the functioning of territorial communities. At the same time, the effectiveness of the fund depends on transparency in the allocation of resources, timeliness of financing, control over cash expenditures, prevention of the accumulation of accounts receivable, and public reporting on the results achieved. Therefore, this fund should not operate in isolation but as an integral component of a unified system of budgetary and donor financing for recovery.

Based on the results of the study, it is advisable to strengthen the strategic prioritisation of budget expenditures on recovery. State budget funds and international assistance should primarily be directed toward areas that generate the greatest social impact: housing for persons who have lost their homes; critical and energy infrastructure; educational and healthcare institutions; social protection; demining; transport accessibility; water supply; and support for communities that have suffered the greatest destruction or received large numbers of internally displaced persons. Such prioritisation would help prevent the fragmentation of resources and improve the effectiveness of budget financing.

An important direction for improvement is the integration of all funds, programmes, and donor mechanisms into a unified public investment management system. Projects financed from the state budget, local budgets, international assistance, or special funds should undergo a unified procedure of preparation, appraisal, selection, financing, monitoring, and reporting. It is advisable to ensure the mandatory inclusion of such projects in the DREAM digital ecosystem, specifying the source of financing, amount, implementing entity, implementation period, status of execution, and results achieved. This would improve the transparency of the use of funds and enable the public and international partners to monitor the recovery process.

It is also advisable to strengthen the performance orientation of budget programmes related to recovery. Evaluation should be based not only on the amount of funds disbursed but also on the actual economic and social impact. This requires taking into account the number of restored facilities, the number of citizens who have gained access to housing, education, healthcare, or social services, as well as the impact of projects on employment, economic activity, energy resilience, and the quality of life of the population. Such an approach would enable a transition from formal financing toward results-based management.

Particular attention should be paid to the wider use of grants and compensation mechanisms. Given the high state budget deficit and existing debt risks, social, humanitarian, and housing programmes should preferably be financed through grants, compensation payments, proceeds from frozen Russian assets, and other forms of non-repayable assistance. Concessional loans should be directed primarily toward areas that generate long-term economic effects and are capable of creating added value, including energy, transport, production, export infrastructure, business support, private-sector development, and innovative projects [20].

Strengthening the financial capacity of territorial communities is another important direction. Communities directly face the consequences of destruction, the needs of the population, and the challenges of restoring social facilities, housing, municipal services, and critical infrastructure. The state should provide methodological assistance to communities in project preparation, access to standard project solutions, training in public investment management, advisory support, and fair co-financing

mechanisms. Particular attention should be given to frontline, de-occupied, and financially vulnerable communities.

A promising direction is the more active involvement of the private sector in recovery. The state budget and international assistance cannot fully cover all reconstruction needs; therefore, it is necessary to develop public-private partnerships, guarantee mechanisms, war-risk insurance, concessional lending, investment funds, and blended-finance instruments. Private capital should be attracted to projects in the fields of energy, logistics, housing construction, agricultural processing, industry, transport, and digital infrastructure. Under such a model, the state budget should act as a catalyst for investment rather than as the sole source of financing.

Summarizing the results of the study, it can be concluded that the state budget is a key financial instrument for Ukraine's post-war recovery; however, its effectiveness depends on the state's ability to integrate its own budgetary resources, international assistance, special funds, local budgets, and private capital into a coherent financing system. The recovery of the national economy and social infrastructure requires not only substantial financial resources but also high-quality management of those resources. Therefore, the principal objective of budget policy in this area should be to ensure transparency, prioritisation, targeting, effectiveness, and a long-term socio-economic return from every hryvnia of state budget funds and every dollar of international assistance.

References:

1. Accounting Chamber of Ukraine (2024) Bilshu chastynu koshtiv Fondu likvidatsii naslidkiv zbroinoi ahresii u 2023 rotsi rozpodilyly neprozoro ta bez nalezhnoi priorytetyzatsii [Most resources of the Fund for the Elimination of the Consequences of Armed Aggression in 2023 were distributed non-transparently and without proper prioritisation]. Available at: https://rp.gov.ua/bilsu-castinu-kostiv-fondu-likvidaciyi-naslidkiv-zbroinoyi-agresiyi-u-2023-roci-rozpodilili-neprozoro-ta-bez-naleznoyi-prioritezaciyi

2. Boyarchuk D., Dabrowski M. (2026) Financing Ukraine's recovery and reconstruction through the 2028–2034 Multiannual Financial Framework. European Parliamentary Research Service. Available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2026/785764/BUDG_BRI(2026)785764_EN.pdf

3. Cabinet of Ministers of Ukraine (2023, as amended through 2026) Poriadok vykorystannia koshtiv fondu likvidatsii naslidkiv zbroinoi ahresii [Procedure for the use of resources of the Fund for the Elimination of the Consequences of

Armed Aggression] (Resolution No. 118 of 10 February 2023; amendments include Resolution No. 180 of 21 February 2025 and subsequent amendments in 2026). Available at: https://zakon.rada.gov.ua/laws/show/118-2023-%D0%BF#Text

4. Cabinet of Ministers of Ukraine (2026) Pro skhvalennia Kontseptsii rozbudovy Yedynoi tsyfrovoi ekosystemy upravlinnia publichnymy investytsiiamy [On approval of the Concept for developing the Unified Digital Ecosystem for Public Investment Management] (Order No. 547-r). Available at: https://zakon.rada.gov.ua/laws/show/547-2026-%D1%80#Text

5. Chuhunov I., Makohon V. (2023) Biudzhetno-podatkova polityka v umovakh nevyznachenosti [Fiscal policy under uncertainty]. *Scientia Fructuosa*, vol. 150, no. 4, pp. 19–31. DOI: https://doi.org/10.31617/1.2023(150)02

6. European Commission (2024) The Ukraine Facility. Available at: https://commission.europa.eu/topics/eu-solidarity-ukraine/eu-assistance-ukraine/ukraine-facility_en

7. European Union (2024) Regulation (EU) 2024/792 of the European Parliament and of the Council of 29 February 2024 on establishing the Ukraine Facility. Official Journal of the European Union. Available at: https://eur-lex.europa.eu/eli/reg/2024/792/oj

8. Fiscal Center (2025) Vydatky na vidnovlennia Ukrainy: interaktyvnyi dashbord ta vidkrytyi nabir danykh [Ukraine recovery spending: interactive dashboard and open dataset]. Available at: https://fiscalcenter.org/

9. International Monetary Fund (2026) Ukraine: Request for an extended arrangement under the Extended Fund Facility and cancellation of the current arrangement. IMF Country Report No. 26/058. Available at: https://www.imf.org/-/media/files/publications/cr/2026/english/1ukrea2026001-source-pdf.pdf

10. Khaustova V. Ye. (ed.) (2023) Povoienne vidnovlennia ekonomiky Ukrainy: problemy ta napriamky vyrishennia: kolektyvna monohrafiia [Post-war recovery of Ukraine's economy: problems and solutions: collective monograph]. Kharkiv: Liburkina L. M., 239 p. (in Ukrainian).

11. Klymenko K., Savostianenko M. (2022) Pidkhody do otsinky naslidkiv povnomasshtabnoi viiny ta finansovykh potreb vidnovlennia [Approaches to assessing the consequences of the full-scale war and recovery financing needs]. *Finansy Ukrainy – Finance of Ukraine*, no. 9, pp. 53–78. DOI: https://doi.org/10.33763/finukr2022.09.053 (accessed August 19, 2026).

12. Kudriashov V. P. (2024) Plan vidnovlennia Ukrainy: skladovi ta mekhanizmy realizatsii [Ukraine recovery plan: components and implementation mechanisms]. *Naukovi pratsi NDFI – Scientific Papers of the Research Financial Institute*, no. 1, pp. 5–19.

13. Kudriashov V. P. (2024) Finansove zabezpechennia vidnovlennia ekonomiky Ukrainy [Financial support for the recovery of Ukraine's economy]. *Finansy Ukrainy – Finance of Ukraine,* no. 5, pp. 33–50. DOI: https://doi.org/10.33763/finukr2024.05.033

14. Lunina I. O. (2020) Publichni finansy v makroekonomichnii politytsi zrostannia: monohrafiia [Public finance in the macroeconomic growth policy:

monograph]. Kyiv: Instytut ekonomiky ta prohnozuvannia NAN Ukrainy, 440 p. (in Ukrainian).

15. Ministry of Finance of Ukraine (2023) Foreign partners provided Ukraine with UAH 495.2 billion in 2022 to cover priority expenditures through the World Bank's PEACE project. Available at: https://mof.gov.ua/en/news/foreign_partners_provided_ukraine_with_uah_495_billion_in_2022_to_cover_priority_expenditures_through_the_world_banks_peace_project-3993

16. Ministry of Finance of Ukraine (2023) Ministry of Finance of Ukraine attracted USD 42.6 billion of concessional and grant financing from international partners in 2023. Available at: https://mof.gov.ua/en/news/ministry_of_finance_of_ukraine_attracted_usd_426_billion_of_concessional_and_grant_financing_from_international_partners_in_2023-4370

17. Ministry of Finance of Ukraine (2025) Development partners provided Ukraine with over USD 41 billion in budget support in 2024. Available at: https://mof.gov.ua/en/news/development_partners_that_provided_ukraine_with_over_41_billion_in_budget_support_in_2024_and_the_allocation_of_these_funds-4974

18. Ministry of Finance of Ukraine (2025) Uriad skhvalyv zvit pro vykonannia Derzhavnoho biudzhetu na 2024 rik: vydatky na oboronu ta bezpeku stanovyly 2.97 trln hryven [The Government approved the report on execution of the 2024 State Budget: security and defence expenditure amounted to UAH 2.97 trillion]. Available at: https://mof.gov.ua/uk/news/uriad_skhvaliv_zvit_pro_vikonannia_derzhavnogo_biudzhetu_na_2024_rik_vidatki_na_oboronu_ta_bezpeku_stanovili_297_trln_griven-5097

19. Ministry of Finance of Ukraine (2025) Ponad 30% iz zovnishnoho finansuvannia z liutoho 2022 roku – hranty: umovy 100 mlrd dol. zaluchenykh koshtiv [More than 30% of external financing since February 2022 consists of grants: terms of USD 100 billion in attracted funds]. Available at: https://mof.gov.ua/uk/news/more_than_30_of_external_financing_since_february_2022_has_been_grants_what_are_the_terms_of_100_billion_of_attracted_funds-4891

20. Ministry of Finance of Ukraine (2025) In 2025, Ukraine's Ministry of Finance secured USD 52.4 billion in external financing, more than 70% of which came from revenues generated by frozen Russian assets. Available at: https://mof.gov.ua/en/news/in_2025_ukraines_ministry_of_finance_secured_524_billion_in_external_financing_more_than_70_of_which_came_from_revenues_generated_by_frozen_russian_assets-5520

21. Ministry of Finance of Ukraine (2026) The sources of Ukraine's state budget financing in 2026 are war bonds and concessional loans: received external budget financing since February 2022 (general fund). Available at: https://mof.gov.ua/storage/files/Financing_en_v03032026.pdf

22. National Bank of Ukraine (2026) IMF Executive Board approves USD 8.1 billion under a new four-year Extended Fund Facility arrangement for Ukraine. Available at: https://bank.gov.ua/en/news/all/rada-direktoriv-mvf-uhvalila-novu-chotiririchnu-programu-v-mejah-mehanizmu-rozshirenogo-

finansuvannya-dlya-ukrayini-obsyagom-81-mlrd-dol-ssha-ta-zatverdila-pershiy-transh-u-sumi-15-mlrd-dol-ssha

23. United Nations Office for the Coordination of Humanitarian Affairs (2022) Ukraine 2022. Financial Tracking Service. Available at: https://fts.unocha.org/countries/234/summary/2022

24. United Nations Office for the Coordination of Humanitarian Affairs (2023) Ukraine 2023. Financial Tracking Service. Available at: https://fts.unocha.org/countries/234/summary/2023

25. United Nations Office for the Coordination of Humanitarian Affairs (2024) Ukraine 2024. Financial Tracking Service. Available at: https://fts.unocha.org/countries/234/flows/2024

26. United Nations Office for the Coordination of Humanitarian Affairs (2025) Ukraine 2025. Financial Tracking Service. Available at: https://fts.unocha.org/countries/234/summary/2025

27. Organisation for Economic Co-operation and Development (2025) Fostering macroeconomic stability and a sustainable recovery. In OECD Economic Surveys: Ukraine 2025. Paris: OECD Publishing. Available at: https://www.oecd.org/en/publications/oecd-economic-surveys-ukraine-2025_940cee85-en/full-report/fostering-macroeconomic-stability-and-a-sustainable-recovery_24ed81a1.html

28. Panchenko V. A. (2024) Rol mizhnarodnoi finansovoi dopomohy u vidbudovi ekonomiky Ukrainy v umovakh viiny [The role of international financial assistance in rebuilding Ukraine's economy during the war]. *Ekonomika, upravlinnia ta administruvannia – Economics, Management and Administration*, no. 2(108), pp. 139–143. DOI: https://doi.org/10.26642/jen-2024-2(108)-139-143

29. Sokrovolska N. Ya., Korbutiak A. H. (2018) Suchasnyi stan informatsiino-tekhnichnoho zabezpechennia kaznacheiskoho obsluhovuvannia biudzhetu [The current state of information and technical support for treasury budget servicing]. In J. Žukovskis, K. Shaposhnykov (Eds.). Innovative Development of the Economy: Global Trends and National Features. Kaunas: Baltija Publishing, pp. 176–192. (in Ukrainian).

30. Storonianska I., Patytska K., Ivashko O. (2025) Reforming the public investment management system: institutional foundations and implementation barriers. *Finansy Ukrainy – Finance of Ukraine*, no. 7, pp. 27–43. DOI: https://doi.org/10.33763/finukr2025.07.027

31. Ukraine Facility Plan (2024) Ukraine Plan 2024–2027. Available at: https://www.ukrainefacility.me.gov.ua/wp-content/uploads/2024/03/ukraine-facility-plan.pdf

32. Verkhovna Rada of Ukraine (2010) Biudzhetnyi kodeks Ukrainy [Budget Code of Ukraine] (Law No. 2456-VI). Available at: https://zakon.rada.gov.ua/laws/show/2456-17#Text

33. Verkhovna Rada of Ukraine (2010) Pro derzhavno-pryvatne partnerstvo [On public-private partnership] (Law No. 2404-VI). Available at: https://zakon.rada.gov.ua/laws/show/2404-17#Text

34. Verkhovna Rada of Ukraine (2021) Pro Derzhavnyi biudzhet Ukrainy na 2022 rik [On the State Budget of Ukraine for 2022] (Law No. 1928-IX). Available at: https://zakon.rada.gov.ua/laws/show/1928-20#Text

35. Verkhovna Rada of Ukraine (2022) Pro Derzhavnyi biudzhet Ukrainy na 2023 rik [On the State Budget of Ukraine for 2023] (Law No. 2710-IX). Available at: https://zakon.rada.gov.ua/laws/show/2710-20#Text

36. Verkhovna Rada of Ukraine (2023) Pro Derzhavnyi biudzhet Ukrainy na 2024 rik [On the State Budget of Ukraine for 2024] (Law No. 3460-IX). Available at: https://zakon.rada.gov.ua/laws/show/3460-20#Text

37. Verkhovna Rada of Ukraine (2024) Pro Derzhavnyi biudzhet Ukrainy na 2025 rik [On the State Budget of Ukraine for 2025] (Law No. 4059-IX). Available at: https://zakon.rada.gov.ua/laws/show/4059-20#Text

38. World Bank, Government of Ukraine, European Commission, United Nations (2025) Ukraine Fourth Rapid Damage and Needs Assessment (RDNA4): February 2022–December 2024. Washington, DC: World Bank. Available at: https://documents1.worldbank.org/curated/en/099022025114040022/pdf/P1801741ca39ec0d81b5371ff73a675a0a8.pdf

39. World Bank, Government of Ukraine, European Commission, United Nations (2026) Ukraine Fifth Rapid Damage and Needs Assessment (RDNA5): February 2022–December 2025. World Bank. Available at: https://www.worldbank.org/en/news/press-release/2026/02/23/updated-ukraine-recovery-and-reconstruction-needs-assessment-released

40. Yurii E. O., Korbutiak A. H., Sokrovolska N. Ya. (2018) Osoblyvosti informatsiinoho zabezpechennia kaznacheiskoho obsluhovuvannia biudzhetu [Features of information support for treasury budget servicing]. Fizyko-tekhnolohichni problemy peredavannia ta zberihannia informatsii v infokomunikatsiinykh systemakh: VII Mizhnarodna naukovo-praktychna konferentsiia (Chernivtsi, November 8–10, 2018). Chernivtsi: Yuriy Fedkovych Chernivtsi National University, pp. 189–192. Available at: https://drive.google.com/open?id=1EvukGHsqXzIzrK1fJqNRXA2qLOz1Rsyt (in Ukrainian).

41. Verkhovna Rada of Ukraine, Committee on Budget Issues (2023) Komitet z pytan biudzhetu rozghlianuv zvity Kabinetu Ministriv pro vykonannia zakoniv «Pro Derzhavnyi biudzhet Ukrainy na 2021 rik» i «Pro Derzhavnyi biudzhet Ukrainy na 2022 rik» [The Budget Committee reviewed the Cabinet of Ministers' reports on the execution of the State Budget Laws for 2021 and 2022]. Available at: https://budget.rada.gov.ua/news/main_news/77500.html

42. Verkhovna Rada of Ukraine, Committee on Budget Issues (2024) Komitet z pytan biudzhetu rozghlianuv zvit Kabinetu Ministriv Ukrainy pro vykonannia Zakonu «Pro Derzhavnyi biudzhet Ukrainy na 2023 rik» [The Budget Committee reviewed the Cabinet of Ministers' report on execution of the Law on the State Budget of Ukraine for 2023]. Available at: https://budget.rada.gov.ua/news/Zakonoproektna_robota/Visnovki_ZP_golovni_9skl/78530.html

43. Verkhovna Rada of Ukraine, Committee on Budget Issues (2025) Komitet z pytan biudzhetu rozghlianuv zvit Kabinetu Ministriv Ukrainy pro vykonannia Zakonu «Pro Derzhavnyi biudzhet Ukrainy na 2024 rik» [The Budget Committee

reviewed the Cabinet of Ministers' report on execution of the Law on the State Budget of Ukraine for 2024]. Available at: https://budget.rada.gov.ua/news/main_news/79867.html

44. Verkhovna Rada of Ukraine, Committee on Budget Issues (2026) Komitet z pytan biudzhetu rozghlianuv zvit Kabinetu Ministriv Ukrainy pro vykonannia Zakonu «Pro Derzhavnyi biudzhet Ukrainy na 2025 rik» [The Budget Committee reviewed the Cabinet of Ministers' report on execution of the Law on the State Budget of Ukraine for 2025]. Available at: https://budget.rada.gov.ua/news/main_news/81651.html

45. U.S. Department of the Treasury (2025) Treasury Announces Agreement to Establish United States-Ukraine Reconstruction Investment Fund. Available at: https://home.treasury.gov/news/press-releases/sb0126

46. International Monetary Fund (2026) Ukraine: 2026 Article IV Consultation and First Review of the Extended Arrangement Under the Extended Fund Facility, Requests for Waivers of Applicability of Performance Criteria, a Waiver of Nonobservance of a Performance Criterion, and Financing Assurances Review. IMF Country Report No. 26/188. Available at: https://doi.org/10.5089/9798229053877.002

47. Ministry of Finance of Ukraine (2023) Uriad zatverdyv Poriadok vykorystannia koshtiv Fondu likvidatsii naslidkiv zbroinoi ahresii [The Government approved the Procedure for using the resources of the Fund for the Elimination of the Consequences of Armed Aggression]. Available at: https://mof.gov.ua/uk/news/uriad_zatverdiv_poriadok_vikoristannia_koshtiv_fondu_likvidatsii_naslidkiv_zbroinoi_agresii-3835

INTANGIBLE ASSETS IN THE DIGITAL ECONOMY: CORPORATE VALUE, ARTIFICIAL INTELLIGENCE AND RESILIENCE

Oksana Stepanenko[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-16

Abstract. Global digital transformation, the rapid advancement of artificial intelligence technologies, the expansion of the knowledge economy, and the integration of ESG principles are fundamentally reshaping the role of intangible assets in creating corporate value and ensuring the long-term resilience of companies. At the same time, traditional approaches to the valuation and accounting recognition of intangible assets fail to fully capture contemporary sources of economic value creation, highlighting the need to reconsider their functional role within modern business models. *The purpose* of this study is to provide a comprehensive examination of the role of intangible assets in the formation of corporate value and resilience through the analysis of their interaction with artificial intelligence, contemporary valuation models, and the sustainable development paradigm. *Methodology.* The study is based on a systemic, evolutionary, and interdisciplinary research framework. The methodological toolkit includes comparative analysis, generalisation, structural and logical modelling, conceptual synthesis, and a critical review of contemporary international approaches to the valuation of intangible assets, corporate value creation, and ESG-driven business transformation. *Results.* The study substantiates the interdependence between the development of artificial intelligence and the accumulation of intangible assets as mutually reinforcing drivers of economic value creation. Contemporary models for measuring the intangible value of businesses are systematized, and their role in supporting the information base for strategic management is identified. Furthermore, the evolution of the concept of intangible assets within the sustainable

[1] PhD in Economics, Associate Professor,
Accounting and Consulting Department,
Kyiv National Economic University named after Vadym Hetman, Ukraine
ORCID: https://orcid.org/0000-0002-8781-3762

© Oksana Stepanenko

development framework is examined, demonstrating the importance of integrating intangible assets into corporate resilience systems as strategic resources that enhance adaptability, innovation capacity, and the long-term development of businesses. *Practical implications.* The findings may be applied to improve corporate governance systems, develop methodologies for measuring intangible value, enhance integrated and non-financial reporting practices, and support the design of digital transformation strategies, intellectual capital management frameworks, and the implementation of ESG-oriented business practices. *Value/Originality.* The scientific contribution of the study lies in the development of an integrated conceptual framework that positions intangible assets as strategic resources simultaneously underpinning corporate value creation, the advancement of artificial intelligence technologies, and corporate resilience. Unlike traditional approaches, which primarily consider intangible assets as accounting objects or individual components of intellectual capital, this study proposes an integrated perspective that recognises intangible assets as a fundamental element of the digital economy and sustainable development.

INTRODUCTION

In the modern economy, the sources of corporate value creation are increasingly shifting from tangible resources towards intangible assets that underpin innovation-driven development, digital transformation, and the long-term competitiveness of businesses. The rapid proliferation of artificial intelligence technologies, the development of the knowledge economy, digital platforms, and ESG-oriented management models are substantially transforming approaches to understanding the economic nature of such assets and their role in business operations.

Intangible assets occupy a leading position in the contemporary system of corporate value creation and corporate sustainability. They generate long-term competitive advantages that cannot always be measured using traditional financial indicators. Brands, reputation, patents, software, and human capital form the foundation of market capitalisation, which often exceeds the book value of tangible resources. It is precisely through intangible assets that companies are able to retain customer loyalty and ensure stable cash flows.

Intangible assets underpin innovation-driven development, as knowledge and intellectual capital enable the continuous renewal of products and technologies. Social capital, in the form of partnerships and stakeholder trust, contributes to greater business resilience in the face of crises. Intangible assets also serve as a means of protection against competition, as patents and copyrights create barriers to entry for new market players.

At the same time, traditional accounting and financial reporting systems are predominantly oriented towards reflecting tangible resources, resulting in a gap between the book value and market value of companies. This highlights the need to reconsider the role of intangible assets in value creation processes, the assessment of business performance, and the achievement of long-term corporate sustainability. Particular importance is attached to investigating the relationship between the development of intelligent technologies, the accumulation of intangible resources, and the transformation of contemporary business models. There is a growing need to improve methodological approaches to measuring the economic value of intangible assets, which increasingly determine companies' investment attractiveness and market capitalisation.

Another important area of research is the integration of intangible assets into the concept of corporate sustainability, which involves a balanced combination of economic, social, and environmental aspects of development. In this context, intangible assets should be regarded not merely as accounting objects or outcomes of intellectual activity, but as a strategic resource capable of fostering adaptability, innovation potential, and long-term business value. Therefore, a comprehensive examination of their role in corporate value creation, the development of contemporary valuation models, and the achievement of corporate sustainability is of particular theoretical and practical significance. Consideration of these aspects makes it possible to develop a comprehensive understanding of the transformation of the functions of intangible assets in the digital economy and to identify promising directions for the development of corporate governance, financial reporting, and investment policy.

1. Artificial Intelligence and Intangible Assets: Interdependence and Value Creation

The most valuable component of corporate value lies in invisible assets embedded in lines of code, neural networks, and the collective knowledge

of technical teams. Financial reporting is well suited to capturing the value of tangible assets, but it does not show the true value of artificial intelligence (AI) capabilities, which are increasingly driving corporate success. Artificial intelligence highlights the fact that most corporate value is derived from intangible assets. In 1975, tangible assets accounted for 83% of the market value of *S&P 500 companies* [1], while intangible assets accounted for only 17%. By the end of 2025, this proportion has changed dramatically: intangible assets account for about 92% of the S&P 500 market capitalization, while tangible assets have decreased to 8%. In the current economic environment, companies generate a share of their cash flows from intangible assets. They underpin firms' ability to compete, invest, sustain cash flows, generate profit growth, and deliver returns to investors.

From an accounting perspective, IAS 38 "Intangible Assets" [2] defines an intangible asset as an identifiable non-monetary asset without physical substance. For an intangible asset to be recognised in the financial statements, it must satisfy the relevant recognition criteria, including identifiability, control, and the probability of future economic benefits. Brand Finance's Global Intangible Finance Tracker (GIFT™) [3] uses the concept of *"implied (or undisclosed) intangible assets"* to refer to them. They do not have a clearly defined legal form or documented evidence, but they can have a significant impact on economic value creation.

Implied intangible assets do not arise independently; rather, they emerge from coordinated actions and the efforts of individuals and teams within a company. An IT worker writes programme code, a sales manager builds relationships with customers, a researcher documents discoveries, a marketing team develops a new brand – all of these activities contribute to the creation of intangible value. These assets are not static inventories that are stored in a warehouse. They are products of human cooperation, formed on the basis of decisions, actions and organisational learning. This human dimension is essential for understanding implied intangible assets in the context of artificial intelligence. Their creation requires a clear alignment between functions, incentives and capabilities. AI does not replace human activity; it interacts with it and amplifies it. Artificial intelligence systems and models learn from human-generated outputs, while their outputs influence human decisions. Together, these interactions create a continuous cycle of human-AI collaboration and value creation.

Artificial intelligence provides computers and machines with the ability to simulate intelligent functions and solve complex problems. As part of the study, the *World Intellectual Property Organization (WIPO)* and *Luiss Business School (LBS)* presented a specific investment model [4], which explains the rapid growth of both tangible and intangible assets in sectors that create and use artificial intelligence tools. The model identifies several waves of investment:

1) *in tangible* assets that ensure the physical deployment of artificial intelligence technologies (servers, data centres, equipment, energy infrastructure);

2) *investment in three groups of intangible assets*: digitised information (big data, knowledge bases, digital archives); innovative property (patents, algorithms, software); and economic competencies (personnel skills, organisational practices, managerial knowledge).

The future development and use of AI depend equally on investment in intangible assets (Table 1, Table 2):

– *digital information:* data are a critical element for artificial intelligence, along with computing software. AI companies are investing in machine learning tools, training databases, and proprietary platforms. Sectors using AI are digitising information and implementing industry tools;

– *innovative property:* AI developers engaged in prototype research, microchip design, and patent portfolio building; users integrate artificial intelligence into products and services, while protecting industry knowledge;

– *economic competencies:* artificial intelligence drives investment in human potential and institutional transformation. AI developers and users focus on talent development, process transformation, trust building, and restructuring with AI-integrated workflows in mind.

Intangible assets power AI, and artificial intelligence creates intangible assets. As *Paul Adams and Jason Strimpel* note*,* "the relationship between artificial intelligence and intangible assets is not a one-time transaction, but a continuous cycle" [5]. The authors refer to such relationships as the *"flywheel effect",* which increases the competitive advantage for those who manage it – and accelerates decline for those who do not. The key stages of the relationship between intangible assets and artificial intelligence are:

1) *Generation of proprietary microdata (internal data and information)*: the company's existing intangible assets – its customer relationships,

operational processes, industry expertise, content – generate flows of its own data. This is not publicly available data, such as information from Wikipedia, public datasets, or industry benchmarks; rather, it is company-specific data: transaction patterns, customer behaviour, operational anomalies, decision history. This is critical – universal AI trained on public data provides capabilities that competitors can replicate. AI trained on its own microdata generates differentiated insights that create a sustainable competitive advantage.

2) *Artificial intelligence processes and learns from microdata:* AI systems absorb their own microdata, discovering patterns, relationships, and predictions that would be invisible to human analysts. The effectiveness of this training is critically dependent on the quality, depth, and historical continuity of the data. AI requires dynamic time-series data – long-term records that reflect how variables change over time – to benchmark performance, identify trends, and improve forecasts. Companies that systematically collect and store historical data are better positioned to benefit from AI than those whose data practices are episodic or fragmented.

3) *AI outputs and intangible assets*: better solutions, new products, operational efficiency, predictive capabilities – increase the value of existing intangible assets and create new ones. Customer relationships become more valuable when AI-powered personalisation increases customer retention. A dataset becomes more valuable when AI-generated insights reveal previously hidden business opportunities. Software becomes more valuable when AI optimises performance.

4) *Improved intangibles generate more valuable data*: Intangible assets based on AI models generate better, more valuable data streams (which go back to the first stage). Customer relationships that have been strengthened by AI-powered personalisation generate more granular behavioural data. An optimised business process generates more accurate operational telemetry. The flywheel is accelerating – each stage of this cycle increases corporate value and increases the value of intangible assets. Companies that activate the flywheel early and manage it effectively gain an advantage over their competitors. Those who do not activate the flywheel – or fuel it with weak foundations of intangible assets – gradually find themselves at a disadvantage. Figure 1 shows the model of interaction between the company's intangible assets and artificial intelligence.

Table 1

Investment in Intangible Assets in the Production of Artificial Intelligence Tools

Category	Short-term perspective	Long-term perspective
Digital information (software and databases)	Machine learning tools and training data	Proprietary AI platforms, training systems
	Cloud data licensing	Large-scale datasets, data management
	Data infrastructure	
Innovative Property (R&D, IP, design, financial products)	Research and development at the prototype level	Algorithms, chips, patent and intellectual property portfolios
	Early chip development and patent filing	AI-based interfaces and industrial systems
	User Experience (UX) modelling	New risk financing instruments
Economic competencies (market research, branding, training, skills)	AI product landscape analysis, identification of new branding opportunities	Building leading brands and developing an ethical positioning strategy for AI
	Experimental groups for AI development	Integration of AI across organisational units and deployment of AI services on the platform
	Recruitment and engagement of AI development personnel and initial training	Continuous learning and AI academies

Source: constructed by the author based on information [4]

This flywheel effect explains why investing in AI without visibility into intangible assets is strategically disadvantageous. If a company does not know what assets it possesses, it cannot effectively fuel the flywheel. If microdata are not systematically collected and stored, the flywheel cannot accelerate effectively. And if a company does not value assets created using AI tools, the company underestimates its long-term value-creation potential and, accordingly, will not be able to allocate capital wisely to maintain its momentum.

Table 2

Investment in Intangible Assets in Sectors Using Artificial Intelligence Tools

Category	Short-term perspective	Long-term perspective
Digital information (software and databases)	Implementing industry-specific AI tools	Real-time data integration systems
	Digitisation of workflows and collection of operational data	Digital twins and interoperable data infrastructures
	Training data	
Innovative Property (R&D, IP, design, financial products)	AI integration in products and processes	Intelligent product lines and proprietary AI models that can be customised to meet customer needs
	Pilot industry implementation of design	AI-enabled industrial development and financial services
Economic competencies (market research, branding, training, skills)	AI services market research	End-to-end branding of AI-based services
	Joint pilot projects with infrastructure partners	Organisational reorganisation to adapt to AI-based activities
	AI testing workflows, AI recruiting	Scaling continuous AI learning, training, and enhancing functional skills across all organisational units

Source: constructed by the author based on information [4]

Modern tools and platforms have greatly simplified the process of prototyping AI-based solutions; however, the transition from experimental development to large-scale deployment remains challenging. Particular difficulties arise in ensuring the stability, security and responsible functioning of such systems in real business processes. Scaling AI requires not only technical sophistication and performance of AI models, but also robust system architecture, reliable engineering infrastructure, and systematic risk management. A proof of concept usually focuses on demonstrating the capabilities of the technology; however, this is not enough to generate practical value for the company. Developing viable AI-powered products and services requires integrating technological, organisational, and legal aspects. Additionally, it is necessary to take into account ethical principles,

requirements for transparency and data protection, as well as employees' readiness to work with new tools. Effective implementation of AI involves a comprehensive approach to management that covers the entire life cycle of the system – from initial concept to operational deployment. In this context, AI should not be viewed as a standalone technological experiment but as a strategic intangible asset requiring long-term planning and responsible stewardship.

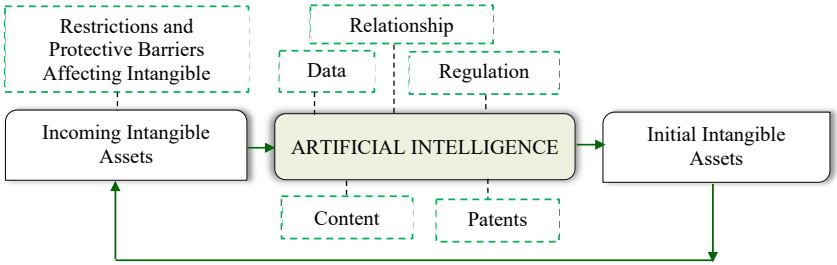


Figure 1. Model of the Relationship between Intangible Assets and Artificial Intelligence

Source: built by the author based on information [5].м

Despite significant initiatives in talent, infrastructure, and experimentation, most AI initiatives never scale. According to the results of a *McKinsey survey* [6], almost two-thirds of enterprises remain in the experimental phase, unable to implement AI in core operations, where it can significantly affect productivity. The adoption and scaling of enterprise AI in large, organisationally complex companies face obstacles including strict regulatory requirements, legacy technology platforms, and functionally siloed workflows. The pattern is consistent: companies are trying to scale AI as a technology initiative, while the real success factor is the alignment of leadership and the operating model built for enterprise adoption.

Achieving a positive return on investment in intangible assets does not necessarily require complex or excessively costly interventions, but requires a systematic and balanced approach. It is advisable for management to start by clearly aligning AI initiatives with defined strategic or operational outcomes and establishing performance evaluation criteria in advance.

Defining success indicators at the planning stage creates the basis for an objective analysis of the feasibility of implementing models. When the objective is to reduce customer churn, it is advisable to use predictive tools that identify loyalty factors and customer attrition risks. In the presence of a clearly defined baseline, such models can demonstrate practical value within a relatively short period. If the priority is to improve operational efficiency, a systematic analysis of current processes, cycle times and error rates is the basis for further improvements. Linking AI initiatives to business goals ensures transparency of investment decisions and increases the likelihood of generating sustainable economic benefits.

Companies that invest in responsible AI generate business value in the form of innovation, efficiency, and trust. The integration of responsible practices creates systems that scale, provide measurable impact, and gain the trust of stakeholders. According to the results of a survey of 310 US business leaders, *PwC* [7] identifies key benefits (business outcomes) that can be derived from responsible AI management practices:

1) increased return on investment in AI (58% of respondents);
2) more efficient customer engagement (55%);
3) enhanced innovation (55%);
4) stronger cybersecurity and data protection (51%);
5) greater transparency of information and information flows (41%).

Also, the results of the *PwC* survey [7] focus on the barriers that arise in the process of implementing responsible artificial intelligence: (1) the complexity of converting principles into scalable and operational processes (50% of respondents); (2) cultural resistance to change (40%); (3) limited budgets or resources (38%); (4) lack of technological tools or technical factors (37%). A responsible approach to the use of artificial intelligence is a key prerequisite for ensuring long-term economic returns on investments in relevant technologies. Companies need to establish corporate governance systems capable of adapting to the pace of technological change and maintaining appropriate standards over time. Such governance should be based on the integration of ethical norms, internal regulations and monitoring mechanisms that ensure the consistency of technological solutions with strategic priorities and societal expectations.

Intangible assets – data, intellectual property, branding, workflows, human capital – transform hardware into intelligent, reliable performance

systems. The combination of physical infrastructure and intangible capabilities generates the economic value of artificial intelligence, and the investment structure reflects a dual nature: physical infrastructure and general-purpose technology. The global growth in software investment reflects not only the ever-accelerating digital transformation, but also the convergence of AI-powered technology development. In this case, AI acts as fuel, and software acts as a machine.

Software spending will grow steadily, driven by the introduction of AI tools, a steady stream of investment in cloud infrastructure, and the growing importance of scalable, intelligent software in various sectors of the economy. In practice, AI is based on a multi-level architecture, which includes:

1) data infrastructure for collection and labelling;

2) an environment for training models (such as TensorFlow and PyTorch);

3) deployment environments based on CI/CD pipelines using Docker and Kubernetes for scalable real-time operation.

In 2024, global software spending reached $675.0 billion (excluding inflation), representing an increase of almost 50% compared with 2020 ($454.0 billion) [8]. This trend shows a significant increase in investment in software development and improvement, which began following the end of the pandemic. The increase in investment flows comes at the same time as the expansion of the e-commerce sector and the development of artificial intelligence technologies. This growth is not a one-time leap; it is an established "new normal" in the digital economy: annual software spending remains high, with no substantial decline expected.

The United States remains the leading investor in software. In 2024, it invested $368.5 billion, exceeding the combined software expenditure of all other countries. This was approximately six times China's expenditure and 16 times Germany's expenditure. US investment in software also exceeds total software expenditure in the European Union (EU). EU spending in 2024 amounted to $117 billion, which was less than one-third of US expenditure. The United States spends more than twice as much on software as the EU and China combined (Figure 2).

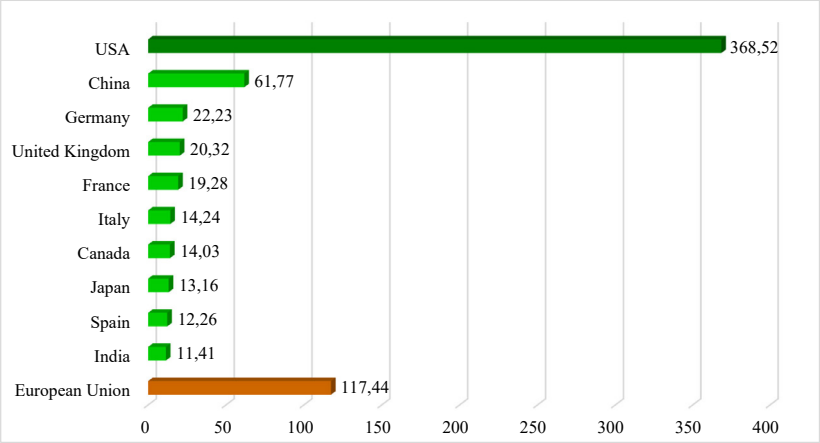


Figure 2. Software Investment in the World's Leading Economies (US$ billions), 2024

Source: based on information from [8]

With its distinctive AI-powered software ecosystem, the United States has further strengthened its advantage in software investment. Companies such as OpenAI, Google, Microsoft, Amazon, Meta are not only developing cutting-edge AI models but also integrating them into major software platforms. In addition, the US has the resources to scale innovative solutions such as infrastructure with embedded AI, automated machine learning, and explainable AI (XAI). China, whose software spending reached $61.77 billion in 2024, retains its status as the second-largest software investor. China has a large domestic market for the adoption of AI-based technologies – from fintech and logistics to smart cities and surveillance technologies. Companies such as Baidu, Alibaba, Tencent, Huawei have substantial capabilities for developing AI-integrated software at scale. Germany ranks third in the world in terms of software investment at $22.23 billion in 2024. The United Kingdom ranks fourth globally in software investment, at $20.32 billion, and is a European leader in AI development. In 2024, France invested $19.28 billion in software, underscoring its ambition to become one of the world's leaders in artificial intelligence. Innovation hubs such as Station F, together with initiatives

such as La Mission French Tech, have contributed to a dynamic start-up ecosystem that includes prominent AI companies such as Mistral AI and Hugging Face.

According to WIPO's 2025 findings [9], leadership in the global intangible economy remains multifaceted:

1. The United States dominates in absolute investment ($4.9 trillion), followed by Japan ($810.0 billion), Germany ($727.9 billion), France ($663.5 billion), and the United Kingdom ($610.2 billion).

2. Sweden leads in terms of intangible investment intensity as a share of GDP (17.4%). It is followed by the United States (15.6%), France (15.2%), Denmark (14.9%), and Finland (14.8%).

3. India shows the fastest growth in intangible investment among the 15 largest economies (7.9% during 2024-2025). Japan follows at 4.8%, followed by the Philippines (4.6%), the United States (4.4%), and Germany (3.3%).

Software and data are the fastest-growing categories of intangible assets, driving productivity growth, especially in service industries and sectors that use artificial intelligence (AI) tools. In relation to this group of assets, according to *the WIPO Report* [9], investment growth in 2025 was observed in the following countries: Brazil, Bulgaria, Canada, Czech Republic, Estonia, Finland. The highest shares of research and development (R&D) expenditure in total intangible investment were recorded in Japan and Germany, at 33.5% and 30.8%, respectively, which is consistent with their strong industrial and manufacturing base. Denmark (28.8%), Croatia (28.4%) and the United States (22.7%) also have high shares in R&D, while the United Kingdom (13.5%) and France (13.4%) have more moderate shares. R&D has a much smaller share in middle-income economies: 12.7% in India, 6.6% in Brazil and 5.5% in the Philippines.

Among the 29 economies covered in this report, representing 57 percent of global GDP, intangible investment in 2025 reached an all-time high of more than US$10 trillion [9]. Investments in intangible assets such as software and databases, intellectual property, research and development (R&D), brands, and design account for the dominant and growing share of global gross domestic product.

In the context of global economic competition, intangible assets have a significant impact on the performance and prospects of both companies

and countries. Investing in intangible assets allows companies to strengthen competitive advantage, accumulate intellectual property, drive innovation and growth, attract top talent, build customer loyalty, and ultimately ensure success in the market. Although intangible assets are often less visible than physical assets, they have a significant impact on everyday life, contributing to improved economic prospects, the creation of higher-paying jobs, and improved product quality and reliability.

2. Models for Measuring the Intangible Value of a Business

Financial reporting information systematically understates both corporate profits and the book value of companies, particularly when they actively invest in intangible assets, including but not limited to artificial intelligence. This manifests itself in the following ways:

1) *Distortion of reported performance (particularly in terms of profit)*:

– research expenditure is recognised immediately as an expense, while qualifying development expenditure is capitalised and subsequently amortised;

– expenditure on employee training and development reduces current earnings despite contributing to the creation of future value;

– marketing expenditure aimed at building brand value is treated as an expense, despite contributing to the development of long-term customer relationships;

2) *Cash flow-related issues*:

– periods of high initial investment result in negative free cash flow, despite the development of valuable future capabilities;

– traditional free cash flow metrics do not distinguish between growth investment and maintenance investment;

– working capital metrics do not capture investments in data and intellectual property;

3) *Understatement of the company's book value:*

– successfully developed internally generated software is effectively assigned a book value of zero; consequently, even when a company creates a valuable tool for its own use, it is not recognised in financial reporting as an asset with a monetary value;

– accumulated organisational knowledge is not reflected in the balance sheet and is therefore effectively assigned a value of zero;

– the value of a brand created through marketing is not recognised as a company asset and is not presented in the financial statements.

Intangible assets are a dominant yet largely invisible source of contemporary corporate value. This invisibility creates significant challenges for capital allocation, management, and valuation. At the same time, artificial intelligence is fundamentally changing how these assets are created, enhanced, and deployed, while also relying on them to achieve its own effectiveness. Artificial intelligence is not merely a tool that interacts with and operates with intangible assets. Rather, it is a driver of transformation that reshapes data collection processes, knowledge organisation, and decision-making.

Companies that do not understand the capabilities of their intangible assets will be unable to objectively assess the effects of AI implementation. Conversely, companies that incorporate AI tools into their business processes but fail to fully recognise the outcomes they generate may face problems related to inefficient capital allocation and the underestimation of risks. In this context, the relationship between intangible assets and AI is interdependent. Intangible assets fuel AI, while artificial intelligence creates intangible assets. *Paul Adams* and *Jason Strimpel* [5] refer to this interrelationship as the "flywheel effect", which was discussed in the previous section.

AI intersects with intangible assets in a distinctive way: intangible assets simultaneously serve as *inputs to* AI workflows and as *outputs* of investment and use. This creates a feedback loop – a flywheel – in which intangible assets generate proprietary data, AI consumes and learns from this data, AI outputs enhance intangible value through better decisions and new products, and improved intangible assets generate richer data, thereby continuing the cycle.

Each AI initiative delivers not only immediate operational benefits but also residual intangible assets, including data, software, and know-how, that persist beyond the scope of the project. This relationship highlights the critical importance of understanding and accurately valuing intangible assets.

Myron Scholes, an adviser to the Andersen Institute, notes: "Intangible assets now account for the majority of enterprise value, yet they remain largely invisible in financial reporting. AI systems consume these assets

as key inputs and transform them into new sources of value. As AI becomes central to business performance, leaders must understand which intangible assets the enterprise controls and how they contribute to value creation. Without rigorous measurement of this relationship between AI and intangible assets, capital allocation to AI will remain driven more by assumptions than by evidence" [5].

Unrecognised intangible assets and assets created using AI models have a tangible impact on the corporate value of businesses across various sectors:

1) Software and technology:

– AI-based language models developed by *Google*, such as BERT and LaMDA, require substantial investment in research and development, which is recognised as an expense despite contributing to the development of foundational technologies that generate significant sources of revenue;

– expenditure on the development of *TikTok's* recommendation algorithms is expensed immediately, although this AI system generates unprecedented levels of user engagement and advertising value;

– *NVIDIA's* development of AI-based software is recognised as current expenditure, despite creating long-term competitive advantages in AI acceleration;

2) Media and entertainment:

– *Disney's* investments in AI-based content recommendation and production tools are reflected as expenditure, despite increasing customer engagement with its streaming services;

– *Netflix's* expenditure on artificial intelligence for content personalisation and optimisation reduces current profits but creates valuable predictive capabilities;

– the development of *Meta's* AI-based content moderation system is treated as expenditure, despite creating value for the platform;

3) Retail:

– *Costco's* investments in AI-based inventory management and demand forecasting reduce reported profits while simultaneously delivering sustained improvements in operational efficiency;

– expenditure on the development of *Nike's* AI-based platforms obscures the company's future revenue potential;

– *Amazon's* investments in robotics and AI-driven logistics are treated as expenditure, despite creating substantial automated order-fulfilment capabilities.

More than 90% of the value of modern companies is underpinned by intangible assets. However, most companies are unable to fully identify, measure, or manage these assets. Traditional accounting frameworks, such as IFRS 3 [10] and IAS 38 [2], capture only a proportion of these assets – typically 20–40% of total intangible value. The remainder represents strategic value that remains unmeasured. Table 3 presents the benefits of making intangible assets visible in corporate reporting and the consequences of their remaining unrecognised.

Table 3

Value and Risks of the Invisibility of Intangible Assets in Financial Reporting

Aspects	Benefits of Visibility	Consequences of Invisibility
Transparency	Investors and partners can see the actual structure of the company's value	Lack of confidence in financial reporting; risk of business undervaluation
Company valuation	Provides a more accurate reflection of market capitalisation and growth potential	The company may appear less valuable than it actually is
Investment attractiveness	Demonstrates innovation, a strong brand, and a customer base	Investors may underestimate the company's prospects and decide not to invest
Asset management	Management has the tools to allocate resources effectively	Strategic decision-making becomes more difficult, increasing the risk of losing valuable resources
Tax implications	Amortisation of intangible assets may reduce taxable profit	The business loses opportunities to optimise its tax position
Corporate reputation	Highlights the strengths of the business (brand, culture, and innovation)	The actual value of the brand and corporate culture remains "invisible" to external stakeholders

Source: compiled by the author based on the findings of the study

To assess the intangible assets that create corporate value, specialists at *Opagio Intangibles* [11] have developed a comprehensive methodology –

the *Opagio 12™ Framework*. It provides a taxonomy of 12 strategic drivers (Table 4) covering the full spectrum of intangible value. Its purpose is to identify and structure the intangible assets that account for 90% of the value of modern companies.

Table 4

Structure of the Opagio 12™ Framework

№	Driver (category)	Types of assets included in the driver
1	*Brand & Reputation*	Registered trademarks, brand equity, domain names, market recognition, and reputation capital
2	*Customer Capital*	Customer contracts, relationships and loyalty, and retention rates
3	*Network Effects & Platforms*	Multi-sided marketplaces, platform ecosystems, viral growth, API networks, and user-generated content
4	*Technology & Innovation*	Patents, proprietary software, R&D capabilities, trade secrets, and technical architecture
5	*Data & Intelligence*	Proprietary datasets, predictive models, customer behavioural data, and competitive intelligence
6	*Human Capital*	Team talent, specialised expertise, institutional knowledge, training programmes, and the value of key professionals
7	*Organizational Capital*	Documented processes, guidelines, management frameworks, operational efficiency, and decision-making systems
8	*Ecosystem & Partnerships*	Strategic partnerships, distribution networks, platform integrations, co-marketing relationships, and consultant networks
9	*Content & IP*	Published content, research, proprietary frameworks, copyrights, educational content, and thought leadership
10	*Regulatory & Compliance Capital*	Operating licences, regulatory approvals, certifications (ISO, SOC 2), legacy data, and compliance infrastructure
11	*Switching Costs & Lock-In*	Contractual lock-in, depth of integration, retraining costs, data migration friction, and ecosystem dependencies
12	*Culture & Ways of Working*	Company values, a culture of innovation, psychological safety, customer orientation, and organisational structure

Source: compiled by the author based on information from [11]

Taken together, these 12 categories provide a comprehensive map that enables the identification and management of modern corporate assets and, accordingly, becomes a driving force for value creation in the AI era.

This model differs substantially from those used in Purchase Price Allocation (PPA). Under IFRS 3, purchase price allocation (PPA) is required for business combinations, where the purchase price paid for a company is allocated to the identifiable assets acquired and liabilities assumed at their fair values, with the residual amount recognised as goodwill. This is important for the transparency of financial reporting and the accurate recognition of future amortisation expenses. PPA frameworks are generally retrospective and compliance-oriented.

Each *Opagio 12*™ driver corresponds to established classification systems – the Corrado-Hulten-Sichel (CHS) framework, the types of intangible assets recognised under international accounting standards, and the *Six Capitals* model – thereby providing a comprehensive spectrum of business value.

The *Six Capitals* model provides a systematic framework for understanding and reporting on value creation by tracking stocks of financial, manufactured, intellectual, human, social and relationship, and natural capital required for the sustainable health of the planet. It serves as an accounting identity for planetary stewardship and requires companies and countries to track their depletion or accumulation through interconnected forms of wealth. This concept directly challenges the externalisation of costs that characterises industrial economies, recognising that the depletion of one form of capital may be temporarily concealed by gains in another. *The Six Capitals model offers a rethinking of organisational wealth, asserting that value is preserved not only in balance sheets but also in living stocks of natural, social, and human resources.* The *Six Capitals* model groups value-generating resources into six categories, four of which are covered by *Opagio 12*™ (Table 5).

IFRS 3 [10] identifies five classes of identifiable intangible assets for purchase price allocation (PPA). Not all 12 *Opagio 12*™ drivers correspond to the requirements of this standard. Within this methodology, they reflect hidden forms of value that are not captured in traditional accounting: human capital (*Human Capital*), organisational capital (Organizational Capital), and culture and ways of working (*Culture & Ways of Working*).

Table 5

Relationship between *the Six Capitals Model* and Opagio 12™ Drivers

Six Capitals Model Categories	Opagio 12™ Drivers
Intellectual Capital	*Technology & Innovation* *Data & Intelligence* *Organizational Capital* *Content & IP*
Social and Organisational Capital	*Brand & Reputation* *Customer Capital* *Network Effects & Platforms* *Ecosystem & Partnerships* *Switching Costs & Lock-In*
Human Capital	*Human Capital* *Culture & Ways of Working*
Natural Capital	Regulatory & Compliance Capital

Source: compiled by the author based on information from [11]

The *Corrado-Hulten-Sichel (CHS)* framework is a widely used academic taxonomy for intangible investment. It groups intangible assets into categories that reflect strategic business decisions rather than accounting standards. The CHS framework is an economic measurement methodology that expands the traditional concept of capital by treating investment in intangible assets as equivalent to investment in tangible capital. It demonstrates that business expenditure on innovation, brands, data, and human capital should be treated as investment rather than current expenditure. CHS illustrates that official measures of GDP and productivity underestimate actual growth when intangible investment is not taken into account. Table 6 presents the relationship between the *Opagio 12*™ drivers and the categories of intangible assets identified by CHS.

The practical application of the *Opagio 12*™ *Framework* for measuring intangible assets provides a systematic approach to their identification and assessment. It enables companies to structure their intangible resources into twelve categories, thereby facilitating a more accurate representation of the sources of corporate value creation. This increases the transparency of corporate reporting and makes businesses more attractive to investors by demonstrating their actual economic strength beyond the balance sheet. The model helps management make strategic decisions based on intangible

drivers of competitiveness. In the long term, this contributes to building a strong and sustainable reputation and enhancing a company's ability to adapt to the challenges of the digital economy.

Table 6

Relationship between Corrado-Hulten-Sichel (CHS) Categories and Opagio 12™ Drivers

CHS Categories	Opagio 12™ Drivers
Brand	*Brand & Reputation* *Customer Capital*
Technology	*Network Effects & Platforms* *Technology & Innovation* *Data & Intelligence* *Switching Costs & Lock-In*
Human Capital	*Human Capital* *Culture & Ways of Working*
Organisational Capital	*Organizational Capital* *Ecosystem & Partnerships* *Regulatory & Compliance Capital* *Culture & Ways of Working* *Switching Costs & Lock-In*
Intellectual Property	*Content & IP*

Source: compiled by the author based on information from [11]

In contemporary economic research and management practice, intangible assets are regarded as key sources of corporate value creation. However, different research and methodological approaches propose their own frameworks for identifying and measuring these assets (Table 7).

The *Corrado-Hulten-Sichel (CHS) Framework* focuses on the macroeconomic measurement of investment in intangible resources, whereas the *Six Capitals* model integrates economic, social, and environmental aspects into reporting; the *Opagio 12™ Framework* offers a detailed taxonomy of intangible assets at the individual company level. A comparison of these three models highlights their complementarity, ranging from macroeconomic analysis to corporate management and integrated reporting.

Table 7

Models for Measuring Intangible Assets: A Comparative Analysis

Model	Essence	Methodology	Economic Focus	Strengths
Corrado-Hulten-Sichel (CHS) Framework	Expands the concept of capital by treating expenditure on intangible assets as investment	Use of national accounts; classification of expenditure on R&D, brands, organisational and human capital	Macro-economic measurement of productivity and GDP	Demonstrates the actual contribution of intangible assets to economic growth
Six Capitals	Reflected in integrated reporting and comprises six types of capital: financial, manufactured, intellectual, human, social, and natural	IIRC methodology; focus on long-term value creation and sustainability	ESG reporting; balancing economic, social, and environmental outcomes	Provides a multi-dimensional view of business value; aligned with the SDGs
Opagio 12™ Framework	Taxonomy of 12 intangible asset drivers	Systematic classification of assets, combining accounting standards and economic models	Micro-economic level – valuation of companies in M&A and PPA	Makes invisible assets visible and supports strategic management

Source: compiled by the author based on the findings of the study

In models for measuring the intangible value of a business, intellectual property serves as a key driver of innovation and competitiveness. Its proper assessment makes it possible to transform invisible assets into tangible economic strength. It provides legal protection and opportunities for the commercial use of the results of creative and scientific activities. For businesses, this involves not only value creation but also the development of a long-term competitive strategy.

In the digital era, intellectual property encompasses not only traditional objects, such as patents, copyrights, and trademarks, but also digital assets, including algorithms, software, databases, digital content, and artificial

intelligence. As artificial intelligence technologies develop, new challenges are emerging regarding the determination of authorship and the protection of rights to AI-generated outputs.

Intellectual property is not merely a legal construct but also a strategic resource that determines the level of innovative development and economic growth in the contemporary world. It is a key factor in the monetisation of intangible assets, contributing to investment attraction, the development of technological ecosystems, and the creation of competitive advantages. Through commercialisation, licensing, and integration into business processes, intellectual property becomes an instrument for stimulating innovation and enhancing global competitiveness.

Intellectual property as an economic category has a multi-layered nature. In addition to its basic (classical) characteristics – functionality, a two-level structure, and a system of rights and obligations – its essence is revealed through additional aspects, including market valuation, legal regulation, its impact on competitiveness, and commercialisation mechanisms (Figure 3). Taking these factors into account makes it possible to assess more accurately the role of intellectual property in the contemporary economy and to determine strategies for its effective use.

The development of digital technologies makes it possible to identify specific characteristics of intellectual property that can help address contemporary challenges and assess the opportunities and risks associated with its use:

1) Digital replication and scalability are distinctive features of intellectual property in the contemporary economy. Thanks to digital technologies, intellectual property objects such as software, algorithms, databases, NFTs, and elements of artificial intelligence can be copied, transferred, or modified instantaneously without physical limitations. They differ substantially from traditional intangible assets because digital products are not subject to depletion and can be used indefinitely without losing their value. This opens up new opportunities for monetisation through subscription-based models, licensing, and global digital markets. However, there is another side to this: the ease of copying creates risks of uncontrolled distribution, increasing the importance of digital protection, the use of blockchain technologies, and new approaches to intellectual property rights management. As a result, approaches to IP valuation are changing, with factors such as the level of

protection, the uniqueness of an algorithm, and its scalability in the global environment playing an important role.

2) Automated generation and use of intellectual property in the era of artificial intelligence (AI) and Big Data is changing traditional notions of authorship and the legal status of intangible assets. Machine-learning algorithms are capable of creating unique texts, images, music, software code, and other objects that were previously considered exclusively products of human creativity. This raises questions regarding the allocation of rights among the algorithm developer, the user, and the AI system itself. From an economic perspective, the automated generation of intellectual property creates new opportunities for business scalability, lower development costs, and faster innovation. At the same time, legal uncertainty surrounding the regulation of such objects complicates their commercialisation and creates risks of unauthorised use. This creates a need to develop international standards and mechanisms for protecting intellectual property rights in AI-generated outputs to ensure their effective economic use.

3) Global accessibility and the digital transboundary nature of intellectual property are distinctive features of the digital era. Thanks to the development of the internet and cloud technologies, intellectual property objects such as software, digital content, algorithms, and data can be distributed instantaneously worldwide. This creates opportunities for business scalability, access to international audiences, and increased revenues through global digital platforms. The transboundary nature of intellectual property complicates its legal regulation because copyright, patent protection, and trade secret laws vary across countries. At the same time, risks arise in connection with piracy, uncontrolled use of content, and the need to harmonise international legal norms. Effective management of digital assets requires the use of global licensing agreements, blockchain technologies, and mechanisms for protecting intellectual property rights.

4) Cybersecurity and threats of digital piracy constitute a challenge associated with the protection of intellectual property. The rapid dissemination of digital content through the internet and the development of artificial intelligence technologies significantly facilitate the unauthorised use of copyrighted materials, software, and trade secrets. Cybercriminals actively employ hacking, illegal copying, and the distribution of content through the dark web and file-sharing platforms, causing billions in losses to rights holders. To combat digital piracy, advanced technologies are used,

including: 1) *blockchain*, which enables transparent recording of ownership rights; 2) *smart contracts*, which automatically regulate the conditions for the use of digital assets. Companies also implement *AI algorithms for content monitoring*, digital watermarks, and encryption to make unauthorised copying more difficult.

5) Intellectual property as an element of digital platforms and ecosystems – the uniqueness of this process lies in the fact that a significant proportion of intellectual property is created not only by corporations but also by their users, through content, data, reviews, software development, and even interactions with artificial intelligence algorithms. Accordingly, new challenges arise for traditional notions of ownership, particularly in relation to rights to user-generated content, algorithmic recommendations, and collected data. Digital platforms gain a competitive advantage by monetising these assets through advertising mechanisms, Big Data analytics, and personalised services. Ensuring a fair distribution of rights and benefits requires modern legal regulation that takes into account both the interests of companies and users' rights to their digital contributions. This makes intellectual property not only a legal but also a socio-economic category that is shaping new rules of the game in the global digital environment.

The rapid development of digital technologies is changing approaches to understanding intellectual property and its place and role in the business processes of an enterprise. In the context of the present study, the category of ***"intellectual property"*** is proposed to be defined *as the outcomes of human intellectual, creative, innovative, and digital activities that acquire economic value through their legal protection, commercialisation, and integration into business processes; serve as a strategic, financial, and competitive resource of an enterprise in the form of an intangible asset; contribute to the development of the digital economy, the formation of global technological ecosystems, and the achievement of competitiveness amid rapid digital transformation.*

The market valuation and liquidity of intellectual property make it possible to regard it as a strategic financial asset. In high-tech industries, such as IT, pharmaceuticals, and biotechnology, a significant proportion of companies' market capitalisation is based precisely on such assets. At the same time, the economic value of intellectual property depends to a considerable extent on the effectiveness of legal protection, confirming the need to improve national and international legislation in this area.

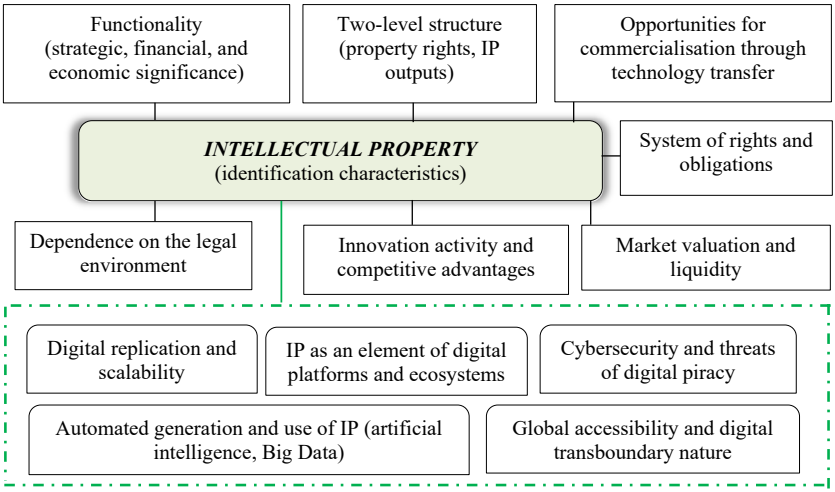


Figure 3. Identification Characteristics of Intellectual Property in the Era of Digital Technologies and Artificial Intelligence

Source: developed by the author based on information from [12]

3. Intangible Assets as a Foundation for Corporate Sustainability and Sustainable Development

Intangible assets in the context of sustainable development represent non-physical elements that underpin ecological health, social cohesion, and economic resilience. They form the foundation of functioning socio-ecological systems, providing value that cannot be readily quantified based on information disclosed in corporate reporting but is indispensable for long-term well-being. Consider, for example, the complex network of trust that enables communities to cooperate, the deep knowledge of local ecosystems held by Indigenous peoples, or robust governance structures that ensure the equitable distribution of resources. These are not merely by-products of the development of human societies, communities, and businesses. Rather, they are active, generative forces that enable natural and human systems to adapt, persist, and thrive.

At a fundamental level, *intangible assets* are the capabilities and qualities that enable an ecological, social, or economic system to function effectively

over time and remain sustainable. They constitute an invisible architecture that supports visible structures. Consider the resilience of a forest ecosystem not only in terms of its timber volume, but also its biodiversity, soil health, and complex interactions among species. This resilience is an intangible asset that is critical to its ability to withstand shocks such as drought or disease. Similarly, a society's capacity for innovation, its cultural heritage, and the strength of its democratic institutions are all forms of *intangible assets* that contribute to its long-term viability and ability to address complex challenges such as climate change. The fundamental importance of intangible assets lies in their ability to provide systemic resilience and adaptive capacity – qualities that are essential for overcoming the challenges of sustainable development. Table 8 presents a pathway towards the recognition and integration of intangible assets within the framework of sustainable development.

Table 8

Periodisation of the Integration of Intangible Assets within the Framework of Sustainable Development

Period	Event	Impact and Implications
1	2	3
Late 1980s – early 1990s	Emergence of corporate social responsibility (CSR) reporting	Attempts, often qualitative, to communicate non-financial performance by addressing reputational assets, stakeholder relationships, and ethical behaviour. This signalled initial efforts to move beyond financial metrics.
1997	Launch of the Global Reporting Initiative (GRI)	The first widely adopted framework for sustainability reporting, encouraging companies to disclose performance across economic, environmental, and social dimensions, thereby promoting consideration of related intangible factors such as governance quality and stakeholder engagement effectiveness.
Early 2000s	Rise of the "Triple Bottom Line" concept (People, Planet, Profit)	Promotion of the idea that corporate success should be measured holistically by assessing social and environmental outcomes alongside financial profitability, thereby placing greater emphasis on the intangible assets underpinning social and environmental outcomes.

End Table 8

1	2	3
Mid-2000s	Increased attention to climate change and carbon accounting	The strategic importance of innovation potential (for low-carbon technologies), adaptive management capabilities, and reputational risks and opportunities associated with climate action was highlighted. Carbon markets sought to internalise externalities, indirectly highlighting the value of emissions-reduction opportunities.
2013 (updated in 2021)	Launch of the *International Integrated Reporting Framework*	A global corporate reporting framework that combines financial and non-financial information to reflect the creation, preservation, or erosion of corporate value over the short, medium, and long term. Non-financial reporting provides information on different forms of "capital", including intellectual, human, social, organisational, and natural capital, thereby directly incorporating key intangible assets into the value-creation narrative.
2015	Adoption of the UN Sustainable Development Goals (SDGs)	Provided a universal framework for sustainable development, requiring substantial investment in and use of intangible assets such as education (human capital), innovation, institutional capacity, and global partnerships (social/organisational capital) to achieve the Sustainable Development Goals.
Late 2010s / early 2020s	Integration of ESG investing (environmental, social, and governance)	Investor demand for ESG data significantly increased pressure on companies to measure, manage, and report on factors that have a substantial impact on intangible assets, such as corporate culture, board effectiveness, data protection protocols, and community relations. This further linked intangible outcomes to financial valuation.

Source: developed by the author based on the findings of the study

Understanding intangible assets within the framework of sustainable development requires moving beyond traditional economic indicators. Their main types can be broadly classified, while also overlapping and interacting dynamically:

– *social capital:* encompasses bonds, norms, and trust that facilitate cooperation and collective action within and between communities. It

brings societies together, enabling them to address problems collectively and provide mutual support;

– *knowledge and information*: includes scientific understanding, traditional ecological knowledge, technological knowledge, as well as the capacity for learning and innovation. It is the intellectual engine that drives adaptation and progress;

– *institutional and governance frameworks*: rules, laws, policies, and organisational structures that govern behaviour and resources and ensure accountability. Effective governance is an asset that contributes to stability and equity;

– *cultural heritage and values*: refers to shared beliefs, traditions, artistic expressions, and ethical frameworks that shape identity and guide collective decision-making. Cultural values provide meaning and a sense of belonging, influencing how societies interact with their environment;

– *ecological integrity*: often associated with natural capital (the inherent health, biodiversity, and functional capacity of ecosystems). The capacity to provide essential ecosystem services can also be regarded as an intangible asset. It reflects the inherent quality and potential of a system.

These components are not static; rather, they are dynamic and interdependent. For example, strong social capital can facilitate the exchange and application of knowledge, while robust governance can protect cultural heritage and ecological integrity. Recognising and developing these assets is a key aspect of any meaningful agenda underpinned by sustainable development.

The conceptual dimension of intangible assets, particularly in the context of sustainable development, does not follow a single linear trajectory. It brings together diverse intellectual currents that have gradually recognised the limitations of purely materialistic perspectives. Although the term "intangible assets" has a long history in accounting and finance, its application to socio-ecological systems is more recent and stems from critiques of industrial society and a growing awareness of the interconnectedness of human and natural systems. As noted by the authors of the sustainable development handbook, "*recognising intangible assets for sustainable development* represents a gradual awakening from a materialistic dream, acknowledging that true wealth lies in the health of our relationships, knowledge, and the living planet itself" [13].

The theoretical foundations of intangible assets within the discourse of sustainable development are grounded in systems thinking, complexity theory, and a fundamental re-evaluation of value beyond purely economic or material terms. These assets do not function in isolation but rather as interconnected components of broader socio-ecological systems, influencing their behaviour, resilience, and adaptive capacity. Their theoretical significance lies in their ability to explain phenomena that are difficult to understand within the traditional economic model: why some communities thrive under conditions of stress while others collapse, or how innovation can occur even in the presence of limited material resources. The theoretical foundation provides a basis for arguing that intangible assets are generative forces within socio-ecological systems. They support resilience and adaptation through interconnectedness, which is manifested in the following:

1) *system dynamics:* considers intangible assets as critical variables within feedback loops. For example, investment in education, where knowledge constitutes an intangible asset, lays the foundation for increased innovation, which can generate economic returns in the future and contribute to greater investment in education. Conversely, the erosion of social capital can create feedback loops of distrust and conflict, undermining the stability of the system.

2) *network theory:* social capital is often analysed through network theory, which examines the structure and quality of relationships. Stronger and more diverse networks (intangible assets) can facilitate the flow of information, resources, and support, enhancing the system's capacity to respond to challenges.

3) *measurement and proxy challenges:* a key theoretical challenge is the quantitative assessment of these assets. Unlike physical assets, their value is context-dependent and difficult to measure directly. Theories explore various proxy indicators, such as measures of social cohesion, patent applications, or governance quality indices. This gives rise to ongoing debates about how to establish an objective assessment of these assets and make them visible in corporate reporting without losing sight of corporate value.

4) *interconnectedness theory:* intangible assets are closely linked to other forms of capital (Table 9). The theory emphasises that sustainable development requires a holistic approach that recognises and cultivates these interdependencies.

Table 9

Alignment of Intangible Asset Categories with Key Sustainable Development Goals (SDGs)

Category of intangible assets	Sustainable Development Goals (SDGs)	Manifestation of impact
Human capital	SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth)	Investments in employee training and development contribute to higher productivity and social resilience
Organisational capital	SDG 9 (Industry, Innovation and Infrastructure), SDG 16 (Peace, Justice and Strong Institutions)	The implementation of transparent governance practices enhances trust and organisational effectiveness
Social capital	SDG 10 (Reduced Inequalities), SDG 11 (Sustainable Cities and Communities), SDG 17 (Partnerships for the Goals)	Developing partnerships and trust among stakeholders contributes to social integration
Intellectual capital	SDG 7 (Affordable and Clean Energy), SDG 12 (Responsible Consumption and Production)	Innovation and patents enable the development and adoption of environmentally friendly technologies
Natural capital	SDG 13 (Climate Action), SDG 14 (Life Below Water), SDG 15 (Life on Land)	The sustainable use of natural resources reduces the environmental footprint of businesses

Source: developed by the author based on the findings of the study

The landscape of intangible assets in the context of sustainable development is characterised by growing recognition alongside persistent practical challenges. There is an increasing understanding, particularly among leading companies and international organisations, that factors such as brand purpose, stakeholder trust, and innovation potential are critically important. ESG investing has brought these aspects into the financial mainstream, creating demand for better data and more comprehensive disclosure.

Frameworks such as the IIRC and ISSB Standards aim to enhance the quality and informativeness of reporting by providing information on risks and opportunities related to sustainable development. However, significant

gaps remain. Measurement methodologies are still evolving and lack standardisation, resulting in inconsistencies in ESG ratings and difficulties in integrating intangible value into traditional financial analysis. Many companies find it challenging to move beyond reporting towards the active management and strategic development of these assets.

Contemporary approaches to intangible assets focus on their recognition and management through a range of strategies aimed at bridging the gap between their theoretical and economic significance and their practical application in sustainable development efforts. Recognising intangible assets makes it possible to reflect the actual value of human capital, innovation, brands, and social relationships in both financial and non-financial reporting. The management of intangible resources provides strategic control over knowledge, corporate culture, and partnerships, which is crucial for long-term resilience. Such strategies seek to balance economic efficiency with social responsibility, in line with ESG principles and the United Nations Sustainable Development Goals. They help companies mitigate risks associated with environmental and social challenges while simultaneously enhancing investment attractiveness through transparency and innovation. As a result of implementing strategic decisions, intangible assets become not only a source of competitive advantage but also a foundation for the sustainable development of businesses and society (Table 10).

Business strategies focused on sustainable development have a positive impact on financial stability, corporate reputation, and the company's long-term prospects. Their benefits include enhanced competitiveness, cost reduction, attracting investors, stronger brand recognition and customer loyalty, compliance with regulatory requirements, increased productivity and talent attraction, innovative development, and greater resilience to crises and risks. As noted by *Kelsey Miller*, "In line with a business sustainability strategy, data increasingly show that companies with forward-looking ESG performance achieve higher financial returns. Consequently, an increasing number of investors have begun to focus on ESG metrics when making investment decisions" [14].

Table 10

Sustainable Development Strategies for the Recognition and Management of Intangible Assets

Strategic dimension	Strategy implementation approach	Example of effect
Economic dimension	Recognition of innovation, brands, and data as investments; integration of intangible assets into financial reporting	Increased company market value; enhanced investment attractiveness
Social dimension	Management of human and social capital; development of corporate culture and partnerships	Strengthened stakeholder trust; increased employee motivation and productivity
Environmental dimension	Innovation in green technologies; responsible use of natural capital	Reduced environmental footprint; alignment with the Sustainable Development Goals (SDGs)
Integrated dimension	Integration of economic, social, and environmental aspects into a single business model	Development of a sustainable competitive advantage; long-term growth and adaptability

Source: developed by the author based on the findings of the study

The implementation of sustainable development strategies can be manifested through the concept known as the *Triple Bottom Line (TBL)*. This is an approach to assessing business success that goes beyond traditional financial indicators. The concept implies that companies should evaluate not only their financial performance but also the social and environmental impacts of their activities. Business success is determined not solely by profit but also by the extent to which a company contributes to societal well-being and environmental preservation. The concept is based on three key elements, known as the *"three Ps": Profit, People, Planet.* Each of these elements reflects, to varying degrees, the contribution of intangible assets to sustainable development.

Profit ensures a company's financial stability and its capacity for further development. Traditionally, businesses were assessed solely in terms of profitability; however, contemporary companies are increasingly focusing on social responsibility. Within the framework of sustainable development, financial benefits should be generated without causing harm to society or the environment, which requires the implementation of ethical business

practices. The efficient use of resources, responsible treatment of employees and partners, and adoption of innovative technologies contribute to long-term financial stability. Within the Triple Bottom Line framework, profit is not merely an ultimate objective but also a means of creating a positive impact on society and the environment.

People: a company's social impact is measured by its ability to provide fair working conditions, decent remuneration, equal opportunities for career development, and workplace safety. Responsible businesses respect human rights, avoiding labour exploitation, discrimination, and other violations of ethical standards. Companies that pay attention to social responsibility strengthen the trust of customers and partners, which positively affects their reputation and competitiveness. The implementation of ethical business practices entails transparency in business operations, fair treatment of consumers, and consideration of their needs and interests.

Planet: this dimension reflects the environmental responsibility of businesses. Companies should recognise their impact on ecosystems and actively work to reduce harmful emissions, use natural resources efficiently, and minimise waste. This involves transitioning to renewable energy sources, implementing circular economy principles, and developing environmentally friendly technologies. A responsible approach to the environment includes optimising logistics, reducing water consumption, and lowering the carbon footprint of production processes. Investment in *green initiatives* opens up new opportunities for businesses, including through government grants, tax incentives, and cooperation with international organisations. Companies that assume environmental responsibility reduce their adverse impact on nature and contribute to the sustainable development of society as a whole, while ensuring cleaner resources for future generations.

Integration of ESG indicators into a company's strategy plays a key role in the long-term sustainability of a business. The importance of such integration can be observed both in the practices of leading companies and in cases where the neglect of ESG risks results in financial losses and reduced trust among customers and investors. Positive integration practices include the following:

1) *Microsoft* [15] aims to achieve carbon neutrality by 2030 and to offset all carbon emissions generated since its founding by 2050. The company actively invests in renewable energy sources, reduces waste, and lowers the

carbon footprint of its products. Microsoft's efforts include implementing digital tools that help customers measure and reduce their environmental impact. In addition, the development of ESG-related innovations helps the company strengthen its reputation and enhance its investment attractiveness, meeting the expectations of environmentally conscious investors and partners.

2) *Patagonia* [16] has built a strong reputation by integrating environmental and social values into its brand, thereby fostering significant customer loyalty. The company emphasises sustainability through various initiatives, such as the use of recycled and organic materials, ensuring fair labour practices, and supporting activism and environmental engagement. The company's support for environmental initiatives and transparency regarding supply-chain practices further strengthen brand loyalty and differentiate it in the market.

3) *Unilever's Sustainable Living Plan (USLP)* [17] was a pioneering initiative launched in 2010 with the aim of enhancing the company's social impact and reducing its environmental footprint. It included more than 50 targets focused on improving health, reducing waste, and creating a positive social impact at the global level. The plan made a significant contribution to *Unilever's* reputation, enabling the company to stand out in the market as a responsible and sustainable business, particularly appealing to investors interested in environmental, social, and governance (ESG) performance. The key achievements of the *USLP* included a 50% reduction in greenhouse gas emissions from manufacturing, achieving 100% renewable electricity use, and reaching 1.3 billion people through health-related initiatives. Building on the success of the *USLP*, *Unilever* introduced the Unilever Compass strategy, which retains a focus on sustainability by setting ambitious targets for climate action, reducing plastic use, promoting fair pay, and advancing gender equality throughout the supply chain.

The trajectory of intangible assets in sustainable development is characterised by their growing recognition, evolving from being treated as external factors to becoming central pillars of sustainable and equitable systems. This evolution has been underpinned by key stages and developments that have contributed to methodological improvements and their deeper integration into policy and business strategies. The environmental movement brought greater clarity to the concept of

natural capital, although it was initially considered primarily through the lens of resource depletion and pollution. It laid the foundations for assessing non-market aspects of the environment. The formalisation of social capital theory provided a strong academic basis for understanding the value of networks, trust, and norms, challenging the notion that wealth is determined solely by material factors. Growing dissatisfaction with gross domestic product (GDP) as the sole measure of progress led to the development of alternative indicators and frameworks incorporating social, environmental, and intangible dimensions of well-being. The rapid growth of information technology and the knowledge economy highlighted the economic and social value of intellectual property, data, and human knowledge, further reinforcing the importance of intangible assets. The intensification of the climate crisis and growing awareness of systemic risks have strengthened the need for adaptive capacity, social cohesion, and effective governance.

Looking ahead, the trajectory of *intangible assets* in sustainable development is characterised by their growing centrality and complexity. As global challenges such as climate change, biodiversity loss, and social inequality intensify, the ability of societies and economies to adapt and transform will critically depend on their capacity to recognise, cultivate, and strategically utilise these intangible resources. The future is likely to involve deeper integration of intangible asset considerations into all levels of decision-making, from global policy to the actions of local communities.

New trends indicate a shift from simply recognising these assets towards actively designing systems that foster their development and resilience. This involves innovative approaches to: 1) measuring and assessing social and environmental capital; 2) developing new governance models that are more adaptive and inclusive; and 3) using digital technologies to enhance knowledge sharing and collaboration. The concept of intangible assets will evolve to encompass new forms of value, such as the "regenerative capacity" of systems or the "well-being potential" embedded in healthy socio-ecological interactions. The challenge will be to translate this growing understanding into tangible, systemic changes that move humanity towards a truly sustainable and equitable future.

Looking ahead, intangible assets in sustainable development are likely to become increasingly important as key drivers of systemic resilience,

innovation, and equitable well-being in an increasingly complex world. Key development trends in this area may include the following:

1) *reconsideration of approaches to the valuation, recognition, and accounting of intangible assets:* innovations in methods for valuing and accounting for social, cultural, and environmental capital. As a result, this may lead to the development of new integrated reporting frameworks that impose requirements on intangible assets comparable in rigour to those applied to financial reporting indicators, potentially increasing their influence on investment decisions and corporate accountability.

2) *digital platforms for collaboration and knowledge sharing:* technologies such as artificial intelligence, blockchain, and data analytics will play an increasingly important role in knowledge management and sharing, facilitating global collaboration and potentially creating new forms of digital commons and intellectual capital.

3) *design of regenerative systems:* greater emphasis will shift from "sustaining" current levels towards actively "regenerating" degraded systems. This requires a profound understanding and strengthening of intangible capacities such as ecological health, social trust, and adaptive governance that drive regeneration.

4) *policy innovation for social and environmental sustainability:* future policies should be designed not only to mitigate harm but also to build the intangible foundations of resilience. This may include universal basic income to strengthen social capital, substantial public investment in education and research, as well as new legal frameworks for governing common resources.

5) *ethical frameworks for intangible value:* as the sustainable significance of intangible assets grows, ethical considerations related to their distribution, access, and governance will also emerge. Discussions concerning intergenerational equity, digital rights, and the rights of nature will become increasingly prominent.

The challenge lies not only in managing these assets but also in creating an environment in which they can flourish organically, stimulating innovation and resilience in the face of unprecedented change. The success of this transition depends on the willingness to reconceptualise prosperity by moving beyond material accumulation and embracing the profound, generative power of the intangible.

CONCLUSIONS

In the digital economy, intangible assets are becoming a key factor in corporate value creation and the achievement of companies' long-term competitive advantages. The development and scaling of artificial intelligence technologies depend directly on investment in digital information, innovative property, and economic competencies, which form the foundation of the contemporary intangible economy. The cyclical nature of the interaction between artificial intelligence and intangible assets means that accumulated data, knowledge, and intellectual property enhance the performance of AI models, while the outputs generated through their use create new intangible assets and increase their economic value. The model of the relationship between artificial intelligence and intangible assets demonstrates the strategic importance of effective management of data, human capital, content, intellectual property, and regulatory mechanisms in generating a sustainable "flywheel effect" of value creation. An analysis of global trends has demonstrated sustained growth in investment in software, research and development, databases, and digital infrastructure, confirming a shift in the structure of global capital investment towards intangible resources. At the same time, the findings of the study indicate that the competitiveness of countries and companies is increasingly determined not by the volume of tangible resources, but by their ability to create, accumulate, and effectively utilise intangible assets in combination with artificial intelligence technologies. Further research should focus on developing methodological approaches to assessing the economic value of implied intangible assets created or enhanced through the use of artificial intelligence, as well as on improving their recognition and presentation within accounting and corporate reporting systems.

Traditional accounting approaches do not provide a complete representation of intangible assets, as a result of which a significant proportion of corporate value remains invisible to financial reporting and investors. It has been established that, with the increasing adoption of artificial intelligence technologies, the issue of measuring intangible assets is becoming particularly important, as they simultaneously serve as key resources for the operation of AI systems and as outcomes of their use. A comparative analysis of the Corrado-Hulten-Sichel (CHS) framework, the Six Capitals model, and the Opagio 12™ Framework has shown that

they are complementary and cover different levels of intangible value assessment – from macroeconomic analysis to corporate governance and strategic decision-making. Particular attention has been paid to the *Opagio 12*™ Framework, which provides a comprehensive taxonomy of intangible value drivers and enables the systematic identification of assets that are not recognised under current accounting standards. Increasing the visibility of intangible assets contributes to a more objective assessment of the market value of businesses, more efficient capital allocation, greater investment attractiveness, and improved strategic management. Integrating contemporary economic valuation models with traditional accounting systems creates the basis for a more comprehensive representation of corporate value creation processes in the digital economy. Further research should focus on developing methodological approaches to integrating intangible asset valuation models into financial and integrated reporting systems, as well as on developing indicators that would enable the quantitative assessment of the contribution of artificial intelligence to corporate value creation.

The study has demonstrated that intangible assets are a fundamental component of sustainable development. They shape the adaptive capacity, resilience, and long-term value of socio-economic and ecological systems. Human, intellectual, social, organisational, and natural capital constitute interconnected intangible resources that determine the ability of society, governments, and businesses to respond effectively to contemporary global challenges. The evolution of international approaches to corporate reporting, the development of the ESG concept, integrated reporting, and the United Nations Sustainable Development Goals have contributed to the gradual recognition of intangible assets as key drivers of long-term value creation. It has been demonstrated that integrating intangible assets into strategic management enhances innovation potential, strengthens stakeholder trust, increases investment attractiveness, and creates sustainable competitive advantages. Of particular importance is the development of methodological approaches to the valuation and disclosure of information on intangible assets in financial, non-financial, and integrated reporting, which will contribute to greater transparency of corporate activities and improve the quality of management decisions. At the same time, effective management of intangible assets should be based on a comprehensive combination of

economic, social, and environmental objectives, ensuring the implementation of ESG principles and the achievement of the Sustainable Development Goals. Further research should focus on developing integrated models for assessing intangible assets that take into account their contribution to corporate sustainability, regenerative development, and long-term value creation in the context of the digital transformation of the economy.

References:

1. Intangible Asset Market Value Study. (2025) *Ocean Tomo a part of JS|HELD.* Available at: https://oceantomo.com/intangible-asset-market-value-study/

2. International Accounting Standard 38 "Intangible Assets" (IAS 38). *IFRS Foundation.* Available at: https://www.ifrs.org/issued-standards/list-of-standards/ias-38-intangible-assets/#about

3. Global Intangible Finance Tracker (GIFT™) – the annual review of the world's intangible value. (2025) *Brand Finance.* Available at: https://brandfinance.com/insights/gift-2025-the-annual-review-of-the-worlds-intangible-value

4. World intangible investment highlights 2025: key trends and insights. (2025) *World Intellectual Property Organization (WIPO).* Available at: https://www.wipo.int/web-publications/world-intangible-investment-highlights-2025/en/world-intangible-investment-highlights-2025.html

5. Adams, P. & Strimpel, J. (2026) Intangible assets: the input & output of the AI revolution. *Andersen Institute for Finance & Economics.* Available at: https://global.andersen.com/resources/intangible-assets-input-and-output-artificial-intelligence-revolution?utm_source=copilot.com

6. Singla, A., Sukharevsky, A., Hall, B., Yee L. & Chui, V. (2025) The state of AL in 2025: Agents, innovation, and transformation. *McKinsey & Company.* Available at: https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai

7. Sen, R., Golbin Blumenfeld, I., Kosar, J. & Gurdeniz, E. (2025) PwC's 2025 Responsible AL survey: From policy to practice. Available at: https://www.pwc.com/us/en/tech-effect/ai-analytics/responsible-ai-survey.html

8. Global software spending surges to close to USD 700 billion in 2024, up 50% from 2020; the United States extends its lead. *World Intellectual Property Organization (WIPO).* 2025. Available at: https://www.wipo.int/en/web/global-innovation-index/w/blogs/2025/global-software-spending

9. World intangible investment highlights: key trends and insights. (2026) *World Intellectual Property Organization (WIPO).* Available at: https://www.wipo.int/web-publications/world-intangible-investment-highlights-2026/en/key-trends-and-insights.html

10. International Financial Reporting Standard 3 "Business Combinations" (IFRS 3). *IFRS Foundation.* Available at: https://www.ifrs.org/issued-standards/list-of-standards/ifrs-3-business-combinations/#about

11. Framework: the Opagio 12: intangible value drivers. (2026) *Opagio.* Available at: https://opag.io/opagio-12?utm_source=copilot.com

12. Stepanenko, O.I. (2025) Intellectual property in the era of the digital economy and artificial intelligence: challenges, opportunities, risks. *Digital Economy and Economic Security*, no. 1(16), pp. 137-144. DOI: https://doi.org/10.32782/dees.16-21 (in Ukrainian)

13. Sustainability Directory: intangible assets. Available at: https://term.sustainability-directory.com/term/intangible-assets/

14. Miller, K. (2020) The triple bottom line: what it is & why it's important. *Business School Online's Business Insights Blog.* Available at: https://online.hbs.edu/blog/post/what-is-the-triple-bottom-line

15. Nakagawa, M. (2024) Sustainable by design: Advancing the sustainability of AI. *Official Microsoft Blog.* Available at: https://blogs.microsoft.com/blog/2024/04/02/sustainable-by-design-advancing-the-sustainability-of-ai/

16. Everything we make has an impact on the planet. *Patagonia.* Available at: https://www.patagonia.com/our-footprint/?msockid=3df87a74c21463f63dca681ec30662e2

17. Schumacher, H. (2024) Defining a new era for sustainability leadership. *Unilever.* Available at: https://www.unilever.com/news/news-search/2024/defining-a-new-era-for-sustainability-leadership/

QUANTUM-SINGULAR ORIENTATION OF THE NEOTECHNOLOGY PARADIGM OF WORLD ECONOMIC DEVELOPMENT

Oleksiy Stupnytskyy[1]
Volodymyr Vergun[2]
Serhiy Borysov[3]

DOI: https://doi.org/10.30525/978-9934-26-715-4-17

Abstract. The chapter examines the quantum-singular orientation of the neotechnology paradigm of global economic development under conditions of accelerated digitalization, artificial intelligence (AI) diffusion, and the emergence of autonomous algorithmic systems. The study focuses on the transformation of the international economy from a human-centered model toward an algorithmically governed system characterized by nonlinear dynamics, self-learning technologies, and AI-to-AI interaction. Particular attention is devoted to the conceptualization of economic singularity as a new stage of global economic evolution associated with exponential and super-exponential growth driven by autonomous technological systems. The subject of the research is the transformation of the global economy under conditions of AI-driven singularity and the emergence of autonomous economic agents capable of independent decision-making, adaptation, and self-optimization. The purpose of the study is to identify the mechanisms, drivers, and structural consequences of singularity transformations in the international economy, as well as to substantiate the formation of a new logic of economic development based on algorithmic governance, endogenous technological growth, and complex adaptive systems.

[1] PhD in Economics, Professor,
Department of International Business, Institute of International Relations
at Taras Shevchenko National University of Kyiv, Ukraine
[2] Doctor of Economics, Professor,
Department of International Business,
Institute of International Relations
at Taras Shevchenko National University of Kyiv, Ukraine
[3] Assistant, Department of International Business,
Institute of International Relations
at Taras Shevchenko National University of Kyiv, Ukraine

© Oleksiy Stupnytskyy, Volodymyr Vergun, Serhiy Borysov

The methodological basis of the study combines the provisions of endogenous economic growth theory, complexity economics, theories of increasing returns, network interaction models, and concepts of technological singularity. The research applies interdisciplinary, systemic, comparative, and evolutionary approaches, as well as elements of formalized modeling and conceptual forecasting. The proposed Economic Singularity Framework (ESF) model explains the transition from the digital economy to the AI economy, autonomous economy, and economic singularity through the interaction of technological innovations, artificial intelligence, quantum computing, data intensity, and institutional adaptation. The study demonstrates that AI technologies increasingly perform not only auxiliary analytical functions but also strategic economic functions, gradually transforming into independent market participants. Autonomous AI agents are capable of generating knowledge, optimizing economic decisions, coordinating transactions, and interacting with other algorithmic systems without direct human intervention. This creates the prerequisites for the emergence of an AI-to-AI economy in which economic coordination is based on the speed of algorithmic interaction, machine learning efficiency, and access to data resources. The research substantiates that economic singularity should be interpreted as a systemic phase transition of the global economy characterized by the replacement of linear development trajectories with nonlinear self-reinforcing dynamics. Special attention is devoted to the phenomenon of super-exponential growth resulting from the interaction between AI, informational capital, energy singularity, bioeconomic singularity, and cognitive singularity. The chapter proves that increasing returns generated by non-rival informational goods and autonomous innovation systems may fundamentally alter the structure of production, labor markets, global competition, and international economic relations. The conclusions emphasize that the transition toward economic singularity represents not merely a technological modernization of the world economy but a transformation of the very principles of economic coordination, governance, and value creation. The future architecture of the international economy will increasingly depend on the interaction between autonomous AI systems, institutional adaptability, and the ability of states and international organizations to regulate emerging forms of algorithmic power and global technological asymmetries.

INTRODUCTION

The beginning of the twenty-first century has been marked by the rapid expansion of digital technologies, AI, quantum computing, platform business models, and autonomous algorithmic systems, which are fundamentally transforming the architecture of the global economy and international economic relations. Contemporary economic development is increasingly characterized not only by digitalization and automation but also by the gradual emergence of self-learning technological ecosystems capable of autonomous coordination, adaptation, and decision-making. Under such conditions, traditional economic theories based on linear development trajectories and human-centered governance are becoming insufficient for explaining the growing complexity, nonlinearity, and self-reinforcing nature of modern economic processes. The scientific novelty of the study lies in the conceptualization of economic singularity as a systemic phase transition of the global economy associated with the autonomization of economic decision-making, the emergence of AI-to-AI interaction, and the transformation of artificial intelligence from an auxiliary technological instrument into an independent economic agent. Unlike conventional approaches focused primarily on digitalization or platformization, this research proposes an interdisciplinary framework integrating endogenous growth theory, complexity economics, network interaction theory, and concepts of technological singularity in order to explain the transition from the digital economy toward an autonomous algorithmic economy.

The relevance of the research is determined by several interrelated factors. First, the global diffusion of AI technologies and autonomous systems is radically changing the mechanisms of production, finance, logistics, governance, and international competition. Second, the accelerated growth of informational capital and the increasing role of data as a strategic economic resource create fundamentally new forms of market coordination and competitive advantage. Third, the emergence of algorithmically governed ecosystems and platform monopolies intensifies global technological asymmetries and transforms the balance of economic power within the world economy. Finally, the growing possibility of super-exponential economic growth generated by self-learning AI systems raises new theoretical and practical questions regarding institutional adaptation, labor market restructuring, international regulation, and economic security.

The research relies on the provisions of endogenous economic growth theory, theories of increasing returns, complexity economics, complex adaptive systems theory, and futurological approaches to technological singularity. Methods of comparative analysis, structural-functional analysis, logical generalization, conceptual modeling, and formalized analytical interpretation are employed. The chapter also incorporates elements of agent-based reasoning and nonlinear dynamic analysis to explain the interaction between autonomous algorithmic systems and global economic structures.

The logic of the chapter is organized according to the gradual transition from theoretical foundations toward systemic interpretation of singularity transformations. The first section examines the evolution of the concepts of technological and economic singularity and substantiates the formation of the Economic Singularity Framework. The second section analyzes the transformation of the international economy under conditions of AI autonomy and the emergence of AI-to-AI interaction as a new mechanism of economic coordination. The third section investigates the phenomenon of super-exponential growth and explores the interconnection between economic, energy, bioeconomic, and cognitive singularities within the emerging neotechnology paradigm of global development. Thus, the chapter seeks to provide a comprehensive theoretical explanation of how the convergence of AI technologies, informational capital, autonomous systems, and nonlinear economic dynamics is reshaping the modern world economy and creating the preconditions for a qualitatively new stage of global economic evolution.

1. From Digitalization to Singularity: A New Logic of Global Development in the Context of the AI Economy

The current stage of global economic development is characterized by profound transformational processes driven by digitalization, globalization, and the rapid advancement of AI technologies. The implementation of intelligent systems in various spheres of economic activity not only changes management tools but also gradually transforms the very nature of economic relations. Under these conditions, traditional theoretical approaches are increasingly proving insufficient to explain new phenomena associated with the growing autonomy of technological systems. In particular, increasing

importance is being attached to the processes of delegating economic decision-making to algorithmic systems, which create opportunities for the emergence of autonomous agents capable of independent interaction and adaptation.

Of particular relevance is the issue of understanding qualitative changes in the functioning of the economy that go beyond gradual evolution and acquire the characteristics of leap-like development. Such processes are increasingly interpreted through the prism of the concepts of technological and economic singularities, which imply the achievement of a critical point after which the pace of change becomes uncontrollable and the further development of the system becomes difficult to predict. At the same time, the development of the digital economy, the spread of platform business models, and the growing role of algorithmic governance indicate the formation of a new logic of market functioning based on the achievements of endogenous economic growth theory and complex systems theory, which provide the methodological foundation for analyzing nonlinear and self-reinforcing processes in the economy.

In 1958, the Hungarian-American mathematician and physicist J. von Neumann first used the concept of "singularity" directly in a technological context, although it had long existed as a mathematical abstraction [1]. In 1965, G. Moore observed that the number of transistors on an integrated circuit doubled approximately every 24 months, implying that computers were becoming more powerful, their cost per unit of performance was decreasing, and technological progress was accelerating. In other words, there existed a qualitative progression that could be empirically observed and represented graphically as an exponential curve. Since many other similar progressions exist as consequences of more fundamental, general, and global processes, this phenomenon became known as "*Moore's Law*" [2].

In 1963, the British-American historian of science D. Price formulated the "Law of Exponential Growth of Knowledge," which became the foundation of scientometrics and influenced the ideas of technological singularity [3]. D. Price discovered that the number of scientific journals and publications doubled approximately every 10–15 years; thus, the volume of scientific knowledge (the number of articles, books, and discoveries) grows not linearly but exponentially. Knowledge doubles over specific intervals of

time, and each new generation of scientists creates more information than the previous one. Therefore, the growth of existing knowledge accelerates the emergence of new knowledge. He also empirically demonstrated that exponential growth cannot continue indefinitely, as it inevitably encounters limitations such as resources, attention, and funding, after which a transition to another growth model becomes possible, involving either slowdown or "saturation."

In their studies of singularity, V. Vinge [4] and R. Kurzweil [5] attempted to understand the moment when technological development, particularly AI, would become so rapid and radical that humanity would no longer be able to predict or control it in the usual way. V. Vinge introduced the concept of a "point of unpredictability": singularity is an unpredictable "moment after which the rules of the game change completely," occurring when superintelligence emerges through the creation of AI, the enhancement of the human brain (cyborgization), and the networking of intelligences. In turn, R. Kurzweil developed the theory of "exponential development," proving that technologies evolve according to the principle of nonlinear exponential growth, especially evident in computing technology through Moore's Law. According to his forecast, singularity as an evolutionary leap will occur approximately in the middle of the twenty-first century. Thus, while V. Vinge emphasizes uncertainty and risk, R. Kurzweil focuses on technological progress and opportunities. Nevertheless, the common essence of their research lies in the idea that technological development leads to the emergence of intelligence more powerful than human intelligence, changing human nature itself, and that this moment will become a turning point for civilization, transforming the economy as well.

Therefore, according to the generally accepted definition, *economic singularity* is a specific hypothetical state of economic development in which AI and other technologies become so advanced that humanity undergoes dramatic and irreversible changes, while the economy itself transforms from a "human-centered" system into an algorithmically governed one. As for classical economic theory, this category has not yet become a fully explored concept within economics, as it is borrowed from the logic of technological singularity. However, at present, several *main characteristics* of economic singularity can be identified. First, the pace of technological progress is increasingly acquiring exponential, primarily in the sphere of

AI and automation, and uncontrollable forms. Second, traditional economic laws such as supply and demand or labor and capital are losing their classical explanatory power. Third, key decisions are increasingly shifting from human workers to intelligent systems (AI, Quantum AI).

The accelerated dynamics of modern technological trends determine the speed and complexity of the economy under conditions where the processes of technological transformation themselves exceed human understanding. Workers are transformed from the "center of decision-making" into the periphery of the process. In other words, key economic decisions are made not by humans but by interacting algorithms. This is no longer merely about automation but about a full-fledged economic ecosystem in which AI functions as an agent or network of agents, while companies as algorithmic structures conduct commercial activity on the basis of smart contracts in conditions where markets acquire the form of self-regulating platforms. This is perceived as more radical than simple digitalization or globalization because the self-acceleration of the system – economic singularity – is determined by corresponding algorithms that optimize one another and lead to exponential development, creating the effect of an "economy that improves itself." The significance of new forms of competition is growing: it is no longer countries that compete, but ecosystems of data and algorithmic architectures based on the speed of learning new management models.

Under conditions of radical transformation in the mechanisms of value creation, the structure of the labor market, and the principles of economic decision-making, economic singularity implies not merely a fundamentally new stage of economic development but a change in the very logic of its functioning. Algorithmic trading in financial markets, AI-driven solutions in logistics and energy, and corporate ecosystems/platforms such as Amazon or Google, where decisions are made on the basis of data, lead, on the one hand, to a sharp increase in economic efficiency, reductions in the cost of goods and services, and the acceleration of technological breakthroughs. On the other hand, they lead to technological inequality among countries in the world economy, the concentration of economic power within the emerging "core" of international Big Tech corporations, and the loss of control over national and global economic processes.

The *key features* of economic singularity include:

– exponential productivity growth (automation leads to minimal marginal costs, and production becomes almost "free");

– the dominance of AI in decision-making practices (transforming financial markets into systems of algorithms, logistics into autonomous systems, and governance into data-driven governance);

– transformation of the labor market (mass displacement of routine labor, growing importance of creative and strategic professions, and the emergence of concepts such as Universal Basic Income);

– changes in the nature of value (data and algorithms become the main resource, while traditional factors such as land and labor lose their dominant role);

– instability and nonlinearity (markets become less predictable as classical market models cease to function effectively).

Regarding the conceptual formalized model of the *Economic Singularity Framework* (ESF), the economic system passes through the following successive stages of transformation under the influence of technology: *"classical economy → digital economy → AI economy → autonomous economy → economic singularity."* It is necessary to clearly distinguish between the levels and stages of development within the ESF model.

At Level 1, the technological core (AI, Quantum Computing, Big Data, and automation) generates exponential growth. Level 2 (digital platforms, cloud computing, quantum networks, and IoT) ensures scalability. Level 3 is associated with the functioning of economic processes (production, finance, logistics, and energy), which transition into a data-driven mode. The adaptive institutional system (the state, markets, regulators, and corporations), together with the resulting outcomes (a new economic reality, algorithmic governance, and economic singularity), determine Levels 4 and 5 of the ESF model. In essence, this is a "model of transition from an economy of human decisions to an economy of algorithmic decisions."

Under conditions of accelerated innovation development and the decreasing role of human labor, a system transitioning into a state of singularity may be represented as a functional dependence of key elements with corresponding time intervals/lags:

$$ES(t) = f(TI, AI, QC, DATA, INST),$$

where:

– *ES* – the level of "singularity";

– *TI* – technological innovations;
– *AI* – artificial intelligence;
– *QC* – quantum computing;
– *DATA* – the volume and quality of data;
– *INST* – institutional adaptation.

The stages of development (*Stage Model ESF*) are formed according to the following scale (Table 1).

Table 1

Stages of Development of the Economic Singularity Framework Model

Stage	Characteristics	Result
Stage 1: Digital Foundation	digitalization of the economy, development of platforms	transition to a data-driven economy
Stage 2: AI Augmentation	AI assists in decision-making, process automation	increased efficiency
Stage 3: Autonomous Systems	systems operate autonomously with minimal human involvement	algorithmic markets
Stage 4: Self-Optimizing Economy	the economy becomes self-learning with continuous optimization	nonlinear dynamics
Stage 5: Economic Singularity	exponential speed of change, loss of classical models	a new economic paradigm

Source: compiled by the authors

Thus, the ESF reflects the transition from a linear, human-controlled economy to a nonlinear, self-regulating system in which technologies become the leading subject of economic dynamics. In this context, the main KPIs in the process of transition toward singularity should include: the level of automation (percentage of processes without human participation), the share of AI-based decisions (percentage in managerial decision-making), the speed of innovation (*time-to-market*), dependence on data (*data intensity*), and system flexibility (*adaptability*). At the same time, the key drivers of the model (accelerators) are the development of AI, quantum technologies, and global crises as catalysts, against the background of growing regulatory barriers, ethical issues, and limited energy resources.

At present, the foundation of the *mechanism of economic singularity* is the ability of AI systems to engage in self-learning, which ensures the endogenization of technological progress. Unlike classical models, in which innovations are considered an external factor, in this case development becomes an intrinsic property of the system itself. Its key element is not merely the formation and dissemination of AI, but the emergence of a self-accelerating system of autonomous agents capable of continuous improvement and interaction without direct human intervention or control.

In this context, economic singularity is regarded, on the one hand, as a qualitative transition of the system into a state where the speed, complexity, and autonomy of economic processes exceed the capabilities of their traditional (human-centered) governance. On the other hand, it is viewed as a qualitative leap in the development of the global economy that exhibits the characteristics of a nonlinear dynamic system and corresponds to the logic of modern research in the field of complex systems theory.

The functions of the autonomous agents within this mechanism include the accumulation of data during operation, the adaptation of their own algorithms through machine learning mechanisms, and the optimization not only of decisions themselves but also of the decision-making models. In such a system, each new cycle increases the efficiency of the previous one, which, first, creates the preconditions for nonlinear development and forms a closed improvement cycle: "*data → learning → decisions → new data → improved learning*." Second, it determines the nature of AI-to-AI interaction as a new level of economic coordination associated with the transition from the "human–AI" model to the network interaction of autonomous AI agents.

At the same time, agents not only exchange data and signals in real time and conclude transactions (through digital platforms or smart contracts), but also – and most importantly – coordinate behavior within this configuration without centralized governance. As a result, a specific distributive system of economic coordination emerges, characterized by high-speed agreement of decisions, minimization of information asymmetries, and adaptability to changes in both the internal and external environment. It is fundamentally important that the efficiency of each individual AI agent increases with the growth in the number of other agents within the system, creating a second-order network effect in which the value of the system is determined not only

by the number of participants but also by the intensity of their algorithmic interaction.

An important outcome of the mechanism of economic singularity is the combination of self-learning and AI-to-AI interaction, which generates the *effect of exponential acceleration* in the development of the economic system. From a theoretical perspective, the effect of exponential acceleration may be explained through the concepts of positive feedback, increasing returns, and the nonlinear dynamics of economic processes. In this context, it is appropriate to refer to the ideas of B. Arthur [6; 7], who argued that processes of self-reinforcement dominate within technological economies and that equilibrium is not stable. In fact, the AI economy radicalizes this logic: a) each improvement of an algorithm strengthens future improvements; b) the system shifts into a regime of cumulative growth; c) even minor changes may produce disproportionately large consequences.

Thus, the logic of exponential acceleration lies in the continuity of the following process: "improved algorithms generate more efficient decisions, which create more data, while larger volumes of data accelerate learning, leading to even more advanced algorithms." This corresponds to the model of nonlinear systems with positive feedback, in which the trajectory of development is determined not only by initial conditions but also by internal mechanisms of self-reinforcement.

Consequently, the system transitions from linear dynamics to an exponential trajectory of development, where each subsequent stage qualitatively surpasses the previous one in terms of speed and complexity.

To generalize the functioning of the proposed mechanism, it is advisable to present it in the form of a simplified (formalized) analytical-conceptual model under conditions where, for example:

– At – the level of development of autonomous agents at time t;
– Dt – the volume of available data;
– It – the intensity of interaction between agents;
– Et – the efficiency of the economic system.

Under these conditions, the dynamics of the system may be described by the following relationships:

1. Self-learning: $At+1 = At + \alpha \cdot Dt \cdot At$
2. Data generation: $Dt+1 = Dt + \beta \cdot Et$
3. AI-to-AI interaction: $It = \gamma \cdot At2$

4. System efficiency: $Et = f(At, It)$

where $\alpha, \beta, \gamma > 0$ are sensitivity coefficients.

In the context of interpreting the model, three main conditions should be emphasized: a) the growth of At has a self-reinforcing character (an endogenous growth model); b) the interaction It grows quadratically, reflecting the network effect (a network interaction model); c) the efficiency of the system becomes a function not only of the level of development of agents but also of their interaction (a nonlinear dynamic system due to the interdependence of variables). This corresponds to approaches used in contemporary studies of agent-based modeling, complexity economics, and self-organization theory.

It is also critically important that there exists a threshold value A, after reaching which the system enters a regime of uncontrolled acceleration: $At > A \rightarrow$ the pace of system development exceeds the possibilities of its external regulation. According to the theory of phase transitions, this moment may be interpreted as the critical point of economic singularity at which the system changes its mode of functioning. Pre-threshold conditions (system controllability, gradual change, dominance of human control) are replaced by post-threshold conditions – self-organized dynamics emerge, the speed of change becomes uncontrollable, and macro-level properties can no longer be reduced solely to the intentions of individual agents or actors. Thus, singularity is not merely a technological phenomenon but a *systemic phase transition* of the modern global economy.

Therefore, the mechanism of economic singularity is based on the interaction of three interrelated approaches: the endogenization of innovation processes and the self-learning of autonomous agents (endogenous growth theory); the network self-organization of agents and their network interaction (complex adaptive systems theory); and nonlinear dynamics with positive feedback and exponential acceleration of development (the economics of increasing returns).

The synthesis of these approaches makes it possible to consider the contemporary transformation of the global economy, first, as a self-reinforcing system capable of autonomous expansion and increasing complexity, which fundamentally changes the logic of its current functioning. Second, it may be understood as a transition to a qualitatively

new state in which autonomous algorithmic systems become the principal driver of economic evolution.

The conducted analysis demonstrates that the evolution of research on economic singularity is currently taking place with an emphasis on such related areas as the AI economy, automation, digital platforms, and quantum economy. Thus, during 2005–2015, studies devoted to singularity focused on the theoretical prerequisites for the formation of the concept of *Technological Singularity* in the context of the impact of AI on the economy (the economy remained human-centered, but technologies began to transform market structures).

During the period 2015–2023, most studies concentrated on the analysis of platformization and the algorithmic economy, the impact of AI on productivity, the dominance of Big Tech, and the economics of data and algorithmic governance. Throughout this period, intensive scientific discussions took place concerning the "*post-labor economy*" and the formation of the prerequisites for singularity, while the focus of research shifted from the structuring of technologies to the analysis of their economic consequences, namely the transformation of the economy into a data-driven system. This concerns both comprehensive monographs [8; 9; 10] and periodical publications [11; 12; 13]. In recent years (2023–2025), the subject matter of scientific publications has changed fundamentally toward the protosingularity of the AI economy – the transition to *self-optimizing systems*, including the integration of AI and quantum technologies, autonomous systems, and self-learning economic models [14; 15; 16; 17].

Over the last several years, a number of studies by Ukrainian scholars directly devoted to the concept of "economic singularity" have also emerged. Thus, V. Opanasiuk and others [18; 19] examine "integrated singularity" (where AI surpasses human intelligence) through the prism of national readiness (education, research and development, policy) for potential exponential changes. S. Hromiak associates singularity with quality management paradigms [20].

In general, while Western publications prioritize empirical assessment and economic modeling aimed at measuring the impact of AI on economic development, Ukrainian authors focus on national strategies in the context of singularity. Ukrainian studies fill a specific niche by linking global AI trends with the national context, concentrating on conceptual frameworks

and national strategic scenarios, and relying more on scenario-based logic than on multilevel macroeconomic assessments. Regarding policy, Ukrainian scholars emphasize capacity building (digital infrastructure, STEM education, and balanced AI policy) as well as resilience under wartime conditions, whereas Western sources investigate the adaptation of education systems and labor markets to the new challenges of an unpredictable environment. Both research directions reveal knowledge gaps: Western studies identify policy implications in workforce retraining and antitrust legislation, while Ukrainian authors stress the importance of the quality of governance in digital infrastructure and education for achieving positive outcomes.

In his study of singularity, G. Snooks proposed using a graphical form to interpret the behavior of the exponential curve (a figurative description of the shape of the growth curve to denote the result of mathematical progression) [21]. This concept became known as the "*Snooks Vertical*," understood as a process (rather than a separate formula) in which the gradual growth of a system (economy, technology, etc.) subsequently transitions into accelerating exponential growth, and at a certain moment the curve takes the form of a vertical line. This resembles the classical exponential growth curve but emphasizes the final phase, where growth becomes practically "explosive."

Moreover, according to G. Snooks' theory, all elements of the system acquire new properties and change the nature of their interaction with one another, while certain moments in time become a kind of phase transition, after each of which a qualitative leap occurs within the system. The time intervals between these transitions progressively shorten according to a simple relationship, leading to exponential development and movement toward the point of singularity. He also argued that, according to calculations, humanity would reach the point of singularity in the second half of the twenty-first century, approximately from the beginning of the 2050s onward.

Another important concept relevant in the context of technological singularity is *NBIC convergence*, an acronym denoting four components: nano (N), bio (B), info (I), and cogno (C). In turn, "convergence" refers to the process of merging, rapprochement, or concentration of several entities into a single point. Essentially, convergence implies the merging of all

scientific disciplines into one unified field of knowledge. In futurological concepts, NBIC convergence is currently considered a key element in humanity's transition from the fifth to the sixth technological paradigm.

Each of the previous technological paradigms possessed its own distinctive features and phase transitions:

1) the First Industrial Revolution (from 1772);

2) the Age of Coal and Steam (from 1825);

3) the Second Industrial Revolution – the Age of Steel (from 1875);

4) the Age of Oil (from 1905);

5) the Scientific and Technological Revolution – the Age of Computers (from 1971);

6) the Age of Nanotechnology (from 2004, although the transition has only begun);

7) the Age of Cognitive Technologies.

At the same time, although the convergence of various scientific fields into one unified sphere is currently at an early stage, systems of knowledge also possess the property of differentiation – the transformation of one simple entity into multiple interconnected entities that interact through transactions. In some systems theories, this is referred to as a "system with irreducible complexity." An example is specialization and the division of labor: the more complex a system becomes, the more likely it is to consist of numerous isolated autonomous subsystems, each of which separately has no independent meaning. Thus, rather than convergence, the process often involves disintegration and specialization.

Therefore, the interpretation of the concept of convergence acquires particular significance, for example, in the context of the further segmentation of the labor market into specific professional subpopulations, where each individual is responsible only for a narrow field of knowledge and functions within its boundaries. Nevertheless, these constituent elements of a "distributed system of competencies" remain interconnected, forming a certain unified structure.

At the same time, despite the significant number of studies in the field of digital transformation and AI, including futurological modeling, the issue of the relationship between the autonomization of economic decision-making and the formation of economic singularity remains insufficiently developed. In particular, there is no holistic understanding of the relationship

between AI autonomy and macroeconomic singularity at the level of an interdisciplinary approach, nor of the mechanism of transition from the digital economy to a state in which interaction among autonomous systems becomes the determining factor in the development of the modern global economy.

2. Features of the Transformation of the International Economy under Conditions of AI Singularity

In recent years, due to the development of AI technologies, the problem of singularity has begun to occupy an important place in studies of economic growth. Indeed, superintelligent AI is beginning not only to write "technological code" for all possible production processes but also to improve itself by creating enhanced copies of its own systems without any human involvement. Until recently, this seemed like science fiction; however, today executives of leading IT companies believe that within the next 5–8 years AI will generate almost all code for modern software. According to data from *MIT Technology Review*, 94% of companies already use generative AI in the development of their products, while 82% employ it at several stages of the product life cycle. Gartner analysts estimate that the automation of routine tasks could increase developer productivity by 30% and add more than USD 1.5 trillion to global GDP [22].

Since the number of such AI systems that fully or almost fully replace humans can be expanded rather rapidly, this should lead to the transition of the economy into a regime of singularity, that is, to growth rates that continuously accelerate toward infinity. This refers to a future situation in which "the rapid development of information technologies and AI crosses the threshold beyond which economic growth begins to accelerate dramatically through technological improvements carried out at ever-increasing speed and cascading throughout the entire economy" [23, p. 299].

Unlike the partial replacement of humans by machines, which historically complemented human labor and multiplied its productivity (steam engines, electricity, or the Internet), the implementation of AI claims something more ambitious: the replacement of the unique ability inherent to humans – intelligence itself. Singularity may take different forms depending on the segment of the economy in which advanced AI becomes capable of completely replacing human labor. The economy may

enter a trajectory of "explosive" growth provided that, on the one hand, the elasticity of substitution between labor and capital sharply increases and the share of progressive sectors with continuously growing productivity expands rapidly within GDP. On the other hand, the share of tasks automated through AI will continue to grow, leaving humans with fewer and fewer directly performed tasks. Therefore, not all economists share the "super-optimistic" expectations regarding the interdependence between the progress of AI technologies and the multiple acceleration of economic growth rates.

In contemporary economic literature, the implementation of AI is also frequently described through terms such as "explosive," "super-exponential," or "transformative" economic growth, since under such conditions the speed of growth appears to be an order of magnitude higher than existing statistical indicators. The reason is that in a situation of singularity, production could begin to grow annually by at least 20–30% instead of the current 2–3%, a level that has remained virtually unchanged for countries at the technological frontier over the past century and a half, beginning from the final decades of the nineteenth century. In this context, AI is defined either as "the ability of a machine to imitate intelligent human behavior" or as "the ability of a particular artificial agent to achieve goals across a wide range of diverse environments" [24, p. 238].

Generative AI currently demonstrates one of the most uneven adoption trajectories in the history of technology. On the one hand, it is radically transforming the work of developers; on the other hand, most companies do not yet observe significant returns on their investments. A study by MIT showed that despite investments of USD 30–40 billion in the United States over the past four years, 95% of generative AI projects generate zero returns for companies [25]. According to the study, the outcomes were so sharply divided both among buyers (enterprises, small and medium-sized businesses) and developers (startups, vendors, and consulting firms) that the phenomenon was termed the "*GenAI divide*." Only 5% of pilot projects involving generative AI produce millions in returns, while the overwhelming majority remain without any measurable impact on profits or losses.

At the same time, tools such as ChatGPT and Copilot are being widely adopted: more than 80% of organizations have explored or piloted them, and nearly 40% report actual implementation. However, these tools primarily enhance individual productivity rather than overall

profit-and-loss indicators. Meanwhile, modern enterprise-grade custom system software solutions developed and sold by vendors exhibit the following demand characteristics: 60% of organizations evaluated such tools, 20% reached the pilot stage, and only 5% achieved full production deployment. Most projects fail because of unstable workflows, the absence of contextual learning, and incompatibility with current business operations.

However, for many researchers of technological history, the absence of an immediate effect represents a "normal" delay associated with the classical pattern of implementing breakthrough transformational technologies. The problem lies not in AI itself, but in the fact that companies attempt to apply it by "overlaying" it onto outdated processes rather than fundamentally restructuring business models, redesigning infrastructure (especially data platforms), and retraining personnel. Truly expected results can only be achieved when AI transforms from a simple automation tool into the core of a company's business processes, accompanied by the creation of new types of jobs and the expansion of employee capabilities.

Under current conditions, the architecture of AI consists of *three levels of capability*:

– Weak/Narrow AI – specialization in a single task (for example, recommendation systems or facial recognition);

– Strong/General AI – the ability to solve any intellectual task at the human level;

– Artificial Superintelligence (ASI) – AI that surpasses human intelligence in every field.

In addition, AI includes *four functional levels* according to the experience of its use (basic models, connection layers, AI agent management platforms, and user interfaces):

– Reactive machines – systems without memory that respond only to current stimuli (for example, Deep Blue);

Limited Memory – systems that use past experience for decision-making (for example, chatbots and autonomous vehicles);

– Theory of Mind – potential systems capable of understanding human emotions and beliefs; currently under development;

– Self-aware AI – AI possessing its own consciousness and emotions; still a theoretical and conceptual construct.

Approaches to AI classification also involve accounting for knowledge-based expert systems (Top-Down approaches: natural language processing – NLP, image and video analysis – computer vision, machine learning – ML, and deep learning) as well as the study of neural networks that imitate the functioning of the human brain (Bottom-Up approaches). According to information technology experts, AI is rapidly moving toward superintelligence.

Indeed, on the one hand, AI is fundamentally transforming the conditions of existence across all industries without exception. For example, assessing the safety of food products or the effectiveness of pharmaceuticals no longer requires tens of billions of dollars and thousands of human-years of research. Aggregated data from pharmacies, fitness centers, grocery stores, hospitals, bars, morgues, nightclubs, banks, and other market participants can provide answers within seconds with a high degree of reliability. On the other hand, within a "universal ethics neural network," a synergistic interaction emerges between natural and artificial formations of intelligence and consciousness, while sensory systems enable it to receive information about the surrounding environment. The creation of artificial self-awareness within such a neural network generates the capacity for autonomous learning and real-time adaptation. Since generative AI lacks human emotions, it becomes a reliable generator of arbitrary volumes of material wealth, limited only by the availability of energy resources. Moreover, the pendulum-like shift from irrational euphoria to equally irrational panic (for example, in stock trading), which previously caused fundamental market imbalances and recurrent crises, is being modified under the influence of AI.

Modern AI already has enormous potential to reconfigure the economy through the automation of a significant number of tasks currently performed by humans, and its implementation is effectively a new form of automation [26]. Although "the Internet is also an example of automation that accelerates the production of ideas" [27, p. 146], AI occupies a special position – it does not merely increase the efficiency of researchers and inventors, but potentially replaces them entirely. According to experts at Goldman Sachs [28], in frontier economies AI could add an additional 1.5 percentage points to annual per capita GDP growth over the next decade, while McKinsey estimates [29] suggest 1.5–3.4 percentage points. This implies, in effect, a 1.5–2 times acceleration of economic growth. However, some economists

go further, arguing that within the next ten years AI could increase GDP in developed countries by 100% in the baseline scenario and by up to 300% in a more "aggressive" scenario [30]. This is, of course, not yet singularity, but it represents a rapid approach toward it. Thus, in the current century, economic growth rates may accelerate tenfold or more, and the formal conditions for transitioning to a hypothetical state of singularity within existing growth models are fully open to analysis.

Platformization and digitalization of the economy are stimulating the mass adoption of autonomous AI agents and the delegation of decision-making in finance, logistics, and production, leading to the formation of an economy without a "center," new markets and submarkets, and a partial decline in the importance of traditional market institutions. Existing theories do not adequately explain the "jump-like" nature of these changes, and this "tipping point" in the conceptual evolution of singularity raises the question: "Can the autonomy of economic decision-making be considered a trigger of singularity?"

One of the key transformations of the modern global economy is the gradual formation of a new type of economic agent – the autonomous AI agent – which, unlike traditional market participants, operates based on algorithmic models capable of self-learning, adaptation, and decision-making without direct human intervention. The essential precondition for the emergence of autonomous AI agents is the process of delegating economic decisions from individuals to algorithmic systems. While in the early stages of digitalization AI performed auxiliary functions (data analysis, forecasting), the current stage is characterized by a transition toward operational autonomy.

This process unfolds across several levels: (a) analytical delegation (AI processes large datasets and generates recommendations); (b) tactical delegation (algorithms select optimal actions under given conditions); (c) strategic delegation (systems independently define goals and methods for achieving them within specified constraints). As a result, a situation emerges in which a significant share of economic decisions is made faster, more accurately, and more efficiently. At the same time, this reduces transaction costs but also creates conditions for the loss of (primarily human) control over certain segments of the economic system.

Indeed, from the perspective of endogenous economic growth theory by R. Lucas [31] and P. Romer [32], technological progress is considered an internal outcome of economic functioning. Within this paradigm, knowledge, innovation, and human capital are the key drivers of growth. In the case of autonomous AI agents, this logic evolves further – knowledge is generated not only by humans but also by algorithms, the learning process becomes automated, and the innovation cycle becomes continuous and self-reinforcing. Thus, AI systems act as an endogenous mechanism of knowledge production, extending the classical endogenous growth model to a level of "algorithmic endogeneity." This allows for the formulation of a principle: the economic system no longer merely uses knowledge – it autonomously produces and scales it.

The next stage in the evolution of economic singularity is the transformation of AI from a tool into an independent market participant. Autonomous agents acquire features of economic subjectivity – from decision-making processes (buying, selling, investing) and interaction with other agents (including other AI systems) to adaptation to market environments and optimization of their own behavior based on experience. This gives rise to a new form of economic interaction – the "AI-to-AI economy" – where key transactions occur without direct human involvement, and the market evolves from a space of human decisions into an environment of algorithmic competition (processing speed, quality of machine learning models, access to data). Instead of traditional competition between companies or states, competition emerges between algorithmic ecosystems, fundamentally altering the nature of competition itself.

The interaction of autonomous agents can be interpreted within the framework of complex adaptive systems, where the economy is seen as a network of interacting elements capable of adaptation and self-organization. In this context, each AI agent is an adaptive unit, and their interaction generates emergent system properties in which the macro level (international markets, the global economy) is the result of micro-level algorithmic interactions. A key feature of the current stage is that the speed of these interactions significantly exceeds human decision-making speed, "pushing" the system toward dynamic instability and phase transitions – core concepts in complexity theory.

The current formation of autonomous AI agents is most evident in sectors characterized by high-speed decision-making and large data volumes. In finance, algorithmic systems already perform asset management, risk assessment, and credit scoring. Autonomous agents can independently construct investment portfolios, adapt strategies to market changes, and execute transactions in real time, gradually displacing traditional financial intermediaries and forming algorithmically governed financial ecosystems. In logistics and supply chains, systems increasingly coordinate with each other (e.g., warehouse systems, transport platforms, and production modules), forming self-regulating logistics networks. AI agents also enable automated route planning, inventory optimization, and coordination among supply chain participants, significantly increasing efficiency while reducing transparency of decision-making for human operators.

A particularly illustrative case of AI-to-AI interaction is algorithmic high-frequency trading. This involves decisions made in milliseconds in environments where humans cannot intervene in real time, and algorithms compete on speed and precision. In such a setting, the market effectively functions as a system of interacting algorithms, creating conditions for phenomena that are difficult to capture using traditional economic models (such as sudden crashes or "flash crashes"). Thus, autonomous AI agents in trading, finance, and logistics are gradually transforming from auxiliary tools into full-fledged economic actors, reshaping the structure and logic of global economic relations. The delegation of decision-making to algorithms, the emergence of AI as a market participant, and the further diffusion of such systems across key economic sectors create the preconditions for a new stage of economic singularity, where interaction between algorithms becomes the dominant mechanism of economic coordination.

3. Singularity Transformations of the Economy under Super-Exponential Growth

From a quantitative perspective, modern economic science distinguishes *three main types of economic growth*: exponential growth (the economy grows at a constant rate year by year, for example 3%), super-exponential growth (the growth rate increases continuously over time: 2% in the first year, 3% in the second, 4% in the third, and so on), and sub-exponential growth (the economy grows at a continuously declining rate: 1% in the

first year, 0.5% in the second, 0.2% in the third, etc.). While most growth models (within growth theory) have focused on explaining exponential growth, super-exponential and sub-exponential cases have often been treated as peripheral. Their theoretical possibility has been acknowledged, but they have attracted relatively little attention from researchers. This situation changed in the early 21st century, when real prospects of both super-exponential growth – driven primarily by AI – and sub-exponential dynamics emerged on the horizon, especially for economies at the technological frontier.

In general, two types of singularity are distinguished: Type I and Type II. In the first case, growth accelerates continuously over an unlimited period of time; in the second, infinite growth occurs within a finite time interval. Type II singularity is usually associated with science fiction (although some formal growth models allow it), whereas Type I singularity is considered practically attainable. A more plausible scenario is one in which growth rates continuously accelerate over a bounded but sufficiently long period (for example, several decades), after which they stabilize at a certain level. It is worth noting that "explosive" growth at an annual rate of around 30% has never been observed in world economic history – not in England during the Industrial Revolution, not in Japan in the 1960s, and not in China in recent decades. Existing projections suggest the following: global GDP currently doubles approximately every 20–30 years; under "explosive" growth conditions, it could double every 2–3 years. According to T. Davidson, this would imply "the creation and deployment of such a multitude of technological advances that living standards would improve ten times faster than anything ever developed in human history" [33].

According to this assumption, all improvements in housing, healthcare, software, and related fields that currently take 10 years could be achieved within one year. Similarly, scientific progress in physics, biology, engineering, and social sciences that currently requires a decade could be achieved within a single year. In some sectors, growth would be faster, in others slower, but on average it would accelerate tenfold. As a result, within 10 years humanity could achieve technological and economic progress comparable to what was previously achieved over 100 years. It is currently difficult even to imagine how rapidly AI would transform human life and welfare under super-exponential growth conditions. At 30% annual growth

rates, humanity would become 1,000 times wealthier within 25 years – while historically living standards have increased only about 100-fold over the entire course of human history. If such a growth rate were sustained over a century, per capita income would increase by 250 billion times, which, while not singularity in the strict sense, is practically indistinguishable from it [33].

In all economic growth models, output is defined as a function of production factors (the Cobb–Douglas function): output depends on capital, labor, and total factor productivity (TFP). These models assume diminishing marginal returns, meaning that each additional unit of capital (holding labor constant) and each additional unit of labor (holding capital constant) generates a smaller increase in output. Diminishing returns significantly constrain the growth potential that production factors alone can generate. A large body of empirical research shows that, in the long run, the main contributor to GDP growth is TFP rather than accumulation of physical or human capital. From this perspective, idea-based models appear more adequate than accumulation-based ones.

Returns to scale refer to the change in output when all inputs increase proportionally. They can be constant (doubling all inputs doubles output), increasing (doubling inputs more than doubles output), or decreasing (doubling inputs less than doubles output). By doubling the number of factories – and thus capital and labor – we could double output. However, "explosive" (super-exponential) growth scenarios assume increasing returns to scale.

Ideas, knowledge, and technologies are examples of non-rival goods: their use by one agent does not prevent simultaneous use by others. Because of this non-rivalry, they generate increasing returns to scale, which under certain conditions can lead to singularity-like dynamics with continuously accelerating growth rates. For example, in the Cobb–Douglas production function, capital is treated as an endogenous factor since it can be accumulated through savings and reinvestment. Labor and technological progress, however, are typically treated as exogenous factors determined outside the model. As a result, long-run economic growth is driven primarily by these exogenous components – labor and technology.

F. Trammell and A. Korinek examined 25 alternative ways of incorporating AI into formal growth models, each conceptualizing technological progress

differently [34]. If advanced AI systems can effectively replace humans both in producing "goods" and in producing "ideas," this could become a source of explosive growth by generating increasing returns to scale from accumulating resources. These three general arguments – historical experience, positive feedback in idea production, and the possibility of singularity within standard growth frameworks – are sufficiently strong to avoid dismissing super-exponential growth as implausible and instead to treat its realization within coming decades as a realistic scenario.

The most general argument against the idea of singularity is the so-called *Baumol cost disease*, which may become a structural barrier to "explosive" economic growth. This phenomenon was first identified by the American economist W. Baumol, after whom it is named [35]. According to Baumol and his followers, different sectors of the economy exhibit different levels of susceptibility to technological progress: in some, productivity grows rapidly, while in others it grows slowly or remains constant. As a result, over time, high-productivity sectors tend to occupy a smaller share of GDP, while low-productivity sectors occupy a larger one. Since overall economic growth is a weighted average of sectoral growth rates, increasing dominance of stagnant sectors slows aggregate growth. Empirical evidence broadly supports this mechanism, showing that sectors with declining productivity growth tend to expand their share of GDP over time.

However, the Baumol cost disease scenario is not the only possible outcome (at least in theory). To describe the opposite case, W. Nordhaus introduced the concept of "Baumol's euphoria" [23]. This refers to a situation in which demand shifts toward sectors with rapidly growing productivity, increasing their share of GDP and further accelerating overall economic growth. Which scenario ultimately prevails – Baumol's cost disease or Baumol's euphoria – depends on the elasticity of substitution between goods produced in low-productivity and high-productivity sectors.

According to the "bottom-line" assessment, the conclusions are more or less objective: if technological progress occurs, first, through the continuous improvement of AI systems, and second, through an increasing elasticity of substitution of labor by informational capital embodied in these systems, then sooner or later the economy will enter a trajectory of "explosive" growth. Under these conditions: (1) the share of informational capital in the value of production resources will continuously increase, approaching

the limit of 100%; (2) its contribution to GDP will also steadily rise, approaching 100%; and (3) its continuously accelerating growth will be capable of driving accelerated growth of the entire economy. Moreover, even in this scenario, full replacement of workers by AI systems will not be required: super-exponential growth will be achievable even under partial automation, albeit at a sufficiently high level. According to W. Nordhaus, it would be sufficient to automate 80% of all tasks currently performed by workers (although, given current trends, even approaching this threshold is, in his view, projected only beyond the horizon of the 21st century) [23].

Certain tasks may remain non-automated even if their automation is technically possible, due to the fact that consumers may prefer that they be performed by people in certain professions (athletes, clergy, in-home caregivers, etc.). In other words, people may prefer interaction with human doctors, human teachers, and other service providers that carry high symbolic value [36]. Although computer programs already play chess better than the greatest grandmasters, this has not led to the closure of chess tournaments, since there remains an interest in human competition rather than machine competition. It is unlikely that people will want sermons in churches to be delivered by robot priests, or actors in films to be replaced by robot performers – even when this becomes technically feasible.

"Explosive" growth rates of around 20–30%, under otherwise equal conditions, would require Schumpeterian "creative destruction" on an accelerated scale. With productivity doubling every 2.5 years, substantial portions of physical and human capital would become rapidly obsolete. Each year would require both the radical restructuring of infrastructure – dismantling large parts of existing equipment and installing new systems – and the retraining of a significant share of the workforce. According to the Schumpeterian approach, incentives for innovation are linked to the ability to capture rents from temporary monopoly power enjoyed by innovators, protected through patents, trade secrets, and similar mechanisms. If AI facilitates the copying of innovations, competitors would benefit, while innovators would lose, since the period of rent extraction from new technologies would be shortened.

Energy singularity, in the context of economic singularity, becomes one of the drivers of broader economic transformation alongside AI, automation, and new materials. It is a hypothetical moment when energy becomes

so cheap, accessible, and practically inexhaustible that it fundamentally transforms the economy, similar to how technological breakthroughs reshape society in concepts of economic singularity. The term was first introduced by J. Cordeiro [37], who argued that cheap energy changes production: it triggers a sharp "jump" in productivity and a "collapse" in the cost of many goods, restructures global supply chains, increases the importance of recycling, and reduces incentives to relocate production to countries with cheap labor.

In subsequent (modern) conceptual studies [38; 39], the notion of "energy singularity" is analyzed, on the one hand, as a function integrating nuclear fusion, renewable energy sources, energy storage, and AI optimization, with exponential growth in energy generation as a key factor. On the other hand, it is treated as a predictive hypothesis – a multidisciplinary futurological concept based on energy research in the context of a transition toward energy abundance.

There is also the concept of "*bioeconomic singularity*," which conceptually corresponds to a transition toward a fully bio-based economy, the substitution of fossil resources with biological ones, and exponential growth in biotechnology [40]. In terms of a formalized model, bioeconomic singularity is a function integrating biotechnology, AI, biomass, and cyclical systems. It is also a specific hypothetical moment when advances in synthetic biology make production so cheap, scalable, and universal that it radically reshapes the economy (just as steam engines or electricity did during the Industrial Revolutions). In this sense, biology becomes a universal production platform – bacteria produce materials (bioplastics, "grown" tissues, new composites), cells become "factories for accelerated organism design" (fermentation-based proteins), old industries lose relevance, and production shifts from factories to bioreactors (an analogue of the transition from 20th-century mechanics to 21st-century software). Key drivers of development become data (genetic), design, and intellectual property, rather than land, labor, and raw materials [41].

Today, the bioeconomy is based on the use of biological resources for the production of energy, materials, and services, and represents a transition toward a renewable economy grounded in the integration of ecology and social governance. In turn, the bioeconomic singularity treats biology as a programmable production platform, stimulating a shift from a "extract and

harvest" model to a "grow and synthesize" model. Currently, more than 60 countries in the global economy have their own bioeconomy development strategies. According to existing scenarios, the full transformation of the global chemical industry, energy sector, and agriculture will require investments of USD 1–2 trillion annually by 2050, which is approximately 1.3–2.6% of global GDP [42]. For example, in the European Union, the scale of bioeconomy development is turning it into a macro-sector of the global economy, whose accelerated growth is a precondition for singularity. The estimated value of the EU bioeconomy, including goods and services, is EUR 2.7 trillion; annual growth rates of the biotechnology sector reach 18%, exceeding EUR 720 billion; 17.1 million jobs in the EU are created in biomass production and processing alone, generating 5% of GDP; and for every job created in the bioeconomy, there are 2.9 additional jobs created [43].

A full-fledged bioeconomic singularity occurs under the condition that 80–90% of bio-renewable energy and biologically derived materials operate in closed-loop cycles (zero waste), and biotechnology becomes cheaper than traditional technologies [44]. As a macro-level forecasting concept, the bioeconomic singularity is based on the exponential development of biotechnology and a transition toward a circular economy growing at double-digit rates. However, the shift toward bioeconomic dominance is constrained by strict environmental and resource limitations. At the same time, there is currently no unified measurement framework, which is characteristic of an early-stage systemic transition (a pre-singularity phase), although the bioeconomic and energy "singularities" together create a self-accelerating economy in which innovations objectively generate multiplicative increases in further innovations.

The *cognitive singularity* is a hypothetical moment when human attention, thought, and intelligence become, on the one hand, the primary economic resource, while the boundary between human and machine intelligence effectively disappears. On the other hand, these capacities become so manageable, enhanced, and integrated with technology that they radically reshape the economy (as profoundly as energy or production in the energy and bioeconomic "singularities"). The concept of cognitive singularity is typically considered an aspect of technological singularity: intelligent systems (AI/AGI) surpass human cognitive capabilities and

enter a regime of self-accelerating development (an intelligence explosion). In effect, the economy begins to revolve not around labor or existing resources, but around attention, thinking, and consciousness through the combination of the attention economy (which can be measured, optimized, and amplified), neurointerfaces, and AI. If in Industry 4.0 the scarce resources were labor and capital, in Industry 5.0 the scarce resources become high-quality attention and original thinking. At the same time, the speed of cognitive processes increases, new factors of production emerge – real-time intelligence and a "market of cognitive states" – and the boundary between humans and machines is blurred.

The concept of cognitive singularity emerges at the intersection of research in artificial intelligence, cognitive science, and the philosophy of technology, and forms part of the broader framework of technological singularity. First, it is defined as a hypothetical developmental state in which artificial intelligence systems reach or exceed human intelligence and acquire the capacity for autonomous self-improvement, leading to exponential growth in cognitive capabilities. Second, it is considered a consequence of the so-called "intelligence explosion," with the main mechanisms of this process being machine learning, recursive self-improvement, and the scaling of computational resources [45].

In contemporary research [46; 47; 48], this is interpreted as a transition toward superhuman intelligence associated with the emergence of autonomous self-improving systems and a transformation of the cognitive architecture of society (human + AI). The interdisciplinary field of "singularity studies" encompasses AI, neuroscience, cognitive science, sociology, economics, ethics, and law. The exponential development of AI is driven by increasing computational power and data availability, leading to faster learning and modeling and a transition from narrow AI to multi-task systems. Key constraints include the absence of genuine AI consciousness, limited model interpretability (the XAI problem), and dependence on human-generated data. Key indicators of approaching singularity include decision-making autonomy, self-improvement capability, integration of learning and reasoning (neuro-symbolic AI), and the potential emergence of AI consciousness or its functional analogues.

On the one hand, AI systems already possess components traditionally associated with cognitive singularity (autonomous decision-

making and self-development capabilities, generalization ability, and generativity – the creation of new knowledge and content). On the other hand, AI's ability to surpass human expert knowledge in narrow domains, the shift from algorithmic to heuristic-cognitive approaches, and the absence of fundamental physical barriers to superintelligence development are all notable. At the same time, a key ethical issue remains – forms of control (AI alignment), contradictions, and the probability of rapid transition to superhuman intelligence levels [49; 50].

Since risks grow proportionally with system capabilities, functional indicators of machine "consciousness" are being proposed based on AI computational resources (which double faster than Moore's Law). This leads to exponential growth in data volumes alongside nonlinear improvements in algorithmic efficiency. Despite significant progress, several problems remain unresolved: (a) the absence of artificial general intelligence (AGI); (b) limited model interpretability; (c) dependence on large-scale data. Currently, predictive models (scenarios) of cognitive singularity develop along the following directions:

1. Intelligence explosion (rapid self-improvement of AI leads to uncontrolled growth of intelligence).

2. Human–AI co-evolution (formation of hybrid cognitive systems – human-AI coupling – via brain-computer interfaces and "augmented extended intelligence").

3. Institutionally controlled development (AI regulation through international legal mechanisms).

Through three key components – (1) direct brain–machine interfaces enabling thought-to-action without keyboards and accelerating decision-making; (2) enhancement of cognitive abilities via memory, concentration, and learning augmentation; and (3) new forms of labor ("thinking as a service" and collective cognitive networks) – the role of neurointerfaces is rapidly increasing. This fundamentally transforms the economy. First, labor becomes less physical and routine and more cognitive, with part of thinking delegated to AI. Second, an "intelligence market" emerges, initially based on real-time expert task decomposition as modular units of thinking. Third, learning barriers disappear: with neurointerfaces, knowledge can be acquired rapidly, making learning almost instantaneous. Fourth, new business models emerge based on deep monetization of

attention, subscriptions to cognitive enhancement, and "packages of thinking" (skills-as-a-service).

At present, cognitive singularity interacts with energy singularity (providing infrastructure) and bioeconomic singularity (providing biological tools for the brain), and together they form a self-organizing economy in which energy, matter, and intelligence are nearly unconstrained, while production, biology, and cognition converge. Simultaneously, a feedback loop effect emerges, in which all three "singularities" interact as a unified system in a repeating cycle: AI improves biology → biology improves the brain → enhanced brains create better AI → cheap energy scales all processes. Thus, energy singularity provides scale, bioeconomic singularity provides material flexibility, and cognitive singularity provides speed and direction.

Accordingly, the cognitive singularity is a scientifically grounded but empirically unverified hypothesis. Current AI development demonstrates the presence of key prerequisites: autonomy, self-learning, and scalability. Leading international studies confirm the possibility of transitioning toward superhuman intelligence, while emphasizing issues of control and regulation. The most likely scenario is a gradual cognitive integration of humans and AI, rather than a sudden "intelligence explosion." Future research should focus on developing safe AGI (AI alignment) and its legal regulation within ethical frameworks for AI use.

CONCLUSIONS

The conducted research demonstrates that the contemporary stage of global economic development is characterized by the transition from a linear, human-centered economic model toward a nonlinear, algorithmically governed system based on artificial intelligence, autonomous agents, and self-learning technological ecosystems. The convergence of digitalization, AI technologies, quantum computing, platformization, and data-driven governance forms the foundation of a new neotechnology paradigm of global development associated with the emergence of economic singularity. The main conclusions of the study are as follows:

Economic singularity should be interpreted as a systemic phase transition of the global economy rather than solely as a technological phenomenon. Its defining characteristics include exponential and super-exponential

growth dynamics, increasing autonomy of technological systems, algorithmic governance, and the gradual displacement of human-centered economic coordination mechanisms.

The proposed Economic Singularity Framework (ESF) conceptually explains the transition from the classical economy toward the digital economy, AI economy, autonomous economy, and ultimately economic singularity. The key drivers of this transformation are artificial intelligence, quantum computing, informational capital, data intensity, and institutional adaptability.

Autonomous AI agents are becoming a fundamentally new type of economic actor within the international economy. Unlike traditional market participants, they possess the capacity for self-learning, adaptation, autonomous decision-making, and interaction with other AI systems without direct human intervention. This creates the prerequisites for the formation of an AI-to-AI economy in which algorithmic ecosystems increasingly replace traditional forms of market coordination.

The study substantiates that endogenous technological progress generated by self-learning AI systems fundamentally transforms the logic of economic growth. Knowledge production becomes partially autonomous, while innovation cycles acquire self-reinforcing and cumulative characteristics. As a result, the economy evolves into a complex adaptive system governed by nonlinear dynamics and positive feedback loops.

The emergence of super-exponential growth trajectories becomes theoretically possible due to increasing returns generated by informational capital and non-rival technological goods. Under such conditions, the contribution of AI-driven informational capital to GDP and productivity growth continuously increases, creating the foundations for accelerated structural transformation of the global economy.

The interaction between economic singularity, energy singularity, bioeconomic singularity, and cognitive singularity forms an integrated self-accelerating system of technological evolution. Energy abundance, programmable biology, neurointerfaces, and AI-driven cognitive enhancement collectively reshape production systems, labor markets, global value chains, and mechanisms of value creation.

The transformation of the global economy under conditions of singularity generates both opportunities and systemic risks. On the one hand, AI-driven

technologies may significantly increase productivity, reduce production costs, accelerate scientific progress, and improve living standards. On the other hand, they intensify technological inequality, concentration of economic power within global Big Tech ecosystems, institutional asymmetries, and ethical challenges related to algorithmic governance and loss of human control.

Traditional economic theories and institutional mechanisms are increasingly unable to adequately explain or regulate the nonlinear and self-organizing dynamics of the emerging AI economy. This necessitates the development of new interdisciplinary approaches combining economics, complexity theory, technological forecasting, international political economy, ethics, and global governance studies.

For countries participating in international economic relations, strategic competitiveness will increasingly depend not on traditional industrial advantages but on access to data, AI infrastructure, computational resources, digital ecosystems, and the ability to integrate into global technological networks. Consequently, the architecture of future international competition will shift from state-centered competition toward competition between algorithmic ecosystems and technological platforms.

The future trajectory of economic singularity will largely depend on the effectiveness of international regulation, AI governance mechanisms, ethical standards, institutional flexibility, and the capacity of societies to adapt to rapidly accelerating technological transformations.

Prospects for further research should focus on several directions: the development of formal macroeconomic models of economic singularity; quantitative assessment of AI-driven productivity effects; analysis of institutional adaptation under conditions of algorithmic governance; investigation of AI alignment and international regulation mechanisms; and the study of geopolitical transformations associated with technological asymmetries and the global concentration of informational capital. Particular attention should also be devoted to the interaction between cognitive, bioeconomic, and energy singularities within the emerging architecture of Industry 5.0 and the future world economy.

References:

1. Ulam S. (1958) *Tribute to John von Neumann. Bulletin of the American Mathematical Society*, 64(3), 1–49. DOI: https://doi.org/10.1090/S0002-9904-1958-10113-0

2. Moore G. E. (1965) *Cramming More Components into Integrated Circuits. Electronics,* 38(8).

3. Derek J. de Solla Price (1963) *Little Science, Big Science.* New York: Columbia University Press, 119 p.

4. Vinge V. *(1993) The Coming Technological Singularity: How to Survive in the Post-Human Era.* (NASA Lewis Research Center/VISION-21 Symposium), 11 p.

5. Kurzweil Ray (2005) *The Singularity Is Near: When Humans Transcend Biology. New York: Viking Books, 652 p.*

6. Arthur W. B. (1996). Increasing returns and the new world of business. *Harvard Business Review*, 74(4), 100–109.

7. Arthur W. B. (2015) *Complexity and the Economy*. Oxford University Press, 211 p.

8. Lee Kai-Fu (2021) *AI 2041: Ten Visions for Our Future.* Crown Publishing, 480 p.

9. Srnicek N. (2021) *Platform Capitalism.* Polity Press, 256 p.

10. Agrawal A., Gans J., Avi Goldfarb A. (2022) *Power and Prediction: The Disruptive Economics of Artificial Intelligence.* Harvard Business Review Press, 288 p.

11. Cockburn I., Henderson R., Stern S. (2020) *The Impact of Artificial Intelligence on Innovation. Research Policy*, 49(3), 103–120. DOI: https://doi.org/10.1016/j.respol.2019.103861

12. Bessen J. (2020) *AI and Jobs: The Role of Demand. Journal of Economic Perspectives*, 34(4), 30–52. DOI: https://doi.org/10.1257/jep.34.4.30

13. Aghion P., Antonin C., Bunel S. (2021) *Artificial Intelligence, Growth and Employment. Economic Policy*, 36(106), 1–44. DOI: https://doi.org/10.1093/epolic/eiab002

14. Acemoglu D., Johnson, S. (2023) *Power and Progress: Our Thousand-Year Struggle Over Technology and Prosperity. Journal of Economic Perspectives*, 37(4), 3–28. DOI: https://doi.org/10.1257/jep.37.4.3

15. Acemoglu D. (2024) *The Simple Macroeconomics of AI.* Working Paper. NBER WP No.32487, 57 p.

16. Saam M. (2024) Macroeconomic Productivity Effects of AI. *The Economists' Voice,* 21(2), 327–333. DOI: https://doi.org/10.1515/ev-2024-0072

17. Brynjolfsson E., Li D., & Raymond L.R. (2025) Generative AI at Work. *Quarterly Journal of Economics,* 140(2), 889–942. DOI: https://doi.org/10.1093/qje/qjae044

18. Opanasyuk V. (2025) Tsyfrova ekonomika Ukrayiny v epokhu intehrovanoyi synhulyarnosti [Digital Economy of Ukraine in the Era of Integrated Singularity]. *Ekonomika ta Suspil'stvo – Economics and Society,* (80). DOI: https://doi.org/10.32782/2524-0072/2025-80-2 [in Ukrainian].

19. Opanasiuk V., Savytskyi S. (2025) Pidhotovka Ukrayiny do intehrovanoyi synhulyarnosti: ekonomiko-orhanizatsiyni stratehiyi ta rol′ osvity [Preparing Ukraine for Integrated Singularity: Economic-Organizational Strategies and the Role of Education]. *Ekonomika, Upravlinnya ta Administruvannya – Economy, Management and Administration,* 4(114), 3–10. DOI: https://doi.org/10.26642/ema-2025-4(114)-3-10 [in Ukrainian].

20. Hromiak, S. I. (2024) Systema upravlinnya yakistyu yak chynnyk formuvannya natsional′noho bahatstva [Quality Management Systems as a Factor in Forming National Wealth]. *Ekonomika ta Suspil'stvo – Economy and Society,* 63, 103-115. DOI: https://doi.org/10.32782/2524-0072/2024-63-103 [in Ukrainian].

21. Snooks G. D. (2019) *Exploding the Great Singularity Myth*. Canberra: Institute of Global Dynamic Systems, IGDS Working Papers, № 16, 25 p.

22. Pasichnyi O. (2025) V 2026 rotsi shtuchnyy intelekt zaminyt′ polovynu rozrobnykiv [*In 2026, Artificial Intelligence Will Replace Half of Developers]*. Available at: https://terazus.com/uk/4489-v-2026-rotsi-shtuchnij-intelekt-zaminit-polovinu-rozrobnikiv [in Ukrainian].

23. Nordhaus W. D. (2021) Are We Approaching an Economic Singularity? Information Technology and the Future of Economic Growth. *American Economic Journal: Macroeconomics*, 13(1), 299–332. DOI: https://doi.org/10.1257/mac.20190167

24. Aghion P., Jones B., Jones C. (2019) Artificial Intelligence and Economic Growth / In: A. Agrawal, Gans J., Goldfarb A. (eds). *The Economics of Artificial Intelligence: An Agenda.* Chicago: University of Chicago Press. P. 237–290.

25. The GenAI Divide State of AI in Business 2025. MIT NANDA, July 2025, 26 p. Available at: https://mlq.ai/media/quarterly_decks/v0.1_State_of_AI_in_Business_2025_Report.pdf

26. Erdil E., Besiroglu T. (2024) Explosive Growth from AI Automation: A Review of the Arguments // arXiv:2309.11690v3. Available at: https://arxiv.org/pdf/2309.11690

27. Jones C. (2022) The Past and Future of Economic Growth: A Semi-Endogenous Perspective. *Annual Review of Economics,* 14(1), 125–152. DOI: https://doi.org/10.1146/annurev-economics-051520-020319

28. Goldman Sachs (2023) Generative AI Could Raise Global GDP by 7 percent. Available at: https://www.goldmansachs.com/intelligence/pages/generative-ai-could-raise-global-gdp-by-7-percent.html

29. McKinsey Global Institute. (2023) The Economic Potential of Generative AI. Available at: https://www.mckinsey.com/~/media/mck-insey/business%20functions/mckinsey%20digital/our%20insights/the%20economic%20potential%20of%20generative%20ai%20the%20next%20productivity%20frontier/the-economic-poten-tial-of-generative-ai-the-next-productivity-frontier.pdf

30. Korinek A., Suh D. (2024) Scenarios for the Transition to AGI. Cambridge (Mass.): NBER. NBER Working Paper No. 32255.

31. Lucas R. E. (1988) On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3–42. DOI: https://doi.org/10.1016/0304-3932(88)90168-7

32. Romer P. M. (1990) Endogenous technological change. *Journal of Political Economy*, 98(5), 71–102. DOI: https://doi.org/10.1086/261725

33. Davidson T. (2021) Report on Whether AI Could Drive Explosive Economic Growth. Open Philantrophy. Available at: https://www.openphilan-thropy.org/could-advanced-ai-drive-explosive-economic-growth

34. Trammell P., Korinek A. (2023) Economic Growth under Transformative AI. Cambridge (Mass.): NBER. NBER Working Paper No. 31815.

35. Baumol W. J. (1967) Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis. *American Economic Review*, 57(3), 415–226. DOI: https://doi.org/10.2307/1812111

36. Granulo A., Fuchs C., Puntoni S. (2021). Preference for Human (vs. Robotic) Labor is Stronger in Symbolic Consumption Contexts. *Journal of Consumer Psychology*, 31(1), 72–80. DOI: https://doi.org/10.1002/jcpy.113

37. Cordeiro, J. L. (2013) Energy Singularity: From Scarcity to Abundance. *Foresight and STI Governance*, 7(1), 72–80. DOI: https://doi.org/10.17323/1995-459X.2013.1.72.80

38. Garcia, A. I. et al. (2021) Sustainable fusion energy: the future of power generation. *Energy Reports,* 7, 856–867. DOI: https://doi.org/10.1016/j.egyr.2021.01.003

39. Jones C. R. et al. (2024) The clock is ticking: Understanding the 'mixed feelings' about fusion energy in Europe. *Energy Research & Social Science*, 113. DOI: https://doi.org/10.1016/j.erss.2024.103538

40. Aguilar A., Twardowski T. (2022) Bioeconomy in a changing word. *EFB Bioeconomy Journal*, 2, November. DOI: https://doi.org/10.1016/j.bioeco.2022.100031

41. Eversberg D., et al. (2023) *The bioeconomy and its untenable growth promises. Sustainability Science,* 18, 569–582. DOI: https://doi.org/10.1007/s11625-022-01237-5

42. Manfred Kircher M. (2019) Bioeconomy: Markets, Implications, and Investment Opportunities. *Economies*, *7*(3). DOI: https://doi.org/10.3390/economies7030073

43. The 2025 EU Bioeconomy Strategy. Europian Commition. Available at: https://jackson.webtools.europa.eu/rest/html2m/output/QZ1JHd9MXZnFWbpJXZnFWZ0dnJlVnc/bioeconomy-factsheet-environment-european-commission.pdf

44. Faulkner J. P., Murphy E., Scott M. (2024) *Bioeconomy, Planning and Sustainable Development: A Theoretical Framework. Sustainability,* 16(19). DOI: https://doi.org/10.3390/su16198734

45. Eden A.H., Moor J.H., Søraker J.H., Steinhart E. 2013) *Singularity Hypotheses: A Scientific and Philosophical Assessment.* Springer, 441 p.

46. Brynjolfsson E., McAfee A. (2023) *The Turing Trap: The Promise & Peril of Human-Like Artificial Intelligence.* W.W. Norton & Company, 480 p.

47. Brynjolfsson E., Li D., Raymond L. (2023) *Generative AI at Work. NBER Working Paper*, 31161, 1–45. DOI: https://doi.org/10.3386/w31161

48. Steinmetz A. (2025) A Progress Report on the Economics of AI: Impacts, Challenges, and Future Directions. *Journal of Economic Analysis,* 4(4). DOI: https://doi.org/10.58567/jea04040007

49. Russell S. (2019) *Human Compatible: Artificial Intelligence and the Problem of Control.* Viking (Penguin Random House), 352 p.

50. Nature Machine Intelligence Editorial. *The AI revolution needs regulation. Nature Machine Intelligence*, 2019, 1, 261–262. DOI: https://doi.org/10.1038/s42256-019-0052-2

STRATEGIC MANAGEMENT TRANSFORMATION AND SUSTAINABLE DEVELOPMENT IN IT OUTSOURCING

Oleh Ustymenko[1]

DOI: https://doi.org/10.30525/978-9934-26-715-4-18

Abstract. The subject of this study is the transformation of the strategic-management system of international IT outsourcing companies under conditions of global technological, market, organizational, and institutional change and the implications of this transformation for sustainable development. The study proceeds from the premise that these companies are not merely a convenient empirical setting for observing a general phenomenon. Their knowledge-intensive resource base, global delivery networks, ecosystem dependence, rapidly changing service portfolios, and participation in client transformation generate a specific managerial problem: changes in the logic of value creation increasingly require changes in the mechanisms through which strategy is interpreted, formulated, implemented, coordinated, evaluated, and renewed. *Purpose.* The purpose of the chapter is to develop a system-configurational explanation of how changes in the business environment and value-creation logic of international IT outsourcing companies create the need to transform their strategic-management systems, and to determine how coherent transformation may support long-term adaptability, resilience, and sustainable development. *Methodology.* The study combines conceptual synthesis, a two-stage Scopus-oriented literature review, and analytical interpretation of previously obtained longitudinal findings. A theory-driven search using candidate constructs produced 38 documents, while a subsequent theory-neutral search focused on the transformation/adaptation of IT outsourcing and IT service provider firms without pre-specifying a theory produced 230 records. A focused evidence review of 15 provider-level studies was then used to identify the principal explanatory lenses and their boundaries. The analytical framework draws on Dynamic Capabilities, Strategy-as-Practice, and the configurational approach as complementary perspectives

[1] Postgraduate Student at the Department of Management,
National Technical University "Kharkiv Polytechnic Institute", Ukraine

© Oleh Ustymenko

that illuminate different levels of the same transformation phenomenon rather than as a single meta-theory. *Results.* The literature review shows substantial knowledge about particular mechanisms and domains of change - including dynamic capabilities, organizational ambidexterity, global value-chain upgrading, business-model transformation, strategic-change cases, and routines/knowledge mechanisms – but does not reveal one dominant integrative construct that represents these changes as mutually dependent manifestations of transformation of the strategic-management system. The chapter therefore distinguishes the strategic-management system from the domains it strategically reconfigures. The system is conceptualized through interrelated processes of strategic sensing, interpretation, choice, resource and capability orchestration, implementation, control and feedback, and strategic learning/reconfiguration, supported by actors, decision rights, governance, practices, and information-analytical mechanisms. The nine previously identified transformation contours are interpreted not as components of the system itself, but as domains in which its strategic reconfiguration becomes observable. *Practical implications.* The proposed distinction enables managers to diagnose not only which business domains are changing, but whether the mechanisms of strategizing themselves are being transformed and whether changes across domains form a coherent configuration. *Value/originality.* The originality of the chapter lies in shifting from a fragmented interpretation of separate strategic responses toward a system-configurational representation of their interdependence. This makes it possible to distinguish isolated strategic change from transformation of the strategic-management system and provides a theoretical basis for identifying manifestations, configurations, intensity, phases, and resulting states of transformation. Sustainable development is treated as a broader strategic implication of adaptability and resilience rather than as a synonym for transformation.

INTRODUCTION

International IT outsourcing companies have developed within one of the most dynamic segments of the global economy. Their historical expansion was associated with international specialization, access to global talent pools, labor and knowledge arbitrage, distributed delivery, economies of scale, and the transfer of technological and business processes from

client organizations to specialized providers. In the contemporary digital economy, however, the nature of this model is changing. Providers are increasingly expected not only to execute predefined technological tasks but also to participate in the design of digital architectures, transformation programs, business-process redesign, data strategies, artificial intelligence initiatives, cybersecurity, cloud migration, and ecosystem integration. This shift changes the strategic role of the provider and, consequently, the requirements imposed on its strategic-management system.

The scale and speed of current technological change create conditions in which periodic strategic planning becomes insufficient. Artificial intelligence, cloud computing, advanced analytics, digital platforms, automation, cybersecurity, and new forms of human-machine collaboration alter the economics of IT services, the structure of client demand, the composition of skills, and the logic of value creation. Digital transformation research emphasizes that technological disruption does not remain confined to the technical layer of the organization: it can reshape value propositions, organizational structures, business models, capabilities, and strategic responses [15; 16; 17]. For international IT outsourcing companies this effect is amplified because the same technologies simultaneously change their internal operating model and the services through which they create value for clients.

The problem is therefore broader than the replacement of one technology by another or the revision of a particular corporate strategy. If a company launches an AI platform, acquires a consulting business, expands a cloud practice, enters a new geography, or signs a hyperscaler partnership, these are strategically important changes.

Yet an individual initiative does not by itself demonstrate that the strategic-management system has been transformed. Transformation of strategic management concerns the mechanisms through which the company recognizes strategic challenges, interprets them, sets priorities, allocates resources, coordinates strategic actions, institutionalizes new practices, and revises strategic choices over time. This distinction between strategic change and transformation of strategic management is essential for the present research.

A second distinction concerns economic performance. Revenue growth, profitability, productivity, market capitalization, diversification, or

changes in the structure of income are meaningful indicators of corporate development, but they should not automatically be treated as direct measures of strategic-management transformation. A company may demonstrate strong financial results while preserving a relatively stable strategic-management architecture. Another company may temporarily experience weaker growth while undergoing deep reconfiguration of capabilities, portfolio structure, delivery models, ecosystem relationships, and strategic practices. Consequently, economic dynamics and strategic-management transformation are analytically related but not identical phenomena.

The same methodological caution is necessary when sustainable development is introduced into the analysis. In this chapter sustainable development is not used as a substitute term for strategic transformation and is not reduced exclusively to environmental or ESG indicators. At the firm level, sustainable development is understood more broadly as the ability to maintain long-term viability and value creation while renewing the economic, organizational, technological, human, governance, and interorganizational foundations of the business. The argument advanced here is that the transformation of strategic management can create an organizational mechanism supporting such long-term adaptability and resilience, but it does not guarantee sustainable outcomes automatically.

The purpose of the study is to develop a system-configurational explanation of how global transformations alter the business and value-creation logic of international IT outsourcing companies, why these changes create a specific need to transform their strategic-management systems, and how coherent transformation can contribute to strategic adaptability, resilience, and sustainable development.

To achieve this purpose, the study addresses the following tasks: to identify the main global transformations that change the business environment and value-creation logic of international IT outsourcing companies; to diagnose the specific strategic-management problem generated by these changes; to distinguish transformation of the strategic-management system from individual strategic changes and economic outcomes; to identify the main theoretical lenses used in the literature to explain provider-level change and the limits of their integration; to define the strategic-management system and separate it from the domains of strategic reconfiguration; to interpret the multi-contour architecture as a configuration of observable transformation

domains; and to clarify the relationship between strategic-management transformation, adaptability, resilience, and sustainable development.

The methodology combines conceptual synthesis and structured literature analysis with an analytical interpretation of previously obtained longitudinal findings. The literature review was organized in two stages. First, a theory-driven Scopus search used candidate constructs such as dynamic capabilities, organizational ambidexterity, strategic change, strategic transformation, and business-model innovation and produced 38 documents. Second, to reduce confirmation bias, a theory-neutral search specified the IT outsourcing / IT service provider context together with transformation, adaptation, reconfiguration, renewal, upgrading, and related phenomena without pre-selecting a theoretical lens; this search produced 230 records. Screening of titles, abstracts, keywords, and references was followed by a focused evidence review of 15 provider-level studies representing the principal explanatory approaches. This design makes it possible to distinguish between constructs imposed by the search strategy and the theoretical language that actually emerges from the field.

The empirical background is provided by earlier longitudinal analysis of the annual corporate reporting of ten international IT outsourcing and adjacent digital-service companies for 2015-2024, where strategically saturated fragments were interpreted through strategic indicators, inductive groups, transformation contours, index measures, and transformation phases [28]. These earlier results are used here as an empirical background for conceptual development rather than as direct proof that every observed business-domain change constitutes transformation of the strategic-management system.

The present chapter does not reproduce the previous empirical calculations. Instead, it reinterprets the established transformation architecture through the distinction between (a) the strategic-management system – the mechanisms and practices through which strategy is interpreted, formulated, implemented, evaluated, and renewed – and (b) the strategic domains in which the consequences of that system-level reconfiguration become observable.

The logic of presentation follows this research design.

First, the chapter identifies global transformations that create strategic pressure on IT outsourcing providers.

Second, it diagnoses the specific strategic-management problem generated by the changing business and value-creation logic of international IT outsourcing companies.

Third, it defines the strategic-management system, distinguishes its transformation from individual strategic changes and economic dynamics, and separates the system itself from the domains it strategically reconfigures.

Fourth, it identifies the theoretical fragmentation revealed by the Scopus review and positions Dynamic Capabilities, Strategy-as-Practice, and the configurational approach as complementary perspectives on different levels of the same phenomenon.

Fifth, it interprets the nine-contour architecture as a set of interdependent domains and observable manifestations of strategic reconfiguration rather than as a list of components of the strategic-management system itself.

Sixth, it discusses the implications for sustainable development. Finally, the discussion formulates research propositions and directions for further empirical verification.

1. Global Transformations and Strategic Pressure

The strategic environment of international IT outsourcing companies is increasingly shaped by several global transformations that interact rather than occur independently. Their cumulative effect changes the logic of competition, the structure of client demand, and the mechanisms through which providers create and capture value. Digital transformation should therefore be interpreted not as a single technological trend but as a complex process of organizational and strategic renewal [15; 16]. In the IT outsourcing industry this process is especially visible because providers both consume digital technologies internally and commercialize them as part of client transformation programs.

Artificial intelligence and intelligent automation constitute one of the most significant drivers. Traditional outsourcing models were built to a considerable extent on the ability to scale delivery through people, standardized processes, and geographic labor-cost differences. Generative AI, machine learning, robotic process automation, code-generation tools, AI-enabled testing, and intelligent knowledge systems reduce the dependence of some activities on linear headcount growth. The strategic consequence is not merely higher productivity. The relationship between

labor, revenue, skills, pricing, intellectual property, and client value is being reconsidered. Providers must decide which activities should be automated, which should be augmented, which require high-level human expertise, and how the resulting productivity gains should be incorporated into commercial models.

This creates a second-order strategic problem. If AI reduces the value of routine execution, sustainable competitive advantage increasingly depends on capabilities that are difficult to commoditize: domain knowledge, architecture, consulting, data governance, transformation design, ecosystem integration, responsible AI, and the ability to convert technology into measurable business outcomes. Thus, AI simultaneously threatens parts of the traditional outsourcing model and creates opportunities for strategic repositioning.

Cloud computing and platformization generate another major transformation. Cloud architectures allow companies to scale infrastructure, services, and software more flexibly, but they also increase dependence on ecosystems controlled by hyperscalers and platform owners. International IT outsourcing companies increasingly compete not only through proprietary resources but through the ability to design and orchestrate combinations of external platforms, partner technologies, data assets, industry solutions, and reusable components. Platform strategy therefore becomes inseparable from partnership strategy and ecosystem positioning.

Cybersecurity, trust, privacy, and regulatory complexity are also shifting from operational concerns to strategic determinants. International providers handle sensitive data, critical infrastructure, regulated processes, and cross-border technology environments. Client decisions increasingly depend on trust, regulatory compliance, cyber resilience, data sovereignty, and the governance of AI systems.

These factors influence market access, partnership opportunities, location decisions, investment priorities, and reputation. Consequently, security and governance must be integrated into strategic-management processes rather than treated as isolated control functions.

Client expectations have also changed. In mature outsourcing relationships, clients increasingly demand measurable business outcomes rather than the simple provision of technical capacity. This shifts the provider's role from task execution toward transformation partnership.

Research on digital transformational outsourcing shows that provider performance depends on combinations of consultative, orchestration, insight-generation, network-management, knowledge-access, and standardization capabilities [20]. Such combinations indicate that the strategic problem is configurational: no single capability is sufficient across all forms of transformation.

The cumulative effect of these changes can be expressed as a transition from a relatively stable outsourcing logic toward continuously reconstructed value creation. The firm must manage AI together with talent, cloud together with ecosystem relations, cybersecurity together with trust, consulting together with portfolio restructuring, and geographic diversification together with resilience. The resulting managerial problem is not simply that many strategic initiatives occur at the same time. Rather, changes in one domain alter the requirements imposed on other domains and on the mechanisms through which priorities are interpreted, choices are coordinated, resources are allocated, and strategic learning is organized.

Transformation of strategic management therefore becomes necessary because isolated strategic responses are increasingly insufficient.

This leads to a key proposition for the chapter: the greater the simultaneity and interdependence of technological, market, client, ecosystem, and institutional shifts, the less adequate is a model of strategic management based on periodic adjustment of individual plans. The specific problem of international IT outsourcing companies is therefore one of strategic-management correspondence: the mechanisms of strategizing must be able to match a business model whose value-creation logic is itself being continuously reconstructed.

2. Specific Strategic-Management Problem of International IT Outsourcing Companies

International IT outsourcing companies face a specific strategic-management problem because their business models combine several sources of dynamism that rarely occur together with the same intensity in traditional industrial or service firms. The issue is therefore not merely that these firms provide a convenient empirical setting. Their internationality, knowledge intensity, ecosystem dependence, participation in client transformation, permeable sectoral boundaries, and rapidly changing

business models jointly increase the frequency and interdependence of strategic decisions and create a persistent need to renew the mechanisms through which strategy is formed and implemented.

The first characteristic is internationality. Delivery networks, talent pools, client portfolios, partnerships, technological dependencies, and regulatory exposure are distributed across countries. Strategic decisions therefore have to reconcile global scale with local institutional conditions, different labor markets, data rules, client expectations, and geopolitical risks.

The second characteristic is a digital-service logic of value creation. The core resources of these companies are not limited to physical assets. Competitive advantage depends heavily on knowledge, skills, organizational routines, client-specific experience, access to partner technologies, reusable intellectual property, data, and the ability to integrate external knowledge. This makes the resource base highly dynamic. Competencies can become obsolete rapidly, while new technological domains can become strategically critical within a short period.

The third characteristic is participation in the transformation of client organizations. An international IT outsourcing company does not simply adapt to digital transformation; in many cases it designs and implements digital transformation for others. This creates a dual strategic requirement: the provider must continuously transform its own capabilities while simultaneously commercializing transformation capabilities in client markets. The quality of internal strategic renewal therefore directly influences the credibility and competitiveness of the external value proposition.

The fourth characteristic is the permeability of sectoral boundaries. The distinction between IT outsourcing, technology consulting, engineering, cloud services, managed services, cybersecurity, data analytics, digital platforms, software products, and business-process transformation is becoming less rigid. Providers can compete with consulting firms in one segment, cooperate with hyperscalers in another, acquire product companies in a third, and build proprietary platforms in a fourth. Strategic identity therefore becomes more fluid, and positioning decisions increasingly concern not only market share but the role the company intends to play within a wider ecosystem.

The fifth characteristic is the dynamic nature of the business model. Changes can occur in the value proposition, client role, service portfolio, pricing logic, delivery model, technology architecture, partnerships, intellectual property, monetization of knowledge, and acquisition strategy. Business-model research emphasizes that value creation and value capture mechanisms are central components of strategy and innovation [21; 22]. In IT outsourcing these mechanisms are particularly sensitive to technological change because improvements in automation and platforms can alter both cost structures and the basis on which clients are willing to pay.

A useful way to express the evolving role of the provider is the sequence: resource provider – technology service provider – transformation partner – ecosystem orchestrator. This is not presented as a universal linear path. Different companies may combine these roles, and some may specialize deliberately in particular positions. The sequence instead captures a broad increase in strategic complexity and client integration. As the provider moves closer to transformation partnership and ecosystem orchestration, its ability to sense change, integrate external capabilities, coordinate knowledge, and manage multiple strategic domains becomes more important.

Taken together, these characteristics generate a specific strategic-management problem. International IT outsourcing companies must continuously reconcile rapid technological renewal, changing client value logic, knowledge-intensive capability development, ecosystem dependence, evolving delivery architectures, and fluid strategic positioning.

Consequently, the transformation of strategic management is not merely an observable phenomenon in this class of firms or a methodological reason for selecting them as a sample. It increasingly becomes a mechanism of their strategic development: the way strategy is sensed, interpreted, chosen, coordinated, implemented, reviewed, and renewed must itself evolve when the logic of the business changes.

The earlier empirical research underlying this chapter used a sample of ten international IT outsourcing and adjacent digital-service companies with extended public reporting and dynamic business models [28]. The longitudinal analysis demonstrated changes in value propositions, service portfolios, technological architectures, partnership configurations, delivery models, client roles, and mechanisms of monetizing knowledge. In

the present chapter these changes are treated as domains and manifestations of strategic reconfiguration. They do not automatically prove system-level transformation; such a conclusion requires evidence that the mechanisms and practices of strategic management that coordinate these domains are also being qualitatively reconfigured.

3. Strategic Change and Management Transformation

The distinction between strategic change and transformation of the strategic-management system is central to the conceptual architecture of the study. Strategic change refers primarily to a modification of strategic content: the company may change a market, product, service, technology, organizational structure, partnership, acquisition policy, delivery model, or investment priority. The strategic-management system refers to the interconnected processes, mechanisms, actors, governance arrangements, managerial practices, and information-analytical links through which the company recognizes and interprets environmental change, forms and revises strategic orientations, makes strategic choices, orchestrates resources and capabilities, implements decisions, evaluates results, learns, and reconfigures its strategic response over time.

For analytical purposes, the core of the strategic-management system can be represented as seven recursive functions: strategic sensing; strategic interpretation and sensemaking; strategic choice and strategy formation; resource and capability orchestration; strategy implementation; strategic control and feedback; and strategic learning and reconfiguration. These functions are supported by a strategizing infrastructure that includes strategic actors, decision rights, governance arrangements, routines and practices, information and analytics, and the temporal logic of strategizing – from periodic planning toward more continuous forms of strategic review. The system is recursive rather than linear because implementation outcomes and new environmental signals continuously return to interpretation and choice.

The difference can be illustrated through artificial intelligence. A company can introduce an AI tool for code generation or customer support without changing the core logic of strategic management. This would be an important technological initiative but not necessarily a transformation of the strategic-management system. By contrast, if AI changes the way

the company identifies market opportunities, redesigns its service portfolio, reallocates investment, restructures talent, revises pricing, builds new partnerships, and establishes new governance practices, then the technology becomes part of a broader strategic-management transformation.

The same applies to acquisitions. A single acquisition can be a tactical or strategic decision within a stable management architecture. A sequence of acquisitions that systematically creates new capability domains, changes the portfolio, alters geographic exposure, integrates consulting, and modifies the company's strategic identity may indicate a deeper reconfiguration of the strategic-management system. The analytical task is therefore to identify patterns and interdependencies rather than isolated events.

This distinction also separates the strategic-management system from the domains it strategically reconfigures. Value proposition, business model, service portfolio, global delivery model, technologies, capabilities, organizational architecture, talent, client relationships, and ecosystem partnerships are not identical to the strategic-management system. They are objects of strategic intervention and domains in which strategic reconfiguration becomes observable. Four analytical dimensions therefore need to be distinguished: the content dimension (what strategic domains are changing); the process dimension (how strategic issues are identified, interpreted, decided, and implemented); the practice dimension (which actors, routines, tools, narratives, and governance mechanisms enact strategy); and the configuration dimension (how changes in these mechanisms and domains interact over time).

The distinction between transformation and economic outcomes is equally important. In strategic-management research, there is a persistent temptation to infer the quality of transformation from performance. Yet performance is influenced by multiple factors including market cycles, exchange rates, client concentration, macroeconomic conditions, acquisitions, accounting choices, and temporary demand shocks. Strategic-management transformation may contribute to performance, but the relationship is mediated and time-dependent.

For this reason the logic of the underlying dissertation research separates the intensity and configuration of transformation from the results of economic dynamics. The economic regime is treated as a contextual and outcome dimension rather than as the transformation itself. Such separation

makes it possible to ask a more meaningful question: under which economic regimes are particular configurations, intensities, and phases of strategic-management transformation observed? This is methodologically stronger than defining transformation retrospectively as whatever precedes strong financial performance.

The analytical logic can therefore be summarized as follows: environmental change alters the conditions of business and value creation; the strategic-management system interprets that pressure and produces strategic choices; those choices are implemented through changes in resources, capabilities, structures, practices, and strategic domains; repeated and interdependent changes become visible as transformation contours and configurations; and the resulting transformation may influence adaptability, resilience, and economic outcomes. Importantly, no single change in a domain is sufficient evidence of system transformation. The research task is to establish when changes in the mechanisms of strategizing and changes in strategic domains become mutually reinforcing and qualitatively alter the way the firm forms and implements strategy.

Strategic-management transformation is therefore defined here as a qualitative reconfiguration of the interconnected processes, mechanisms, actors, governance arrangements, managerial practices, decision-making routines, feedback mechanisms, and learning/reconfiguration processes through which strategy is interpreted, formulated, implemented, coordinated, evaluated, and renewed. This transformation becomes observable through strategic reconfiguration of business models, capabilities, service portfolios, delivery architectures, technologies, talent systems, client relationships, and ecosystem positions. The distinction is important: the first layer describes the transformation of the strategic-management system itself, while the second describes the domains in which the consequences and manifestations of that transformation can be empirically traced.

4. Complementary Theoretical Perspectives and the Identified Gap

The complexity of strategic-management transformation requires several theoretical perspectives, but their combination should not be treated as the construction of a single meta-theory. Dynamic Capabilities, Strategy-as-Practice, and the configurational approach illuminate different analytical levels of the same phenomenon: the capacity to sense and reconfigure, the

actors and practices through which strategizing is enacted, and the causal complexity created by interdependent configurations of change. Their role in this chapter is therefore complementary rather than substitutive or theoretically merged.

The two-stage Scopus-oriented review was designed to test whether provider-level transformation is already explained by one established integrative construct. The initial theory-driven search produced 38 documents because candidate constructs were explicitly included in the query. The subsequent theory-neutral search produced 230 records and allowed the theoretical language of the field to emerge without forcing a particular lens. Within this broader corpus, adaptation-related phenomena were widespread, but the exact label "strategic adaptation" did not emerge as a dominant provider-level construct, while "dynamic capabilities" appeared directly in only a limited subset of records. A focused review of 15 provider-level studies showed that the field relies on several partially overlapping explanatory traditions rather than on one dominant framework.

Provider-level studies illustrate this fragmentation. Dynamic-capability research explains reconfiguration of capabilities, coordination, and performance in offshore IT services [33; 34]. Organizational ambidexterity explains how vendors combine exploitation of existing business with exploration and development of new capabilities [31; 32]. Global value-chain and upgrading research explains movement from lower-value outsourcing toward higher-value solutions and new positions in the value chain [38; 39]. Business-model research captures simultaneous changes in service, technology, organization, and finance under cloud transformation [40]. Strategic-change and internationalization cases show multi-project transformation waves, capability building, and interaction among strategic processes [35; 36; 37]. These studies provide substantial explanatory value, but they usually focus on a particular mechanism, trajectory, or domain of change.

The theoretical gap identified for the present study is therefore not the absence of knowledge about adaptation, capabilities, business models, upgrading, or strategic change. The gap lies in the limited system-level conceptualization of how multiple strategic responses become interdependent and, under certain conditions, constitute a transformation of the strategic-management system itself. The proposed contribution

is accordingly system-configurational: it seeks to represent strategically meaningful changes not as an unstructured collection of initiatives and not as a merger of existing theories, but as mutually related manifestations of a changing architecture of strategizing. This creates a theoretical basis for distinguishing manifestations, configurations, intensity, phases, and resulting states of transformation.

Dynamic Capabilities provide the first complementary perspective. Teece, Pisano, and Shuen argued that in rapidly changing environments competitive advantage depends not only on possession of resources but on the ability to integrate, build, and reconfigure internal and external competencies [1]. Teece later developed this logic through the microfoundations of sensing, seizing, and transforming [2]. Eisenhardt and Martin emphasized recognizable organizational processes through which firms integrate and reconfigure resources [3], while Winter distinguished higher-order capabilities from ordinary operating capabilities [4]. These contributions are highly relevant because they explain the capacity for strategic renewal, but they do not by themselves define the complete architecture of a strategic-management system.

For international IT outsourcing companies, sensing includes monitoring technological discontinuities, changes in client demand, emerging regulatory requirements, competitive moves, labor-market shifts, ecosystem developments, and geopolitical risks. Because the industry is knowledge-intensive, sensing also requires the ability to understand which technological changes are commercially meaningful rather than merely fashionable. Strategic sensing therefore combines market intelligence, technology scanning, client interaction, partner information, and internal knowledge.

Transforming concerns the reconfiguration needed to make strategic choices operational. In an IT outsourcing company this can include changing organizational structures, integrating acquisitions, reskilling employees, closing obsolete capabilities, reorganizing delivery locations, redesigning performance systems, changing client engagement models, and institutionalizing new governance mechanisms. These are strategically important domains and manifestations of reconfiguration. Dynamic Capabilities help explain the organizational capacity that enables such renewal, while the present study separately asks how the mechanisms of

strategic interpretation, choice, coordination, implementation, feedback, and learning are themselves transformed.

Strategy-as-Practice provides the second complementary perspective. Whittington shifted attention toward strategy as something organizational actors do rather than only something organizations possess [7]. Jarzabkowski developed an activity-based perspective, while later research emphasized the interaction among practitioners, practices, and praxis [8; 9; 10]. This approach is essential because transformation of strategic management does not occur at an abstract corporate level. It is enacted through meetings, decisions, planning routines, investment committees, portfolio reviews, narratives, analytical tools, performance systems, leadership communication, and everyday managerial activity. It therefore helps operationalize the process and practice dimensions of the strategic-management system.

The configurational approach provides the third complementary perspective. Meyer, Tsui, and Hinings argued for the analysis of organizational configurations rather than isolated variables [11]. Fiss subsequently developed set-theoretic logic for studying causal complexity and combinations of conditions [12]. Miller emphasized the importance of coherent configurations in organizational analysis [13]. For strategic-management transformation, this perspective is critical because the meaning and effect of a change depend on the other changes with which it is combined. Configuration therefore provides the analytical bridge from fragmented strategic responses toward system-level patterns without requiring the underlying theoretical traditions to be collapsed into one meta-theory.

For example, an AI initiative connected with proprietary platforms, data capabilities, consulting expertise, and client transformation programs represents a different strategic configuration from AI used mainly for internal productivity. Similarly, a cloud strategy connected with ecosystem partnerships, reusable assets, security, and industry solutions differs from a cloud initiative treated primarily as infrastructure migration. The same element can therefore have different strategic meanings in different configurations.

The configurational approach also supports the principle of equifinality: different combinations of capabilities and strategic domains can lead to

similar outcomes. This is important for international IT outsourcing because firms differ in history, client portfolio, geographic footprint, technological heritage, acquisition strategy, and organizational identity. There is little reason to expect one universal transformation path.

Taken together, these perspectives support a layered analytical sequence rather than a unified meta-theory: environmental signals are sensed and interpreted; strategic choices are formulated and enacted through actors and practices; resources and capabilities are orchestrated; strategic decisions are implemented and reviewed; changes become visible across multiple strategic domains; and interdependent changes form company-specific configurations that evolve through phases. Dynamic Capabilities illuminate the capacity for renewal, Strategy-as-Practice illuminates the enactment of strategizing, and the configurational approach explains how multiple changes combine. The object that connects these levels is the strategic-management system and its transformation.

5. Domains of Strategic Reconfiguration: Multi-Contour Architecture

The multi-contour architecture is used here to operationalize the domains in which strategic reconfiguration becomes observable. It should not be interpreted as a list of components of the strategic-management system itself. A contour represents a relatively stable analytical domain in which repeated strategic indicators can be grouped because they reflect a coherent direction of change in what the company does, how it creates value, or how it configures resources and relationships. The strategic-management system, by contrast, concerns how these changes are sensed, interpreted, chosen, coordinated, implemented, governed, evaluated, and renewed. The distinction between system and domains allows the empirical model to capture what is changing without equating every business-domain change with transformation of strategic management.

The empirical work underlying this chapter identified nine contours of strategic reconfiguration within international IT outsourcing companies [28].

The first is strategic repositioning. This contour captures changes in the desired competitive role of the company: for example, movement from execution toward transformation partnership, from generalized technology services toward industry specialization, or from labor-based outsourcing

toward higher-value knowledge and consulting activities. Strategic repositioning changes how the company defines its relevance to clients and competitors and therefore represents an observable domain through which strategic-management choices are expressed.

The second contour is service-portfolio restructuring. It reflects changes in the composition of services and in the logic through which capabilities are monetized. Traditional application development and maintenance can be complemented or partially displaced by cloud transformation, cybersecurity, data, AI, engineering, managed services, platform services, and consulting. Portfolio restructuring is strategically significant because it changes revenue architecture, talent requirements, investment priorities, and market positioning simultaneously.

The third contour is platform-cloud architecture. It captures the growing role of cloud ecosystems, reusable platforms, proprietary solutions, cloud-native delivery, partner technologies, and scalable digital infrastructure. This contour is not simply technical because platform choices influence partnerships, client lock-in, intellectual property, margins, service standardization, and the provider's place in wider technological ecosystems.

The fourth contour is artificial intelligence, data, and automation. It includes AI-enabled services, data platforms, generative AI, advanced analytics, automation of delivery, internal productivity systems, and AI-supported decision making. Its strategic relevance lies in the possibility of changing both the cost structure of the provider and the nature of client value. The contour therefore connects operational efficiency with innovation, knowledge management, talent transformation, and new business models.

The fifth contour is consulting-led transformation. It reflects the provider's movement toward problem definition, transformation design, domain consulting, architecture decisions, change management, and business-outcome responsibility. This contour changes the relationship with the client because the provider participates earlier in the strategic decision cycle and potentially captures a larger share of value. It also demands different skills, organizational status, and commercial models than traditional delivery-oriented outsourcing.

The sixth contour is ecosystem orchestration. Modern digital solutions often require combinations of hyperscaler platforms, software products, cybersecurity tools, data services, specialist vendors, startups, and client-

specific assets. The ability to assemble and coordinate these resources becomes a strategic capability in its own right. Ecosystem orchestration therefore concerns partner strategy, alliance management, co-innovation, access to external knowledge, and the governance of interdependence.

The seventh contour is trust, security, and governance. As providers become involved in critical processes, data, and AI systems, trust becomes part of the value proposition. Cybersecurity, privacy, regulatory compliance, data governance, responsible AI, intellectual-property protection, and auditability influence both client retention and market access. This contour demonstrates that risk-management mechanisms can become strategic rather than merely defensive.

The eighth contour is infrastructure resilience. International delivery networks must maintain service continuity under cyber incidents, geopolitical disruption, natural disasters, infrastructure failures, labor-market shocks, and other systemic risks. Resilience therefore concerns not only redundancy but the design of distributed operating models, location portfolios, business continuity, crisis governance, and the ability to reconfigure delivery while maintaining critical functions.

The ninth contour is the future-technology trajectory. Long-term competitiveness depends on the systematic exploration of emerging technologies and the organizational mechanisms through which experimentation becomes institutionalized learning. This contour includes technology scanning, pilots, innovation labs, partnerships, research initiatives, and the selective transition from exploration to scalable commercial offerings. Its importance lies in preventing strategic renewal from being purely reactive.

The existence of multiple contours creates a complex analytical problem. Their intensity is unlikely to be identical in the same period. A company can intensify AI investment while slowing acquisitions; strengthen consulting while consolidating cloud platforms; emphasize resilience after a systemic shock; or shift strategic attention from geographic expansion toward ecosystem partnerships. Transformation therefore involves changes not only in overall activity but also in the relative structure of strategic attention.

The conceptual importance of this approach is that it separates quantity of change from quality of configuration. A company may initiate many strategic projects but fail to integrate them. High activity can create

organizational overload, contradictory priorities, duplicated investments, unclear accountability, and fragmented client propositions. In such a case transformation intensity is high but strategic coherence is weak.

Conversely, a company may show moderate visible activity while systematically strengthening a complementary set of capabilities. For example, consulting, industry expertise, AI, data, and ecosystem partnerships may reinforce one another and produce a coherent shift toward high-value transformation services. The strategic effect can therefore be stronger than the number of initiatives suggests.

For the dissertation logic, the multi-contour architecture provides a bridge between qualitative evidence and comparative analysis. Strategic indicators derived from corporate discourse can be grouped into domains of strategic reconfiguration, while index measures can assess changes in their intensity and structure. The separate conceptualization of the strategic-management system makes it possible to ask a stronger question than whether many changes occurred: did the mechanisms and practices of strategizing also change, and did those system-level changes produce a coherent configuration across the observed domains? Economic dynamics can then be analyzed separately to determine how different transformation configurations correspond to different regimes of corporate development. The present chapter extends this logic by asking how system-level coherence and domain-level reconfiguration may contribute to adaptability, resilience, and sustainable development.

6. Sustainable Development Implications

The title of this chapter places strategic-management transformation in the context of sustainable development. To preserve conceptual rigor, however, sustainable development should not be treated as another name for transformation. The relationship is indirect and conditional. Strategic-management transformation can strengthen the organizational capacity to pursue sustainable long-term development, but the existence of transformation does not prove that sustainable development has been achieved.

This distinction is particularly important because sustainability has several dimensions. In a broad corporate sense, sustainable development concerns long-term economic viability, responsible use and renewal of

resources, social and human-capital continuity, technological reliability, institutional legitimacy, governance, environmental responsibility, and the ability to create value for stakeholders over time. A strategic-management system influences all of these dimensions because it determines how priorities are selected, how trade-offs are managed, and how capabilities are renewed.

Dynamic capabilities research provides a useful starting point. Teece's concept of sustainable enterprise performance emphasizes the importance of sensing, seizing, and transforming under changing conditions [2]. The implication is not that continuous change is inherently sustainable but that the capacity to renew the resource base is necessary when environmental change makes existing configurations obsolete. For international IT outsourcing companies, technological obsolescence can occur quickly enough that strategic rigidity itself becomes a source of sustainability risk.

The first link between strategic-management transformation and sustainable development is economic adaptability. A provider that can renew its value proposition, service portfolio, pricing models, and technological capabilities before existing services become commoditized is better positioned to maintain long-term economic viability. This does not imply permanent growth. It means preserving the ability to create economically relevant value as the basis of competition changes.

The second link is organizational adaptability. Sustainable development requires organizations to renew routines and structures without repeatedly destroying accumulated knowledge. The strategic-management system must therefore support organizational learning, experimentation, internal mobility, selective standardization, and the integration of acquired or external capabilities. A company that changes technologies without changing learning mechanisms may accumulate tools without developing adaptive capacity.

The third link is human-capital sustainability. AI and automation can increase productivity but can also accelerate skills obsolescence and create uncertainty for employees. Strategic transformation that treats talent exclusively as a cost variable may improve short-term margins while weakening future capabilities. By contrast, systematic reskilling, capability mapping, knowledge transfer, and development of advanced professional

roles can align technological transformation with long-term human-capital renewal.

The fourth link is resilience. Traditional resilience is sometimes understood as the capacity to return to a previous state after disruption. In a highly dynamic digital environment, restoration of the previous state may be strategically insufficient. Transformational resilience involves maintaining critical functions while adapting toward a new viable configuration. This is particularly important for international providers exposed to cyber incidents, geopolitical shocks, infrastructure disruption, regulatory fragmentation, and sudden shifts in client demand.

The fifth link is institutional and ecosystem sustainability. International IT outsourcing companies depend on partners, technology platforms, universities, labor markets, clients, regulators, infrastructure providers, and local communities. Strategic decisions that maximize short-term extraction from one part of this ecosystem can weaken long-term viability. Ecosystem orchestration therefore requires not only access to external capabilities but also governance of interdependence, trust, and mutual value creation.

These relationships suggest that sustainable development is better viewed as a cross-cutting criterion for evaluating the viability of a transformation configuration rather than as a separate transformation contour. A provider may reconfigure AI, cloud, consulting, security, ecosystem, talent, and delivery domains simultaneously, but the strategic question is whether the resulting configuration - together with the management mechanisms that coordinate it - strengthens the company's capacity to create value responsibly and remain viable under future change.

The chapter therefore proposes the following conceptual relationship: global transformations increase strategic uncertainty; strategic-management transformation provides mechanisms for sensing and coordinated reconfiguration; coherent transformation configurations strengthen strategic adaptability and resilience; and adaptability and resilience increase the organization's capacity for sustainable long-term development. This is a probabilistic and mediated relationship, not a deterministic one.

Accordingly, the central proposition of the chapter is that for international IT outsourcing companies sustainable development increasingly depends not on the stability of a particular strategy but on the ability of the strategic-management system to govern continuous and coherent reconfiguration.

The system itself must renew the processes and practices through which strategic signals are interpreted, choices are made, resources are orchestrated, actions are coordinated, and learning is institutionalized, while the consequences of those choices become visible in changing capabilities, business models, technologies, organizational arrangements, and interorganizational relationships.

7. Discussion and Research Propositions

The proposed framework has several implications for the broader study of strategic management and for the dissertation research on international IT outsourcing companies. The first concerns the theoretical unit of explanation. The Scopus review indicates that provider-level change is well represented through separate lenses – dynamic capabilities, ambidexterity, upgrading, business-model transformation, routines, and strategic-change cases – but much less clearly through an integrative system-level account. The present framework therefore integrates the phenomenon rather than the theories: it treats changes explained by different lenses as potentially interdependent manifestations of transformation of the strategic-management system, while preserving the distinct explanatory role of each theoretical perspective.

The second implication concerns the empirical unit of analysis. Outsourcing research has traditionally generated valuable knowledge at the level of sourcing decisions, contracts, projects, clients, and client-provider dyads [18; 19]. These levels remain important, but a longitudinal company-level perspective is required when the research question concerns transformation of strategic management. The same provider simultaneously manages multiple clients, technologies, geographies, service lines, partnerships, and capability domains; system-level transformation emerges from their interaction across time and from the changing mechanisms through which those interactions are strategically coordinated.

The third implication concerns measurement. Transformation of strategic management should not be inferred from a single indicator such as digital investment, acquisition activity, number of AI initiatives, or revenue growth. Measurement should distinguish at least two analytical layers: changes in the mechanisms and practices of the strategic-management system, and changes in the domains that the system strategically reconfigures. The multi-contour perspective is particularly useful for the second layer

because it makes it possible to distinguish intensity, structural shift, breadth, balance, and phase, while process- and practice-level evidence is needed to substantiate system transformation.

The fourth implication concerns causal complexity. Different companies can develop comparable adaptability through different configurations. A consulting-intensive provider may combine industry knowledge, AI, data, and ecosystem capabilities. Another provider may emphasize platforms, managed services, cybersecurity, and recurring revenue. A third may rely more strongly on engineering expertise, geographic delivery diversification, and specialized technology partnerships. The possibility of equifinality means that research should avoid assuming one universally optimal transformation path and should instead examine whether different domain configurations are supported by coherent strategic-management mechanisms.

The fifth implication concerns timing. Transformation and performance may not move synchronously. Investments in new capabilities can reduce margins before they generate revenue; acquisitions can create integration costs before producing portfolio benefits; talent reskilling can increase expenses before improving productivity. Conversely, a company can maintain strong short-term performance by exploiting mature capabilities while underinvesting in future renewal. Longitudinal analysis is therefore essential, and economic dynamics should remain analytically distinct from the transformation process itself.

The sixth implication concerns the difference between transformation intensity and transformation quality. High intensity may signal decisive adaptation, but it can also indicate turbulence, strategic overextension, or an attempt to compensate for previous inaction. Transformation quality depends not only on the amount of change across domains but on complementarity, sequencing, resource capacity, governance, feedback, learning, and alignment with environmental conditions. This distinction is particularly important for a system-configurational interpretation because a high number of initiatives does not necessarily indicate that the strategic-management system has been coherently transformed.

The seventh implication concerns sustainable development. If sustainability is treated as a broader outcome rather than as a direct measure of transformation, the research can investigate mediating

mechanisms. Strategic adaptability and resilience are promising candidates because they explain how a reconfigured strategic-management system can influence long-term viability. Human-capital renewal, governance quality, technological resilience, ecosystem position, and resource productivity may also act as mediators or moderators.

Based on the theoretical synthesis, several propositions can guide further empirical research.

Proposition 1: higher environmental turbulence and stronger interdependence among external changes increase the need for transformation of the strategic-management system rather than isolated strategic adjustments.

Proposition 2: system-level transformation is more likely when changes in strategic sensing, decision-making, resource orchestration, implementation, governance, feedback, and learning co-evolve with complementary changes in the domains of strategic reconfiguration.

Proposition 3: configuration coherence and complementarity between strategic-management mechanisms and reconfiguration domains are more important for long-term adaptability than transformation intensity considered independently.

Proposition 4: economic performance regimes and strategic-management transformation profiles are analytically distinct dimensions whose combinations generate different corporate development trajectories.

Proposition 5: strategic adaptability and organizational resilience mediate the relationship between coherent transformation of the strategic-management system and sustainable development.

These propositions can be tested using a combination of longitudinal content analysis, index-based measurement, company financial and structural data, and configurational methods. Corporate annual reports provide a useful longitudinal source because they contain repeated, institutionally significant strategic communication and allow comparison across companies and years. However, they should be complemented where possible by investor presentations, integrated reports, ESG reports, acquisition disclosures, strategic announcements, and other public sources. Corporate texts are evidence of strategic articulation rather than a complete record of internal strategizing, so triangulation remains important [23; 24].

The proposed framework strengthens the causal logic of the analysis: changes in the environment and value-creation logic of international IT outsourcing companies generate a specific strategic-management problem; this problem requires transformation of the mechanisms through which strategy is formed and implemented; and the consequences of that transformation become observable through configurations of strategic reconfiguration domains.

The framework preserves transformation of strategic management as the central research phenomenon, treats economic dynamics as analytically distinct, and positions sustainable development as a broader but strategically important implication.

CONCLUSIONS

The study confirms that global technological, market, organizational, and institutional transformations change not only the competitive environment of international IT outsourcing companies but also the logic through which these firms create value and, consequently, the requirements imposed on the system through which strategy is interpreted, formed, implemented, evaluated, and renewed. The central problem is therefore not that IT outsourcing companies are simply a convenient empirical setting for studying a general transformation phenomenon. Their business characteristics generate a specific strategic-management problem: the traditional mechanisms of strategic management increasingly have to be reconfigured to remain aligned with a continuously changing business model and value-creation architecture.

Artificial intelligence, cloud computing, platformization, data-driven management, cybersecurity, ecosystem competition, talent transformation, geopolitical fragmentation, and changing client expectations interact with one another and create a strategic environment in which periodic adjustment of individual plans is increasingly insufficient. The strategic-management system must develop the capacity for continuous interpretation, prioritization, coordination, and reconfiguration.

International IT outsourcing companies are therefore theoretically significant because the need for strategic-management transformation is endogenous to the changing logic of their business.

International delivery networks, a knowledge-intensive resource base, dependence on technological ecosystems, participation in client transformation programs, dynamic business models, and rapidly changing service portfolios make strategic reconfiguration both necessary and empirically observable. These conditions allow the research to examine how the mechanisms of strategizing change in response to a specific class-level managerial problem rather than to use the sector merely as a convenient sample.

A fundamental conclusion of the chapter is the need to distinguish transformation of the strategic-management system from individual strategic changes. The introduction of AI, a cloud platform, an acquisition, a new geography, or a partnership can be strategically important without necessarily transforming the strategic-management system. Transformation concerns a deeper reconfiguration of how strategic signals are sensed and interpreted, how choices are formulated, how resources are orchestrated, how actions are coordinated and implemented, and how feedback and learning reshape subsequent strategic decisions. This distinction protects the research from equating visible activity in business domains with system-level transformation.

The study also confirms the need to distinguish transformation from economic performance. Revenue, profitability, productivity, diversification, and other economic indicators can be outcomes or contextual characteristics, but they should not be used as direct substitutes for transformation. Keeping these dimensions separate creates the possibility of identifying how different transformation configurations and phases correspond to different economic regimes. It also prevents the retrospective definition of successful transformation as any change followed by strong financial results.

The theoretical review further shows that the relevant research field is fragmented rather than empty. Dynamic Capabilities, Strategy-as-Practice, organizational ambidexterity, upgrading approaches, business-model research, and strategic-change studies explain important parts of provider transformation, but no single dominant integrative construct emerged from the reviewed corpus that represents them as mutually dependent manifestations of transformation of the strategic-management system. Dynamic Capabilities, Strategy-as-Practice, and the configurational

approach are therefore used here as complementary perspectives on different analytical levels, not as a newly merged meta-theory.

The multi-contour architecture developed in the underlying research provides a structured way to operationalize domains and observable manifestations of strategic reconfiguration. Strategic repositioning, service-portfolio restructuring, platform-cloud architecture, artificial intelligence/data/automation, consulting-led transformation, ecosystem orchestration, trust/security/governance, infrastructure resilience, and future-technology trajectories are not treated as the strategic-management system itself. Their analytical value lies in showing what is being reconfigured, while process- and practice-level analysis is needed to establish whether the mechanisms of strategizing have also been transformed. This distinction enables the research to examine intensity, breadth, structural shift, balance, phase, and resulting state without collapsing business-domain change into system transformation.

An important conclusion follows from the distinction between transformation intensity and transformation quality. A large number of initiatives or a high level of strategic activity does not automatically indicate a strong transformation. Intensive change can be fragmented, poorly sequenced, inconsistent with resources, or internally contradictory. Conversely, a more moderate transformation can be strategically powerful when complementary contours reinforce one another. The relevant capability is therefore controlled reconfigurability – the ability to change the strategic architecture intentionally without destroying coherence.

The relationship between strategic-management transformation and sustainable development should be interpreted through this logic. Sustainable development is not identical to transformation and should not be treated as one more transformation contour. It is a broader outcome that depends on economic viability, organizational learning, technological reliability, human-capital renewal, governance, resilience, environmental responsibility, and stakeholder relationships. Strategic-management transformation can support these conditions by strengthening the company's ability to adapt and renew itself, but the relationship is conditional rather than automatic.

Strategic adaptability and resilience form the conceptual bridge between transformation and sustainable development. Adaptability enables the

organization to interpret structural shifts, select appropriate responses, and reconfigure capabilities. Resilience enables it to preserve critical functions and value creation while undergoing change. In a rapidly changing digital economy, resilience should not be reduced to returning to a previous state; it also includes the capacity to move toward a new viable configuration when the old one is no longer sustainable.

The central conclusion can therefore be formulated as follows: for international IT outsourcing companies, sustainable development increasingly depends not on the stability of a particular strategy but on the ability of the strategic-management system to govern continuous and coherent reconfiguration while preserving strategic coherence and long-term value-creation capacity. This means not only changing capabilities, technologies, services, and relationships, but also renewing the mechanisms through which environmental change is interpreted, strategic choices are made, resources are orchestrated, actions are coordinated, and learning is institutionalized.

The chapter makes four main contributions. It identifies a specific strategic-management problem faced by international IT outsourcing companies, distinguishes transformation of the strategic-management system from changes in individual business domains and economic outcomes, reveals a fragmented theoretical field that supports a system-configurational perspective, and interprets the multi-contour model as a set of observable strategic reconfiguration domains linked to adaptability, resilience, and sustainable development.

References:

1. Teece D. J., Pisano G., Shuen A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal,* vol. 18, no. 7, pp. 509-533.

2. Teece D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of sustainable enterprise performance. *Strategic Management Journal,* vol. 28, no. 13, pp. 1319-1350. DOI: https://doi.org/10.1002/smj.640

3. Eisenhardt K. M., Martin J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, vol. 21, no. 10-11, pp. 1105-1121. DOI: https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E

4. Winter S. G. (2003). Understanding dynamic capabilities. *Strategic Management Journal*, vol. 24, no. 10, pp. 991-995. DOI: https://doi.org/10.1002/smj.318

5. Wang C. L., Ahmed P. K. (2007). Dynamic capabilities: A review and research agenda. *International Journal of Management Reviews*, vol. 9, no. 1, pp. 31-51. DOI: https://doi.org/10.1111/j.1468-2370.2007.00201.x

6. Helfat C. E., Peteraf M. A. (2009). Understanding dynamic capabilities: Progress along a developmental path. *Strategic Organization*, vol. 7, no. 1, pp. 91-102. DOI: https://doi.org/10.1177/1476127008100133

7. Whittington R. (1996). Strategy as practice. *Long Range Planning*, vol. 29, no. 5, pp. 731-735. DOI: https://doi.org/10.1016/0024-6301(96)00068-4

8. Jarzabkowski P. (2005). Strategy as Practice: An Activity-Based Approach. London: Sage. 224 p.

9. Jarzabkowski P., Balogun J., Seidl D. (2007). Strategizing: The challenges of a practice perspective. *Human Relations*, vol. 60, no. 1, pp. 5-27. DOI: https://doi.org/10.1177/0018726707075703

10. Vaara E., Whittington R. (2012). Strategy-as-Practice: Taking social practices seriously. *Academy of Management Annals*, vol. 6, no. 1, pp. 285-336. DOI: https://doi.org/10.1080/19416520.2012.672039

11. Meyer A. D., Tsui A. S., Hinings C. R. (1993). Configurational approaches to organizational analysis. *Academy of Management Journal*, vol. 36, no. 6, pp. 1175-1195. DOI: https://doi.org/10.5465/256809

12. Fiss P. C. (2007). A set-theoretic approach to organizational configurations. *Academy of Management Review*, vol. 32, no. 4, pp. 1180-1198. DOI: https://doi.org/10.5465/amr.2007.26586092

13. Miller D. (1996). Configurations revisited. *Strategic Management Journal*, vol. 17, no. 7, pp. 505-512. DOI: https://doi.org/10.1002/(SICI)1097-0266(199607)17:7<505::AID-SMJ852>3.0.CO;2-I

14. Seidl D., Whittington R. (2014). Enlarging the Strategy-as-Practice research agenda: Towards taller and flatter ontologies. *Organization Studies*, vol. 35, no. 10, pp. 1407-1421. DOI: https://doi.org/10.1177/0170840614541886

15. Vial G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, vol. 28, no. 2, pp. 118-144. DOI: https://doi.org/10.1016/j.jsis.2019.01.003

16. Verhoef P. C., Broekhuizen T., Bart Y., Bhattacharya A., Dong J. Q., Fabian N., Haenlein M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, vol. 122, pp. 889-901. DOI: https://doi.org/10.1016/j.jbusres.2019.09.022

17. Warner K. S. R., Wäger M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, vol. 52, no. 3, pp. 326-349. DOI: https://doi.org/10.1016/j.lrp.2018.12.001

18. Lacity M. C., Solomon S., Yan A., Willcocks L. P. (2011). Business process outsourcing studies: A critical review and research directions. *Journal of Information Technology,* vol. 26, no. 4, pp. 221-258. DOI: https://doi.org/10.1057/jit.2011.25

19. Lacity M. C., Khan S. A., Yan A. (2016). Review of the empirical business services sourcing literature: An update and future directions. *Journal of Information Technology,* vol. 31, no. 3, pp. 269-328. DOI: https://doi.org/10.1057/jit.2016.2

20. Mazumder S., Garg S. (2021). Decoding digital transformational outsourcing: The role of service providers' capabilities. *International Journal of Information Management,* vol. 58, 102295. DOI: https://doi.org/10.1016/j.ijinfomgt.2020.102295

21. Teece D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, vol. 43, no. 2-3, pp. 172-194. DOI: https://doi.org/10.1016/j.lrp.2009.07.003

22. Amit R., Zott C. (2001). Value creation in e-business. *Strategic Management Journal*, vol. 22, no. 6-7, pp. 493-520. DOI: https://doi.org/10.1002/smj.187

23. Bowen G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, vol. 9, no. 2, pp. 27-40. DOI: https://doi.org/10.3316/QRJ0902027

24. Krippendorff K. (2018). Content Analysis: An Introduction to Its Methodology. 4th ed. Thousand Oaks: Sage. 472 p.

25. Adams C. A. (2017). Conceptualising the contemporary corporate value creation process. *Accounting, Auditing & Accountability Journal*, vol. 30, no. 4, pp. 906-931. DOI: https://doi.org/10.1108/AAAJ-04-2016-2529

26. Ustymenko O. O. (2025). Osoblyvosti mizhnarodnykh IT-autsorsynhovykh kompanii yak obiektiv stratehichnoho upravlinnia [Specific features of international IT outsourcing companies as objects of strategic management]. *Ekonomichnyi Visnyk NTUU 'KPI',* no. 33.

27. Ustymenko O. O. (2025). Vyznachennia ta kontseptualna model dynamichnykh zdatnostei IT-autsorsynhovykh kompanii [Definition and conceptual model of dynamic capabilities of IT outsourcing companies]. *International Scientific Journal Internauka. Series: Economic Sciences,* no. 3.

28. Ustymenko O. O. (2026). Empirychna veryfikatsiia konturno-indeksnoi modeli transformatsii stratehichnoho menedzhmentu mizhnarodnykh IT-autsorsynhovykh kompanii [Empirical verification of the contour-index model of strategic management transformation of international IT outsourcing companies]. *Economic Paradigm*, no. 5(109). DOI: https://doi.org/10.25313/3083-7782-2026-5-8191

29. Ustymenko O. O. (2025). Rol dynamichnykh zdatnostei u transformatsii stratehichnoho menedzhmentu mizhnarodnykh IT-autsorsynhovykh kompanii [The role of dynamic capabilities in the transformation of strategic management of international IT outsourcing companies]. *Knowledge, Education, Law, Management*, no. 3(71).

30. Ustymenko O. (2025). Typology of dynamic capabilities of companies. Riga: Baltija Publishing, pp. 137-139.

31. Du W., Pan S. L., Wu J. (2020). How do IT outsourcing vendors develop capabilities? An organizational ambidexterity perspective on a multi-case study. *Journal of Information Technology*, vol. 35, no. 1, pp. 49-65. DOI: https://doi.org/10.1177/0268396219887756

32. Vieru D., Klein S., Bourdeau S., Ntakirutimana J.-B. (2021). Developing ambidextrous routines in the IT service provider industry. Proceedings of the

Annual Hawaii International Conference on System Sciences, pp. 6452-6461. DOI: https://doi.org/10.24251/HICSS.2021.777

33. Holzweber M., Mattsson J., Chadee D., Raman R. (2012). How dynamic capabilities drive performance in the Indian IT industry: The role of information and co-ordination. *Service Industries Journal*, vol. 32, no. 4, pp. 531-550. DOI: https://doi.org/10.1080/02642069.2011.596530

34. Wang M.-M., Wang J.-J. (2019). How vendor capabilities impact IT outsourcing performance: An investigation of moderated mediation model. *Journal of Enterprise Information Management*, vol. 32, no. 2, pp. 325-344. DOI: https://doi.org/10.1108/JEIM-07-2018-0167

35. Schwarz S., Hentrich C. (2012). Transformation journey from offshore service provider to global innovator. In: Globalization of Professional Services: Innovative Strategies, Successful Processes, Inspired Talent Management, and First-Hand Experiences, pp. 225-240. DOI: https://doi.org/10.1007/978-3-642-29181-4_20

36. Silberzahn R., Friesl M. (2009). How to become global? Categorization of change projects and assessment of their contribution to a global change initiative. *International Journal of Knowledge, Culture and Change Management*, vol. 9, no. 3, pp. 21-33. DOI: https://doi.org/10.18848/1447-9524/CGP/v09i03/49710

37. Su N. (2008). Internationalization strategies of IT vendors from emerging economies: The case of China. ICIS 2008 Proceedings – Twenty Ninth International Conference on Information Systems.

38. Lee K., Park T. Y., Krishnan R. T. (2014). Catching-up or leapfrogging in the Indian IT service sector: Windows of opportunity, path-creating, and moving up the value chain. *Development Policy Review*, vol. 32, no. 4, pp. 495-518. DOI: https://doi.org/10.1111/dpr.12065

39. Mehta S., Baskaran A. (2023). Upgrading within global value chains and innovation capabilities: Lessons from Indian information technology sector. *Institutions and Economies*, vol. 15, no. 4, pp. 113-140. DOI: https://doi.org/10.22452/IJIE.vol15no4.5

40. Clohessy T., Acton T., Morgan L. (2019). The impact of cloud-based digital transformation on IT service providers: Evidence from focus groups. In: Sustainable Business: Concepts, Methodologies, Tools, and Applications, vol. 4, pp. 1495-1514. DOI: https://doi.org/10.4018/978-1-5225-9615-8.ch067

GLOBAL EXPERIENCE OF STATE INSTITUTIONS USING ARTIFICIAL INTELLIGENCE TECHNOLOGIES FOR PRUDENTIAL SUPERVISION OF CREDIT INSTITUTIONS' ACTIVITIES

Nataliia Kholiavko[1]
Ihor Potseluiko[2]

DOI: https://doi.org/10.30525/978-9934-26-715-4-19

Abstract. *Relevance.* Prudential supervision of credit institutions has traditionally relied on balance-sheet checks, financial-statement analysis, and on-site/off-site inspections. In an era of digital transformation and exponentially growing volumes of financial data, these conventional methods are increasingly insufficient for the timely detection of threats to financial stability. Central banks and supervisory authorities worldwide are therefore adopting supervisory technology (SupTech) solutions built on artificial intelligence (AI) and machine learning (ML) to process data in real time, detect atypical behavioral patterns among credit institutions, and forecast the probability of distress well before it materializes. *Purpose.* The chapter aims to systematize and critically compare the international experience of applying AI technologies in prudential banking supervision across leading jurisdictions, and to identify common patterns, jurisdiction-specific priorities, and outstanding challenges that condition the further diffusion of SupTech tools. *Methodology.* The study draws on official publications and primary regulatory sources (including the Bank for International Settlements, the Financial Stability Board, European Central Bank, Bank of England, UK Prudential Regulation Authority and Financial Conduct Authority, U.S. Office of the Comptroller of the Currency, Federal Reserve System, Monetary Authority of Singapore, Hong Kong Monetary Authority, and U.S. Government Accountability Office) supplemented by

[1] Doctor of Economics, Professor,
Professor of the Department of Finance, Banking and Insurance,
Chernihiv Polytechnic National University, Ukraine
[2] Postgraduate Student,
Department of Finance, Banking and Insurance,
Chernihiv Polytechnic National University, Ukraine

© Nataliia Kholiavko, Ihor Potseluiko

academic literature and industry reports. *Results.* The comparative analysis of five jurisdictions reveals that, despite structural differences, supervisors converge on two guiding principles: technological neutrality (AI-related risks are assessed under the same risk-management frameworks as any other technology) and human-in-the-loop oversight (AI systems generate proposals and flag anomalies, but final decisions remain with supervisors). The chapter identifies five persistent challenges to further AI adoption in supervision: "black-box" problem of explainability and transparency, including the emerging concern of "misaligned" AI systems; data quality and confidentiality constraints; third-party dependencies and service-provider concentration risk in the AI supply chain; algorithmic herding and procyclicality risk arising from correlated model behavior across institutions; shortage of supervisory staff combining financial-sector expertise with AI/ML competence. *Conclusions.* AI adoption in prudential supervision has moved from conceptual debate to concrete, operational implementation among leading regulators. Its sustainable development requires strategic digital-transformation planning, secure IT infrastructure, systematic staff training, international SupTech cooperation, and adherence to the human-in-the-loop principle as a precondition for trust in AI-assisted supervision. A balanced, technology-neutral regulatory approach combined with robust safeguards for data quality and confidentiality, is essential to realizing AI's supervisory potential while managing its systemic risks.

INTRODUCTION

Prudential supervision of credit institutions' activities is one of the most important instruments for ensuring the financial stability of any state. Traditionally, it is based on checking balance sheet indicators, analyzing financial statements, conducting on-site and off-site inspections, as well as assessing credit institutions' compliance with capital adequacy, liquidity, and asset quality standards. In the era of digital transformation, these methods prove insufficient for the timely identification of threats to financial stability.

Artificial intelligence (AI) and machine learning (ML) technologies are fundamentally changing approaches to prudential supervision worldwide. Central banks and supervisory authorities in most developed countries are implementing so-called supervisory technologies (SupTech – Supervisory

Technology), which make it possible to process data arrays in real time, identify atypical patterns of behavior of credit institutions, forecast the probability of distress long before it occurs, and significantly increase the efficiency of the supervisory process as a whole.

The concept of "prudential supervision" (from Lat. prudentia – prudence, foresight) covers a system of measures applied by regulators to guarantee the safety and soundness of credit institutions, protect depositors and creditors, and maintain the stability of the financial system as a whole. Given the rapid growth in the volume of financial data, the Bank for International Settlements (BIS), in its Bulletin No. 84 of 2024, stated that central banks and supervisory authorities became among the first institutions to master machine learning methods in order to obtain valuable analytical information for statistics, research, and policy formation [1].

The transformations in supervisory practice outlined above are driven by several factors. First, the volume of data generated by the financial system is growing at an unprecedented rate, since each credit institution generates a large number of transactions daily, submits dozens of reporting forms, and interacts with hundreds of counterparties – processing this data by traditional methods is becoming practically impossible. Second, the systemic nature of banking activity means that problems at one institution can quickly spread to the entire financial sector. Third, the financial crises of 2007-2009 and 2023 showed that traditional supervisory instruments are not always able to timely identify hidden risks.

According to the FSB report "The Financial Stability Implications of Artificial Intelligence" (2024), AI technologies in the SupTech field are applied mainly in the following areas: on-site inspections and analysis of reporting data using NLP and generative AI to extract key paragraphs from large volumes of documents and compile reports; assessment of data quality and configuration of error messages in regulatory reporting; modeling of interaction in social networks in the context of bank runs and stress testing.

An important theoretical basis for understanding the role of AI in prudential supervision is the concept of SupTech - regulatory technology on the side of the supervisory authority. Unlike RegTech (technology for fulfilling regulatory requirements on the side of the financial institutions themselves), SupTech is aimed directly at increasing the efficiency of supervisory processes.

Among the main categories of AI technologies used in prudential supervision, the following should be distinguished:

– machine learning algorithms – for forecasting the probability of banking distress;

– natural language processing (NLP) – for analyzing textual documents, reports, and regulatory reporting;

– network analysis – for tracking the interconnectedness of financial institutions;

– anomaly detection – for identifying atypical patterns in financial flows;

– generative AI (GenAI) – for automating the preparation of reports, supervisory requests, and data processing.

The application of AI in prudential supervision also gives rise to a number of fundamental challenges. First and foremost is the "black box" problem: complex ML models often do not allow explaining the logic of a decision made, which contradicts the principles of transparency and accountability of supervisory activity. In addition, data quality risks arise, since AI models are entirely dependent on the quality of input data. A separate problem is the regulatory neutrality of technologies: most supervisory authorities adhere to a technologically neutral approach, according to which risks associated with the application of AI should be assessed according to the same risk management principles as any other technology.

1. Experience of the United States of America

The United States of America became one of the first markets where regulatory authorities began systematically researching and implementing AI technologies in banking supervision processes. The specificity of American regulation lies in its decentralized architecture, in which supervisory functions are distributed among the Federal Reserve System (Fed), the Office of the Comptroller of the Currency (OCC), the Federal Deposit Insurance Corporation (FDIC), and a number of other agencies.

In March 2021, the OCC, the Fed, the FDIC, the Consumer Financial Protection Bureau (CFPB), and the National Credit Union Administration (NCUA) jointly published a request for information on the use of AI by financial institutions [2]. This request testified to the growing concern of regulators regarding the spread of AI technologies in the

banking sector and the need to form comprehensive approaches to their supervision.

The Office of the Comptroller of the Currency (OCC), in May 2022, set out supervisory expectations regarding banks' application of AI and ML technologies in the form of testimony before Congress. Deputy Comptroller for Operational Risk Policy Kevin Greenfield testified before the House Financial Services Committee's Task Force on Artificial Intelligence that the OCC applies a risk-based, technologically neutral approach to supervising the use of AI, assessing relevant risks through the lens of existing model risk management guidance. The OCC emphasized that supervisory expectations are based on the agency's prior guidance, in particular SR 11-7 on model risk management, which is mandatory and provides for independent validation of all analytical models.

The U.S. Government Accountability Office (GAO), in its report "Artificial Intelligence: Use and Oversight in Financial Services" (2025), recorded that the OCC issued 17 matters requiring attention regarding deficiencies in banks' use of AI since fiscal year 2020 [3]. The agency also noted that the CFPB has taken six AI-related enforcement actions since 2020, including in 2022 against a large bank for using an automated fraud detection system that illegally froze customers' accounts [3].

In 2023, the Securities and Exchange Commission (SEC) conducted examinations of AI disclosure and related corporate governance issues at approximately 30 registered investment advisers. The main purpose of these examinations was to identify candidates for more in-depth oversight and to deepen the agency's understanding of AI application practices in the industry and the risks associated with them [3].

The Federal Reserve System is actively implementing AI not only as an object of supervision, but also directly in its own supervisory activities. The Federal Reserve Bank of Cleveland developed the SAFE (Systemic Assessment of Financial Environment) early warning system, which uses ML methods to monitor systemic banking risks. The Fed also applies ML methods within the CCAR (Comprehensive Capital Analysis and Review) program – the annual stress testing of large banks. In accordance with the program's methodology, the Fed developed a system with three macroeconomic scenarios (baseline, adverse, and severely adverse), on the basis of which banks' capital adequacy is assessed.

The Federal Reserve Bank of Cleveland, in April 2024, published a study "Regional Economic Sentiment: Constructing Quantitative Measures from the Beige Book and Testing Their Ability to Forecast Recessions", which demonstrates the use of NLP and ML methods for processing qualitative information to support supervisory decisions [4].

The U.S. Department of the Treasury, in June 2024, published a request for information on "Uses, Opportunities, and Risks of Artificial Intelligence in the Financial Services Sector" (89 Fed. Reg. 50048), which marked a transition to a more coordinated approach to AI regulation at the federal government level [5]. In response to this request, the Department of the Treasury received a wide range of comments from the banking industry, technology companies, and civil society. Feedback revealed that companies are concerned about the fragmented approach to supervising banks and non-bank organizations developing and implementing AI, as well as the resource deficit and dependence on third-party providers for smaller financial institutions.

One of the most concrete examples of the use of AI by American banking regulators is the OCC's implementation of its own machine learning tools within the Microsoft Azure OpenAI platform and the development of "proprietary tools" in machine learning platforms. In December 2024, the OCC published a request for information regarding generative AI services to support proprietary tools developed internally at the agency and provided by contractors [6]. This testifies to the OCC's concrete intention to substantially expand its capabilities in the field of AI and ML for the performance of supervisory functions.

2. Experience of the European Central Bank

The experience of the European Central Bank (ECB) in applying AI for prudential supervision is one of the most systemic and well-documented in the world. The ECB, within the framework of the Single Supervisory Mechanism (SSM), has developed a large-scale digital strategy that includes a wide range of SupTech instruments based on AI and ML technologies.

The flagship of the ECB's AI arsenal is the Athena platform – a text analysis system based on natural language processing (NLP), which provides natural language processing capabilities to all supervisory units. Athena is capable of translating and analyzing the content of supervisory

documents, including internal model reviews, risk assessments, and letters to banks. To build the NLP models, researchers collected labeled data across a wide range of risk topics and used it to adapt predictions to the supervisory context.

A key principle of Athena's operation is "human-in-the-loop": although ML models generate suggestions and forecasts, the key role remains with the supervisory inspector, who checks the text, evaluates the context, and provides feedback for improving the model.

Among the other specialized SupTech instruments developed by the ECB, the following deserve attention:

– Heimdall – a system that supports specialists in processing large volumes of information required for assessing the fitness and propriety (fit and proper) of members of banks' management bodies;

– Medusa – an instrument that facilitates the preparation and verification of the consistency of reports on the results of internal model reviews.

The instruments listed above address specific supervisory tasks and make it possible to substantially reduce the time spent on routine document processing.

One of the most significant infrastructural components of the ECB's digital transformation is Agora – a single data lake for European banking supervision. In her article in Revue Banque, Elizabeth McCaul described a pilot use case of generative AI for Agora, whereby supervisory inspectors without programming skills can formulate queries to the database in ordinary language. Generative AI automatically translates natural-language queries into program code, making it possible to access specific data that previously required programming skills to find.

To support the development of AI tools, the ECB built the Virtual Lab – a cloud-based collaborative platform that offers ML capabilities and a convenient environment for shared use and development of code. This platform not only increases the efficiency of internal cooperation within European banking supervision, but also makes it possible to deploy generative AI within a controlled environment.

According to McCaul, the ECB has identified more than 40 use cases for generative AI in banking supervision. Among the most promising are tools with chatbot capabilities for supervisory regulations and methodologies, as

well as functionality for network analysis that makes it possible to visualize complex ownership structures and links between entities.

In September 2023, the ECB announced the launch of a new "SSM Digital Strategy 2024-2028", which defines technology, data, and innovation as three interconnected pillars of digital transformation. Alongside this, the ECB is actively developing international cooperation in the field of SupTech: according to ECB representatives, during this period cooperation with the Monetary Authority of Singapore (MAS) and the U.S. OCC intensified, and "tiger teams" were formed jointly with the Fed, the Bank of England, and the UK FCA for the implementation of specific joint projects in the field of SupTech, in particular in the area of IT risks and cyber resilience.

Special attention should be paid to the staff training function: the ECB regularly organizes specialized training courses for its employees in partnership with globally recognized education service providers – Coursera and INSEAD Business School. This testifies to a systemic approach to building the human capital necessary for the effective use of AI in supervisory practice.

3. Experience of the United Kingdom: the Bank of England and the Prudential Regulation Authority

Great Britain occupies one of the leading positions in the world in terms of the level of development of the regulatory and supervisory framework in the field of AI. The Bank of England (including the Prudential Regulation Authority – PRA) and the Financial Conduct Authority (FCA) have, over the past several years, consistently been forming a comprehensive system of approaches to the regulation and use of AI in financial services.

An important step in this direction was the establishment of the Artificial Intelligence Public-Private Forum (AIPPF) – a platform for dialogue between regulators and the private sector. In 2020-2022, the Bank of England and the FCA jointly conducted the work of this forum, examining the challenges of using AI/ML in financial services and establishing dialogue between the public and private sectors [7]. The final AIPPF report, published in February 2022, set out specific recommendations on data, model, and governance issues.

In October 2022, the Bank of England, the PRA, and the FCA jointly published Discussion Paper DP5/22 "Artificial Intelligence and Machine

Learning", in which they systematically set out their views on the challenges of using AI/ML in UK financial services [8]. The document identified key risks associated with AI, including the lack of explainability, data quality issues, operational dependence on third-party providers, and potential model bias. In October 2023, the supervisory authorities published the corresponding report FS2/23, which summarized 54 responses received from regulated firms, trade associations, and non-financial businesses [9].

The Bank of England uses AI both directly in its own supervisory activities and to support the broader functions of the central bank. As noted in the Bank of England's written evidence to the House of Commons Committee: "The Bank uses AI for predictive analytics, studying non-linear relationships between variables, and analyzing larger and more enriched data sets, which makes it potentially possible to forecast GDP growth, banking distress, and financial crises" [10].

Significant is the work of J. Suss and H. Treitel from the Staff Working Paper series (Staff Working Paper No. 831, 2019), "Predicting bank distress in the UK with machine learning" [11]. The authors, drawing on confidential regulatory data obtained from supervisory assessments for 2006-2012, developed an early warning system for banking distress. The key conclusion is that the "random forest" algorithm substantially and significantly outperforms other models on AUC and Brier Score metrics. The study also showed that ensemble ML methods are able to capture complex non-linear relationships between banks' financial indicators that cannot be detected using traditional linear regression.

Another key work by Bank of England specialists is the study by Bluwstein K., Buckmann M., Joseph A., Kapadia S., Şimşek O., "Credit Growth, the Yield Curve and Financial Crisis Prediction: Evidence from a Machine Learning Approach", published as Working Paper No. 848 in 2020 (later in the Journal of International Economics, 2023) [12]. The authors demonstrate that ML approaches outperform traditional models in forecasting financial crises on a horizon of 1-3 years ahead, using data on credit growth and the shape of the yield curve.

According to the responses of the Bank of England and the PRA to the House of Commons Treasury Committee (2026), the PRA is actively researching the use of large language models (LLMs) to improve supervisory tools, supporting tasks such as data extraction and natural-

language queries [13]. In addition, the Bank has deployed off-the-shelf AI assistants throughout the organization, providing productivity gains across various tasks, including summarization, note-taking, and code generation.

In 2024, the Bank of England and the FCA conducted the third cycle of the "Artificial Intelligence in UK Financial Services" survey (following the 2019 and 2022 surveys), the purpose of which was to track the dynamics of AI implementation in regulated organizations and deepen supervisory authorities' understanding of AI issues [14]. According to the survey, the most popular explainability methods are feature importance and Shapley values (SHAP) – both methods aimed at explaining the contribution of each input variable to the ML model's prediction.

In response to a request from the UK government in February 2024 (a joint letter from the Department for Science, Innovation and Technology and the Treasury), the Bank of England, the PRA, and the FCA presented a strategic plan for the responsible implementation of AI/ML in the financial sector. In particular, in 2023 the PRA published new model risk management principles for banks that are technologically neutral and outcome-focused, but specifically include factors related to the use of AI models.

3. Experience of Singapore: a Systemic Approach to AI Risks

The Monetary Authority of Singapore (MAS) is a recognized leader in the development and implementation of innovative approaches to regulation and supervision in the field of financial technologies, including AI. MAS combines the role of central bank and integrated financial regulator, which makes it possible to ensure consistency and integrity of approaches to AI regulation across all segments of the financial market.

In 2018, MAS, together with the Association of Banks in Singapore, published principles on the use of AI and data analytics in Singapore's financial sector [15]. These principles became one of the first industry documents in the world to systematically define the regulator's expectations regarding the responsible use of AI by financial institutions.

In mid-2023, MAS launched Project MindForge – an initiative aimed at strengthening AI risk governance for financial institutions implementing AI technologies in their operations. The project resulted in the publication of an AI Risk Management Toolkit for the financial sector, developed jointly by a consortium of 24 leading banks, insurance companies, capital markets

companies, and other industry participants [16]. The Toolkit includes a detailed "Guidebook for AI Risk Management Operationalisation", which provides practical guidance on implementing AI risk management systems in accordance with traditional, generative, and agentic AI technologies.

In 2024, MAS conducted a supervisory thematic review of AI use by key banks – the results of this review formed the basis for the "AI Risk Management Guidelines" proposed in 2025 [17]. As noted by MAS Deputy Managing Director Ho Hern Shin, these proportionate, risk-based guidelines make it possible to ensure responsible innovation by financial institutions implementing corresponding safeguards to counter key risks associated with AI. The guidelines cover various applications and technologies of AI, including Generative AI, as well as the latest developments such as AI agents.

In May 2026, MAS announced a new initiative in the field of financial crimes: MAS is conducting a Proof-of-Value (POV) to explore AI and ML methods for the purpose of proactive fraud detection [18]. This initiative involves close cooperation with the banking industry and demonstrates that MAS, as a supervisory authority, is actively using AI to address specific monitoring tasks.

Singapore's experience also includes the development of the Veritas Initiative – an initiative to verify the fairness, ethics, accountability, and transparency of algorithms used in three pilot use cases: credit risk scoring, credit risk, and asset management. The purpose of Veritas is to develop methodologies and tools for the practical assessment of AI algorithms in accordance with FEAT principles. This approach differs substantially from the approaches of other regulators and is oriented toward specific practical outcomes rather than merely issuing declarative guidance.

In 2024, MAS also actively made use of the BuildFin.ai platform – a new initiative that brings together technology providers, research institutes, and financial institutions to jointly solve complex industry problems. This platform is intended to facilitate the dissemination of AI risk management practices and solutions across the industry, as well as expand participation in AI risk management working groups [16].

MAS's approach is distinguished by a particular emphasis on the balance between innovation and risk: in particular, the regulator does not dictate specific technical solutions, but forms clear expectations regarding

AI risk management and verifies compliance with them within supervisory reviews. The guidelines are applied proportionately, in accordance with the scale and nature of financial institutions' activities, their use of AI, and their risk profiles.

4. Experience of Asia: the Hong Kong Monetary Authority

The Hong Kong Monetary Authority (HKMA) is also actively integrating AI into its supervisory practice. As one of Asia's leading financial centers, Hong Kong is forming its own approach to AI regulation, reflecting both international standards and the specifics of regional financial markets.

In 2024, the HKMA issued a Circular encouraging authorized institutions to use AI to strengthen the monitoring of money laundering and terrorist financing risks. Recognizing the increasingly complex landscape, the HKMA emphasized the advantages of AI-based systems compared to conventional rule-based systems.

In August 2024, the HKMA launched a new GenAI Sandbox in partnership with the technology hub Cyberport, allowing banks to test new ideas in the field of AI within a structured risk management framework. This testifies to the HKMA's desire to simultaneously promote the implementation of AI in the banking sector and ensure an appropriate level of protection against the risks associated with it.

On 28 October 2024, the Financial Services and the Treasury Bureau of Hong Kong published a "Policy Statement on Responsible Application of Artificial Intelligence in the Financial Market" [19]. This document acknowledges one of the highest levels of AI adoption in the world among Hong Kong financial institutions (38% compared to the global average of 26%) and introduces an approach aimed both at promoting the development of AI and at addressing potential risks, in particular cybersecurity, data confidentiality, and intellectual property protection.

In the course of the 2024 annual review of Hong Kong's banking sector, the HKMA emphasized that it is actively implementing generative AI pilot projects to identify supervisory insights [20]. In particular, the agency, on the basis of its own SupTech tools, is seeking to combine real-time regulatory data analysis with the application of large language models to increase the depth and breadth of supervisory coverage.

In its "White Paper on AI", the HKMA defines the key areas of AI application in banking and the principles of responsible implementation [21]. Particular attention is paid to issues of explainability of AI decisions and the inadmissibility of using AI as a substitute for human judgment and analysis. The HKMA's position is clearly formulated: AI should be regarded as a tool that supplements and enhances human capabilities, rather than replacing them.

5. Global Standards For the Application of AI in Supervision

The Bank for International Settlements (BIS) and the Financial Stability Board (FSB) play a key role in shaping global standards and recommendations for the application of AI in prudential supervision. The materials developed by these institutions serve as an important reference point for central banks and supervisory authorities around the world.

In June 2024, the BIS published Chapter III "Artificial intelligence and the economy: implications for central banks" of its Annual Economic Report 2024, in which it systematically set out the opportunities and challenges associated with the implementation of AI in central banks' activities [22]. In the same year, the BIS published Bulletin No. 84 "Artificial intelligence in central banking", in which it identified four key areas of AI use: data collection and compilation of official statistics; macroeconomic and financial analysis; supervision of payment systems and market infrastructure; prudential supervision [1].

The Financial Stability Board (FSB), in November 2024, published the report "The Financial Stability Implications of Artificial Intelligence", which analyzes both the implications of AI application for financial stability and the possibilities of using AI by supervisory authorities to increase supervisory effectiveness [23]. In particular, the report states that NLP and generative AI methods are being tested and applied for examinations: these methods make it possible to extract relevant paragraphs from large volumes of documents and compile examination reports [23].

In October 2025, the FSB published the report "Monitoring adoption of artificial intelligence and related vulnerabilities", in which it systematized member jurisdictions' approaches to monitoring the application of AI. In particular, micro-prudential supervisory authorities in many jurisdictions assess AI-related risks at the level of individual institutions through

supervisory measures, including model risk management reviews. At the same time, the report notes that expanding attention to vulnerabilities across different institutions and sectors could strengthen global efforts to monitor financial stability.

6. Comparative Analysis of Approaches in Different Jurisdictions

Studying the practice of different jurisdictions makes it possible to identify both common trends and substantial differences in approaches to the application of AI for prudential supervision of credit institutions' activities. Let us systematize these approaches according to several key dimensions.

Most leading regulators adhere to the principle of technological neutrality: credit institutions are expected to comply with existing risk management standards regardless of the specific technology used. This principle is consistently followed by the Bank of England, the U.S. OCC, and the ECB. The essence of this principle is that risks associated with the application of AI should be assessed according to the same risk management principles as any other technological risks.

Under the human-in-the-loop principle, all leading regulators unanimously emphasize that AI is not and should not become a replacement for human decision-making in supervisory activity. The ECB declares this principle in the context of the Athena platform; the HKMA – in its own White Paper on AI; MAS – in the FEAT principles and AI risk management guidelines. This principle is not merely declarative – it defines the specific architecture of supervisory AI systems, in which the model generates suggestions and identifies anomalies, while the final decision always remains with the human.

In terms of the nature of priority tasks, it can be observed that different regulators emphasize different aspects of AI application, namely: the ECB has focused on automated document analysis and natural language processing; the Bank of England – on forecasting banking distress and financial crises; MAS – on AI risk management on the side of financial institutions; the HKMA – on the GenAI sandbox; the United States (OCC, Fed) – on stress testing and model risk management.

In terms of the level of development and documentation of approaches, the ECB holds the lead thanks to its large-scale SupTech program with

specific named instruments (Athena, Heimdall, Medusa, Agora, Virtual Lab), a significant number of users (3,500+), and a well-documented methodology. In second place is MAS, thanks to its structured FEAT, Veritas, and MindForge initiatives. The Bank of England stands out for the depth of its academic research, while the OCC and the Fed stand out for the scale of their regulatory framework.

Regarding the balance between regulation and stimulating innovation, all the jurisdictions examined are trying to find the optimal balance: regulators do not seek to restrict the implementation of AI, but instead form conditions for its safe and responsible application. At the same time, the approaches differ: while the EU prefers a framework-based approach to regulation (the EU AI Act), the United States, Singapore, and Hong Kong rely more on principles and recommendations, leaving credit institutions flexibility in choosing specific solutions.

7. Challenges and Prospects for the Implementation of AI in Prudential Supervision

Despite significant progress in the implementation of AI for prudential supervision, regulatory authorities around the world face a number of serious challenges:

– the problem of explainability and transparency – complex ML models, in particular neural networks, are "black boxes", meaning their internal decision-making mechanisms are not directly interpretable. This contradicts the principles of transparency and accountability on which prudential supervision is based. The FSB report (2024) places particular emphasis on misaligned AI systems as a separate category of vulnerabilities and stresses that supervisory authorities in many jurisdictions assess these issues at the level of individual institutions through model risk management reviews [24];

– data quality and confidentiality – AI models are entirely dependent on the quality of input data. Problems of incompleteness, format incompatibility, and reporting errors can substantially reduce the accuracy of AI models. In addition, the use of confidential supervisory data in AI models requires special security measures. In this context, the ECB pays considerable attention to data quality and confidentiality issues within its Agora platform;

– third-party dependencies – most credit institutions, especially smaller ones, do not have their own capacity to develop complex AI systems and are forced to rely on external providers. If leading providers of AI solutions for the financial sector are used by a wide range of institutions, failures or vulnerabilities in their systems can have a systemic effect. The FSB's 2025 report devoted a separate case study to monitoring dependencies on third-party providers and the concentration of AI-related service providers [24];

– the risk of algorithmic herding and procyclicality – if most large banks use similar AI models trained on identical data sets, they may generate identical recommendations – this could amplify systemic risks instead of reducing them. The BIS in 2024 identified this risk as one of the key risks given its potential systemic implications;

– shortage of qualified personnel – the effective application of AI in prudential supervision requires specialists who combine deep knowledge in the field of financial supervision and AI/ML technologies. The ECB, MAS, and other leading regulators are investing in staff training and professional development. The ECB, for example, organizes training courses for supervisory personnel in partnership with Coursera and INSEAD.

Among the promising directions for the development of AI implementation in supervisory processes, we can include the following: the integration of generative AI for the automated preparation of supervisory reports and requests; the development of explainable AI methods to ensure the transparency of AI-based decisions in supervisory activity; the implementation of real-time monitoring systems to detect emerging risks; the strengthening of international cooperation in the field of SupTech, in particular through cooperation between the ECB, the Fed, the Bank of England, MAS, and the OCC within "tiger teams"; the development of standardized approaches to AI model risk management that take into account the specifics of different jurisdictions.

CONCLUSIONS

Systematizing the results of the analysis of global experience in the use of artificial intelligence technologies in prudential supervision of credit institutions' activities, the following conclusions can be formulated:

1) the implementation of AI in prudential supervision is an objectively necessary step under conditions of the growing complexity of the financial

system. Leading supervisory authorities have moved from discussions about the feasibility of AI to the concrete implementation of specific instruments;

2) the actualization of the need for strategic planning of digital transformation, the construction of a secure IT infrastructure, the organization of systematic staff training, international cooperation in the field of SupTech, and the introduction of the "human-in-the-loop" principle as an indispensable condition for trust in AI systems in the field of prudential supervision;

3) a balanced approach to regulation is important – oriented not toward prohibiting the use of AI technologies, but toward forming clear principles and expectations regarding AI risk management. A technologically neutral approach makes it possible to ensure appropriate flexibility while preserving substantial safety guarantees;

4) the need to resolve issues of regulatory data quality and the corresponding legislative and normative framework for protecting confidential supervisory data used in AI systems.

References:

1. Bank for International Settlements (BIS) (2024) *Artificial intelligence in central banking (BIS Bulletin No. 84)*. Basel: BIS. Available at: https://www.bis.org/publ/bisbull84.pdf

2. Office of the Comptroller of the Currency et al. (2021) *Request for Information and Comment on Financial Institutions' Use of Artificial Intelligence, Including Machine Learning (OCC Bulletin 2021-17)*. Washington: OCC. Available at: https://www.occ.gov/news-issuances/bulletins/2021/bulletin-2021-17.html

3. Government Accountability Office (GAO) (2025) *Artificial Intelligence: Use and Oversight in Financial Services (GAO-25-107197)*. Washington: GAO. Available at: https://files.gao.gov/reports/GAO-25-107197/index.html

4. Federal Reserve Bank of Cleveland (2024) *Regional Economic Sentiment: Constructing Quantitative Estimates from the Beige Book and Testing Their Ability to Forecast Recessions*. Cleveland: Federal Reserve Bank of Cleveland.

5. U.S. Department of the Treasury (2024) *Request for Information on Uses, Opportunities, and Risks of Artificial Intelligence in the Financial Services Sector (89 Fed. Reg. 50048)*. Available at: https://www.federalregister.gov/documents/2024/06/12/2024-12336/request-for-information-on-uses-opportunities-and-risks-of-artificial-intelligence

6. FedScoop (2024) *The Comptroller of the Currency looks to level up its generative AI offerings*. FedScoop, December 20. Available at: https://fedscoop.com/the-comptroller-of-the-currency-looks-to-level-up-its-generative-ai-offerings/

7. Bank of England; Financial Conduct Authority (2022) *AI Public-Private Forum: Final Report*. London: Bank of England.

8. Bank of England; Prudential Regulation Authority; Financial Conduct Authority (2022) *DP5/22 – Artificial Intelligence and Machine Learning*. London: Bank of England. Available at: https://www.bankofengland.co.uk/prudential-regulation/publication/2022/october/artificial-intelligence

9. Bank of England; Prudential Regulation Authority; Financial Conduct Authority (2023) *FS2/23 – Artificial Intelligence and Machine Learning*. London: Bank of England. Available at: https://www.bankofengland.co.uk/prudential-regulation/publication/2023/october/artificial-intelligence-and-machine-learning

10. Bank of England (2024) *AI in financial services: written evidence submitted by the Bank of England*. UK Parliament, House of Commons Treasury Select Committee. Available at: https://committees.parliament.uk/writtenevidence/140106/html/

11. Suss J., Treitel H. (2019) *Predicting bank distress in the UK with machine learning (Staff Working Paper No. 831)*. London: Bank of England. Available at: https://www.bankofengland.co.uk/working-paper/2019/predicting-bank-distress-in-the-uk-with-machine-learning

12. Bluwstein K., Buckmann M., Joseph A., Kapadia S., Şimşek O. (2020) *Credit growth, the yield curve and financial crisis prediction: Evidence from a machine learning approach (Bank of England Staff Working Paper No. 848)*. London: Bank of England. *Journal of International Economics*, 2023, vol. 145.

13. UK Parliament, House of Commons Treasury Committee (2026) *AI in financial services: Responses to the Committee's First report*, April 16. Available at: https://publications.parliament.uk/pa/cm5901/cmselect/cmtreasy/1791/report.html

14. Bank of England; Financial Conduct Authority (2024) *Artificial intelligence in UK financial services – 2024*. London: Bank of England. Available at: https://www.bankofengland.co.uk/report/2024/artificial-intelligence-in-uk-financial-services-2024

15. Monetary Authority of Singapore (MAS) (2018) *Principles to Promote Fairness, Ethics, Accountability and Transparency (FEAT) in the Use of Artificial Intelligence and Data Analytics in Singapore's Financial Sector*. Singapore: MAS.

16. Monetary Authority of Singapore (MAS) (2026) *MAS Partners Industry to Develop AI Risk Management Toolkit for the Financial Sector*. Press release. Singapore: MAS, March 20. Available at: https://www.mas.gov.sg/news/media-releases/2026/mas-partners-industry-to-develop-ai-risk-management-toolkit-for-the-financial-sector

17. Monetary Authority of Singapore (MAS) (2025) *MAS Guidelines for Artificial Intelligence (AI) Risk Management*. Press release. Singapore: MAS. Available at: https://www.mas.gov.sg/news/media-releases/2025/mas-guidelines-for-artificial-intelligence-risk-management

18. Monetary Authority of Singapore (MAS) (2026) *MAS Collaborates with Banking Industry to Harness Artificial Intelligence in the Fight Against Financial Crime*. Press release. Singapore: MAS, May 4. Available at: https://www.mas.gov.sg/

news/media-releases/2026/mas-collaborates-with-banking-industry-to-harness-ai-in-the-fight-against-financial-crime

19. Financial Services and the Treasury Bureau, Hong Kong (2024) *Policy Statement on Responsible Application of Artificial Intelligence in the Financial Market*. Hong Kong: FSTB, October 28. Available at: https://gia.info.gov.hk/general/202410/28/P2024102800154_475819_1_1730087238713.pdf

20. Hong Kong Monetary Authority (HKMA) (2025) *Hong Kong Banking Sector 2024 Year-end Review and Priorities for 2025*. Hong Kong: HKMA, January 22. Available at: https://www.hkma.gov.hk/media/eng/doc/key-information/speeches/s20250122e1.pdf

21. Hong Kong Monetary Authority (HKMA) *Reshaping Banking with Artificial Intelligence*. White Paper. Hong Kong: HKMA. Available at: https://www.hkma.gov.hk/media/eng/doc/key-functions/finanical-infrastructure/Whitepaper_on_AI.pdf

22. Bank for International Settlements (BIS) (2024) *Artificial intelligence and the economy: implications for central banks (Annual Economic Report 2024, Chapter III)*. Basel: BIS.

23. Financial Stability Board (FSB) (2024) *The Financial Stability Implications of Artificial Intelligence*. Basel: FSB, pp. 44–47. Available at: https://www.fsb.org/uploads/P14112024.pdf

24. Financial Stability Board (FSB) (2025) *Monitoring Adoption of Artificial Intelligence and Related Vulnerabilities*. Basel: FSB. Available at: https://www.fsb.org/uploads/P101025.pdf

CURRENT STATE AND PROBLEMS OF FORMING AN ACCESSIBLE ENVIRONMENT FOR THE IMPLEMENTATION OF PROMISING DIRECTIONS OF INCLUSIVE TOURISM IN UKRAINE

Sergiy Tsviliy[1]
Pavlo Bobrykin[2]

DOI: https://doi.org/10.30525/978-9934-26-715-4-20

Abstract. The modern development of the global and Ukrainian tourism and hospitality industry is taking place amidst significantly heightened demands for inclusivity, social responsibility, and equal access to services for all consumer groups. Creating a barrier-free and universal environment is a key prerequisite for ensuring equal opportunities for all types of tourists, making a systematic study of barrier-free accessibility in the hospitality sector highly relevant. *The purpose* of the article is to substantiate the theoretical and applied principles for creating an accessible environment and to identify the challenges and future directions for the development of inclusive tourism in Ukraine. Achieving this goal involves systematizing theoretical approaches to developing a barrier-free environment within the tourism industry specifically regarding inclusive tourism in Ukraine during and after the war while drawing on international experience, classifying inclusive tours, and leveraging the potential of various types of inclusive tourism. Addressing these research objectives shapes the article's structure: systematizing theoretical approaches to the concept of an "accessible environment" as the foundation of inclusive tourism; summarizing best international practices for creating barrier-free spaces for persons with disabilities and other groups with limited mobility; critically analyzing the current state and accessibility challenges of domestic accommodation infrastructure; and identifying promising forms of inclusive tourism in

[1] Candidate of Economic Sciences, Associate Professor,
Associate Professor of the Department of Tourism, Hotel and Restaurant Business,
National University Zaporizhzhia Polytechnic, Ukraine
[2] Postgraduate,
Senior Lecturer of Department of Entrepreneurship, Management and Tourism,
Zaporizhzhia Institute of Economics and Information Technologies, Ukraine

© Sergiy Tsviliy, Pavlo Bobrykin

Ukraine alongside mechanisms for their implementation through the development of an accessible environment. *Methodology* of the study is based is based on a comprehensive system of general scientific and specialized methods, including: comparative analysis and synthesis (when examining theoretical foundations and international experience), statistical and analytical review (to assess the state of accommodation infrastructure in Ukraine), as well as methods of generalization and strategic planning (when substantiating promising directions for development). *The results* of this study demonstrate that international practice emphasizes the application of universal design principles and the implementation of reasonable infrastructure adjustments. An analysis of the domestic market reveals significant institutional, financial, and architectural barriers that hinder the accessibility of most tourist accommodation facilities in Ukraine. The study establishes that overcoming these obstacles is a fundamental prerequisite for boosting promising forms of tourism, such as rehabilitation and wellness, cultural and educational, eco-tourism, and adaptive sports tourism. *Practical implications.* The practical significance of the obtained results lies in the potential for state authorities, local self-government bodies, and tourism businesses to utilize the formulated conclusions and recommendations to develop barrier-free strategies, roadmaps for the development of inclusive tourism destinations, and plans for modernizing tourism infrastructure facilities in Ukraine. *Value/originality.* This study integrates an analysis of the theoretical foundations and practical challenges regarding accommodation infrastructure with the development of strategies to implement promising forms of inclusive tourism. This approach emphasizes the systematic integration of accessibility standards aligned with European requirements within the context of post-war recovery. The study substantiates the hypothesis that creating a barrier-free environment for tourists with disabilities, alongside the development of various forms of inclusive tourism in Ukraine and its regions during and after the war, can drive regional economic recovery, generate new jobs, and provide a source of income for local residents.

INTRODUCTION

Today, the priority tasks of Ukraine's state tourism policy must include market analysis and the identification of the most valuable and in-demand

tourism products. Attention should also be focused on developing a competitive tourism sector capable of meeting the service needs of both domestic and international tourists [44; 45; 57].

It is also necessary to address mechanisms for promoting new products in domestic and international markets through the production of promotional and informational materials such as brochures, cards, and guidebooks and by organizing international-level trade shows, familiarization trips for foreign journalists to showcase the country's regions, and screenings of films and presentations highlighting the most attractive features of tourism destinations (based on pre-war conditions) [41; 42; 47].

Despite the challenging wartime conditions facing Ukraine's tourism economy, special attention must currently be paid to developing new forms of tourism that have recently gained global popularity. Such avenues could help increase tourist flows to regional tourism hubs and provide fresh momentum for the development of the tourism industry and related sectors [23; 37]. Developing domestic and inbound tourism today offers not only an opportunity to fully unlock the country's territorial potential but also a way to cope with the pressures of the crisis [16]. Recent years have posed a significant challenge to the country's tourism economy: the coronavirus pandemic (2020–2022) and the war (2022–2026) have affected virtually every aspect of the sector. Closed airspace has limited travel options to other countries. Furthermore, the weakening of the national currency has had a substantial impact, driving up the cost of foreign tours and making them less affordable for the general public [28]. Nevertheless, tours within Ukraine are becoming increasingly popular. Interest in domestic tourism should be sustained and fostered through the development of tourism infrastructure, the creation of new routes, and the expansion of service offerings and target customer segments.

Inclusive tourism should become a key direction for post-war development. Recently, barrier-free tourism or tourism for people with disabilities – has gained increasing societal importance. While the majority of these individuals wish to travel and are capable of doing so, not all countries and cities offer environments sufficiently adapted to ensure a comfortable stay [26]. This is particularly true regarding accommodation facilities [8; 25]. The level of accessibility for people with physical disabilities varies depending on a country and its level of socio-economic development [50].

This consumer segment within the tourism and hospitality industry should be viewed as a significant target audience; they should be considered not merely through the lens of charity or humanitarianism, but primarily as a matter of responsible business practice.

1. Theoretical Foundations of Creating an Accessible Environment as the Basis for the Development of Inclusive Tourism

The contributions of scholars to addressing the challenges and development prospects of inclusive tourism are reflected in numerous works by both domestic and international researchers. In recent years, Ukrainian scholars have made significant contributions to the study of various aspects of inclusive tourism, drawing upon contemporary global and European experience. For instance, the rehabilitative component of this type of tourism has been examined in the works of N. Barna and A. Korotieieva [2]; L. Bezuhla, M. Bieloborodova, and T. Herasymenko [4]; O. Rohovska and A. Tsariok [32]; and A. Skrypnyk and H. Kucherov [36]. The potential for implementing global and European inclusive tourism practices is highlighted in the works of L. Bezuhla, T. Kuvaieva, and T. Herasymenko [7]; I. Danchevska and T. Kalaitan [12]; O. Kravchenko and A. Voitovska [22]; S. Chaika [11]; and I. Trunina and Yu. Sosnovska [40]. Research regarding the creation of an inclusive tourism environment in Ukraine and its support during and after the war has been conducted by Ya. Didukh [16]; M. Zhurylo, S. Antonov, and V. Tkachek [57]; V. Kostynets [21]; A. Motsa, R. Korinets, and K. Horiunova [27]; and L. Slatvinska [37]. Recommendations for ensuring the accessibility of tourism services for various consumer categories taking into account their specific needs and the types of services involved have been developed in the works of researchers such as D. Zakharov and T. Kupach [56], D. Petrunchak, I. Baniieva, and S. Matviienko [30], and U. Tkach and V. Danylenko-Kulchytska [38]. However, despite the abundance of scholarly ideas, there is a practical lack of research into the regional disparities in inclusive tourism development during the war and the factors hindering its growth factors that must be addressed if inclusive tourism is to become a competitive sector in the post-war period. Furthermore, there is a need to devise approaches for identifying current problems that prevent the full realization of inclusive tourism's potential, as well as a need to classify promising forms of inclusive tourism.

Recent research into the challenges of creating barrier-free environments and the application of inclusive approaches in the tourism and hospitality sector specifically within hotel enterprises has been conducted by domestic authors such as O. Motsa, R. Korinets, and K. Horiunova [27]. S. Tyshchenko, T. Chernyshova, and O. Osipchuk [52] examined the essence and purpose of tourism as a means of providing socio-psychological support to people with special needs and developed a typology of adapted tours for this category of tourists. O. Sazonets, O. Hessen, and O. Khanina [34] investigated barrier-free design as an element of an ecological approach to shaping the architectural environment. N. Vlashchenko [54] analyzed the specifics of infrastructure development for inclusive tourism and formulated recommendations for boosting its growth.

The concept of an "accessible environment" is viewed as a social phenomenon that entails creating safe and convenient conditions for persons with disabilities and other groups with limited mobility. Initiatives to implement accessibility principles may be spearheaded by government authorities, civic organizations, or individual active citizens committed to creating inclusive spaces.

At the same time, an accessible environment is designed not only for people with disabilities as is often assumed but also for a broader range of individuals with temporarily or permanently limited mobility. This group includes pregnant women, parents with strollers, the elderly, people with temporary injuries, and cyclists. In fact, most people will experience situations involving reduced mobility at some point in their lives. Therefore, ensuring accessibility is a societal need that concerns everyone [1].

Academic debates regarding the definition of "tourism for people with disabilities" have been ongoing for over two decades; however, a universal and established interpretation has yet to be formulated (Table 1).

In international practice, this field is referred to by various terms: "Accessible Tourism", "Tourism for All", "Universal Tourism" and "Barrier-free Tourism." There is also no unified terminology within the Ukrainian academic and professional communities; alongside the concept of "barrier-free tourism," terms such as "accessible," "inclusive," "adaptive," and "rehabilitative tourism," as well as "paratourism" and "remedial-educational tourism," are used, alongside specialized niches specifically tourism for individuals with hearing or visual impairments [18].

Table 1

Definitions of the concept of "barrier-free tourism"

Author/Source	Content of the definition
Marusei T. [26]	"Barrier-free tourism" is an approach to organizing travel and tourism services that takes into account the needs of all people, regardless of their physical or mental abilities.
Scott R. [1]	"Barrier-free tourism" is, first and foremost, the social integration of people with disabilities into modern society.
Darcy S. [13]	"Accessible tourism" is the process of enabling people with disabilities and the elderly to function independently, equitably, and with dignity through the provision of universal tourism products, services, and environments.
Barskyi Yu. [4]	Inclusive tourism (from the French "inclusif" – meaning "including" and the Latin "includere" – meaning "to enclose" or "to include") is a form of tourism development aimed at ensuring accessibility for all segments of the population. It involves adapting tourism infrastructure and facilities to meet the needs of all people, including individuals with disabilities, the elderly, their caregivers and relatives, people with temporary limitations, and families with young children.
Topalova O. [39]	"Adaptive tourism" is a relatively new form of tourism activity designed for people with physical disabilities; it is a type of adaptive physical recreation that fosters physical rehabilitation, health improvement, and social integration for this specific social group.

Source: compiled based on [1; 3; 4; 13; 39]

Accessible tourism for people with health limitations should be viewed not merely as a form of leisure or a means of improving health, but as a vital tool for rehabilitation and social integration. Researchers emphasize that, firstly, travel stimulates physical activity and helps maintain physical fitness and overall health. Secondly, tourism activities create opportunities for meaningful communication, reduce feelings of isolation and social inadequacy, and facilitate the inclusion of the elderly and people with disabilities in active social life. Thirdly, spending time in favorable climatic conditions and natural environments has a positive impact on one's psycho-emotional state, helping to restore inner resources and psychological balance.

Given the nuances of their definitions, these terms carry different meanings and cannot always be considered synonymous [20].

When addressing the issue of environmental accessibility, it is essential to consider not only physical mobility barriers but also limitations regarding access to medical services, vocational education, cultural life, social protection, employment, sports and physical activity, information, and communication tools. Another crucial aspect is overcoming socio-psychological barriers stemming from stereotypical attitudes toward people with disabilities ranging from excessive pity to disdain or prejudice. The effective social integration of individuals with health-related limitations helps dismantle such stereotypes and fosters an appropriate, tolerant societal perception, which is of fundamental importance above all to the individuals themselves.

Accessible tourism is a relatively new area of development within the modern tourism industry. Despite its relevance, it remains under-researched in the academic community, with the systematic study of its theoretical and practical aspects having gained momentum only in recent years [18].

A comprehensive approach to inclusive tourism integrating technical, service-related, social, and economic aspects has emerged within the global scientific community. In Ukraine, this issue is also gradually attracting academic attention but requires further systematic study that takes into account both global practices and national specificities.

Inclusion is a crucial aspect of modern societal development, reflecting a society's humanity and maturity [52]. Scholarly literature offers numerous interpretations of this concept, linking it to various processes such as education or socialization. The authors consider it appropriate to examine inclusion from the perspective of tourism and propose their own definition: inclusive tourism is a form of tourism activity aimed primarily at creating products and services accessible to people with special needs ensuring their freedom of movement and unrestricted access to tourism resources, while enabling them to feel like full-fledged members of society. Consequently, it is essential to create specific conditions that facilitate the participation of individuals with health-related limitations in travel. In turn, inclusivity in tourism offers opportunities to discover new regions and destinations, explore the country’s culture and way of life, and expand social connections. Furthermore, it provides people with special needs a chance for professional fulfillment and the acquisition of new knowledge and competencies, as the industry requires guides and tour leaders who are

proficient in sign language or possess personal experience in overcoming mental health challenges. Orienting Ukraine's tourism industry toward this demographic opens new avenues for established tourism clusters, attracts investment through participation in socially significant projects, expands the range of services, and drives growth in tourist traffic.

2. International Experience in Creating an Accessible Environment for Persons with Disabilities and other Groups with Limited Mobility

In various regions and countries such as Europe, Israel, the USA, New Zealand, Argentina, and Brazil specialized portals have been established for people with disabilities to facilitate their travel and enable them to plan their own trips independently. Alongside the pan-European accessible tourism portal (https://accessibleurope.com/), many countries have launched their own websites detailing the accessibility of local tourist sites: the UK (disabledgo.com and accessibleplaces.co.uk), Italy (accessibleitaly.com), France (accessiblefrance.com and accessibleparis.org), Israel (israel4all.com), and others. The UK has achieved the greatest success in developing accessible environments and promoting barrier-free tourism among its citizens. National accessibility standards for the tourism industry, developed by British experts, are considered among the best in the world. As a result of implementing these standards, over 2.5 million citizens with disabilities now travel across the United Kingdom annually. International practice in accessible tourism employs several models for developing and structuring tourism products:

– independent travel by individuals with disabilities;

– travel involving companions such as family members, caregivers, friends, etc.;

– accompaniment by volunteers or paid companions sponsored by charitable organizations;

– travel with individuals who accompany a tourist with a disability in exchange for significantly lower costs. Analysis of practical experience indicates that these companions are predominantly students or young people aged 19–24 with limited financial means [3; 9; 55].

Globally, the most common practice involves travel accompanied by family members. However, group travel arrangements organized in pairs where one tourist accompanies another with a disability are becoming

increasingly common; in this model, the companion purchases the trip at a significantly reduced price. A prime example is the British tour operator Traveleyes, which specializes in vacations for the visually impaired, attracting both visually impaired travelers and those who serve as their companions.

For instance, a six-day trip to Rome costs £899 for a person with a disability, while the companion pays £499 meaning the cost for the second traveler is nearly half that of the standard rate [14]. This approach allows families that include individuals with disabilities to significantly reduce travel expenses, as paying for the tour under this special scheme is far more cost-effective than purchasing two full-price packages. Furthermore, this format appeals to university students, who typically seek more budget-friendly vacation options [10; 13; 17].

At the same time, implementing such a model presents certain challenges. First and foremost, it requires the participation of two individuals. The first is the accompanying person, who assumes responsibility for the safety and support of the person with a disability during the trip. The second is the person being accompanied, who covers their own expenses as well as the cost difference or the portion of the fare associated with the discount granted to the accompanying person. Nevertheless, with proper organization, this arrangement opens up extensive travel opportunities, including active and even extreme forms of tourism.

According to an analytical study by D. Buhalis, people with health-related limitations account for more than 7% of global tourism traffic; consequently, accessible tourism is highly developed in Western countries. In Europe, approximately 11% of all tourists about 50 million people have health impairments; in the UK, this figure reaches 37%, and in Germany, 53% this despite the fact that people with physical disabilities generally lead less active lifestyles than the average citizen [18].

According to statistical data, travelers in this segment generally prefer to travel accompanied by friends or family members. In Western European countries, developing itineraries that cater to the needs of people with disabilities as well as designing universally accessible buildings and spaces has already become established practice. Many European nations are implementing specialized programs for people with physical disabilities and adapting the infrastructure of resorts and tourist destinations, while travel

companies are actively expanding their range of services. In particular, they offer specially designed tours tailored to the needs of this category of travelers. Experts note that the United Kingdom stands out among European countries, demonstrating a high level of development in inclusive tourism.

In countries with well-developed tourism industries, the concept of family leisure has become widespread, particularly regarding activities for people with disabilities, low-income populations, at-risk groups, and children. Cultural institutions – such as museums, theaters, and libraries – play a significant role in organizing meaningful leisure activities. Specialized services are being implemented for individuals with visual or hearing impairments; these include sign language tours, audio guides and recorded tour materials, visual signaling systems, and policies allowing guide dogs into museums and other cultural venues, as well as the organization of thematic events and social gatherings (such as holiday celebrations, children's programs, and social evenings).

A number of countries regularly host events and initiatives aimed at supporting people with disabilities. Nations such as Germany, France, Finland, and the USA, among others, are making significant efforts to support the daily lives of people with disabilities and to foster social tourism for this demographic.

Observations regarding social welfare for people with disabilities in the UK reveal the following: to ensure equal rights and opportunities, specially designed infrastructure is developed, and state funds are allocated not only to promote tourism for people with disabilities but also to create comfortable living conditions for them. The author also notes that annual disability benefit payments total approximately £19 billion equivalent to about UAH 1.11 trillion [39]. In the UK, people with physical disabilities receive discounts on medications, dental care, wheelchairs, and hearing aids, and in certain cases, they are provided with completely free care. Urban parking is also provided free of charge to citizens with disabilities. Individuals with disabilities pay for their housing using their pension which is applied toward their upkeep while the local municipality covers the remaining cost. Legislation concerning people with disabilities is so well-developed that approximately 19% of all employed Britons have a disability.

The level of accessibility for people with physical disabilities varies depending on the country and its level of socio-economic development.

An analysis of international experience allows us to identify the countries most advanced in terms of tourism accessibility. The Czech Republic, Germany, and Spain hold leading positions, with nearly 95% of their tourism infrastructure adapted for accessibility. These countries offer cultural and educational tourism, health and wellness tourism, skiing, scooter tourism, and intellectual tourism, as well as accessible trails and international festivals for people with disabilities. Next come Israel (85%), France (85%), the United Kingdom (85%), and the USA (80%), which also offer cultural and educational, beach, religious, health and wellness, skiing, scooter, and intellectual tourism. Australia (75%) and Finland (70%) rank third; the types of tourism available there include cultural and educational, eco-tourism, beach tourism, sailing, and diving. Hungary and Greece have an accessibility adaptation rate of nearly 65%, with a predominance of cultural and educational tourism (including for the visually impaired), beach tourism, and health and wellness tourism [3].

Inclusive social-rehabilitation tourism is emerging and actively developing in Ukraine; it entails a comprehensive set of measures aimed at creating conditions for the recovery and harmonious development of persons with disabilities. Its goal is to support physical well-being, spiritual growth, social integration, and intellectual development, as well as the realization of an individual's creative potential.

In terms of structure, this field encompasses various types of rehabilitation and social services – including medical, psychological, psycho-pedagogical, vocational, sports and fitness, physical, social, and daily living support measures – thereby ensuring a comprehensive approach to recovery and socialization [27].

3. Analysis of the Current State and Accessibility Issues Regarding Tourist Accommodation Infrastructure in Ukraine

One of the pressing issues in the operation of accommodation facilities is the provision of high-quality, safe, and comfortable service for guests with disabilities. The growing number of war veterans, persons with disabilities, and the elderly, combined with rising human rights standards, highlights the need to adapt hotel infrastructure and service processes in line with the principles of universal design and barrier-free accessibility.

It is worth noting that domestic hotel and restaurant businesses are increasingly creating accessible infrastructure that addresses the inclusive needs of various guest categories. Many Ukrainian cities are implementing barrier-free features: installing ramps and lifts, lowering curbs, laying tactile paving for the visually impaired, and setting up traffic lights with audio signals. Such changes help improve the accessibility of urban spaces and foster a positive image of Ukraine as a socially responsible tourism destination committed to the principles of inclusion.

Significant attention is also paid to improving information accessibility. In particular, specialized interactive resources – such as accessibility maps – are in operation, enabling persons with disabilities to quickly locate barrier-free facilities. These platforms display establishments and infrastructure across cities and regions, indicating their accessibility levels, which facilitates travel planning and the use of tourism services [27].

The State Agency for Tourism Development, in cooperation with regional civil-military administrations, conducted a survey on the physical accessibility of accommodation facilities across Ukraine's regions. The survey results are presented in Tables 2 and 3. A total of 6,394 tourism entities participated in the survey, comprising 3,537 hotels, 2,116 recreation centers, 261 health resort facilities, and 445 motels and campsites [15]. The level of inclusivity of the accommodation facilities was assessed using a checklist covering 17 accessibility criteria outlined in the "Methodological Recommendations on Establishing Barrier-Free Environments in Tourism." These recommendations were approved by the Ministry for Communities, Territories and Infrastructure Development of Ukraine and published on the State Agency for Tourism Development's website [29].

Table 2

Results of the survey on the physical accessibility of accommodation facilities

Questions and Answers	Yes	Part	No
Accessible universal toilet cabin	22,55%	22,53%	51,92%
Fully equipped room	22,98%	32,40%	44,62%

Source: compiled based on [27; 29; 48]

The issue with accommodation facilities is that over 50% lack a universal restroom. Survey results indicate that only 19% of accommodation establishments in Ukraine have ramps installed at their entrances. While 28% are equipped with elevators, only 2% of these feature audible signals and Braille floor indicators.

Table 3

Accessibility indicators for the site, building, and additional inclusive elements

Group of indicators	Indicator	Yes, %	Part, %	No, %
Access to the site and building	Barrier-free entrance	42,83	29,39	27,78
	Entrance ramp	18,73	21,20	60,07
	High-contrast markings	23,50	15,08	60,92
	Safe stairs	29,55	31,44	39,01
	Lifting mechanisms	3,91	4,85	91,24
Elevators	Elevator with Braille markings	1,90	3,86	94,25
	Elevator is operational	27,66	1,60	70,74
Additional accessibility elements	Parking spaces for people with disabilities	55,59	12,40	32,01
	International accessibility symbols	23,99	37,36	38,66
	Braille signage	21,25	29,88	48,87
	Accessible evacuation routes	16,34	28,25	55,41
	Accessible security system	21,80	21,07	57,13
	Accessible website	23,84	23,74	52,43
	Knowledgeable staff	66,44	8,98	24,57

Source: compiled based on [27; 29; 53]

The issue with accommodation facilities is that over 50% lack a universal restroom. Survey results indicate that only 19% of accommodation establishments in Ukraine have ramps installed at their entrances. While 28% are equipped with elevators, only 2% of these feature audible signals and Braille floor indicators.

Only 23% of the surveyed establishments offer rooms adapted for people with disabilities, and 26% have universal restrooms. 16% of the facilities reported having accessible evacuation routes for people with disabilities, while 24% indicated the use of international accessibility symbols. The

highest accessibility ratings were recorded in just three areas: barrier-free site access (43%), dedicated parking spaces for people with disabilities (nearly 56%), and staff awareness regarding the rules and etiquette for accommodating people with limited mobility (66%).

The results indicate that the level of accessibility in Ukrainian accommodation facilities is fragmented and unsystematic. While isolated elements of inclusivity are often present, a comprehensive approach to creating a fully barrier-free environment is lacking.

The primary issues include:

– non-compliance with regulatory requirements;

– inadequate technical equipment;

– a lack of comprehensive building modernization;

– weak oversight regarding the implementation of accessibility standards.

Future prospects for developing inclusive services in Ukrainian accommodation facilities depend on strengthening state policies on barrier-free access, implementing European accessibility standards, and increasing corporate social responsibility. Given current circumstances – specifically the challenges posed by the war and the rising number of individuals with temporary or permanent health impairments – creating a universally accessible environment has become a matter of strategic importance [3].

Key prospects include:

– improving the regulatory framework and strengthening oversight regarding compliance with state building codes for barrier-free access;

– modernizing hotel facilities and infrastructure, and implementing universal design principles during renovation and new construction;

– enhancing digital accessibility, specifically by adapting hotel websites, online booking systems, and information resources;

– training staff to assist guests with various types of disabilities;

– leveraging international experience and investment, and participating in grant programs for the development of inclusive infrastructure.

In the long term, the development of inclusive accommodation facilities will not only boost the competitiveness of Ukraine's tourism industry but also integrate principles of social equality into business operations. This will expand the target audience for tourism services, improve service quality, and ensure the realization of the right to accessible leisure and travel.

4. Promising Directions for the Development of Inclusive Tourism in Ukraine and Ways to Implement them Through the Creation of an Accessible Environment

Currently, approximately 15% of the global population lives with health-related limitations [30; 46]. The number of such individuals is rising annually, driven by population aging and the increasing prevalence of chronic diseases. In Ukraine, the war is undoubtedly a critical factor contributing to the growth of this demographic. It is necessary to develop new tours or adapt existing ones to meet the needs of people with disabilities [24; 51]. To this end, the authors propose classifying inclusive tours based on the most viable travel options.

In terms of duration, the most suitable options are: 1) one-day sightseeing tours (allowing travelers to explore their local area or visit a neighboring region of Ukraine); 2) weekend tours (enabling quick trips to adjacent or nearby regions of Ukraine); and 3) tours or travel programs lasting up to two weeks (allowing for travel to any region of the country or abroad).

This classification presents tours best suited for people with special needs. Extending the duration may lead to increased fatigue and diminish the overall impression of the trip.

Among the various types of tourism, cultural-educational, recreational-wellness, gastronomic, event-based, and museum-focused tours are likely to be in highest demand among travelers with special needs. Niche forms of tourism – such as caving, urban exploration ("stalking"), and animal-assisted travel – can also meet their requirements. In terms of organization within Ukraine, inclusive tours can be categorized as either organized or independent, as well as individual or group-based.

Attention should be paid to the specific tour program and its nature. Experience shows [11; 12; 56] that not all routes can be adapted to the needs of people with disabilities. Therefore, these tours should be classified as follows: 1) universal (suitable for all traveler groups, with no significant limitations); 2) conditionally universal (suitable for general travelers and the majority of tourists with special needs); and 3) specialized (designed for a specific subset of tourists with special needs).

"Universal" tours are defined as those that include visits to city museums, theaters, galleries, religious sites, and exhibition complexes. This category also encompasses trips to health and wellness facilities, visits to parks and

gardens, culinary tours, and the like. "Conditionally universal" inclusive tours involve certain limitations and are not suitable for all tourists with special needs; for instance, some routes in national parks may be inaccessible to wheelchair users, and they might not be able to fully view the exhibits in certain large museums. "Specialized" inclusive tours involve designing an itinerary tailored to a specific group of tourists with special needs. Organizing such tours entails additional costs. For example, appropriate supplementary materials must be prepared for visually impaired tourists; these might include scale models of buildings described during the tour, tactile replicas of objects, or relief images that mirror the originals. It is important to engage other senses – such as allowing tourists to smell fabrics, paints, or wood. Culinary tours are highly sought after by this group, as they offer the chance to taste national dishes and participate in their preparation. Workshops on crafting souvenirs from clay, fabric, or other materials enable visually impaired tourists to gain new experiences and impressions (sensory tourism). Careful attention should also be paid to route planning, selecting sites equipped with special features such as tactile paving, Braille signage, and other accessibility aids.

The use of interactive technologies is set to become a key driver for the development of inclusive tourism, both during the war and in the post-war period. For instance, the authors propose supplementing physical travel with virtual experiences for tourist groups with limited mobility. Attractions that are not physically accessible can be made available through VR technology, allowing visitors to gain a comprehensive understanding of the location. Virtual tours can be accessed on-site or via a dedicated app, enabling tourists with special needs to explore accessible walking routes, understand the local accessibility infrastructure, learn about tours and events, and read reviews. It is also important to equip tourist information centers with interactive kiosks that provide comprehensive regional information – such as natural features, landmarks, transport routes, and potential hazards. These technologies will be particularly beneficial for individuals with visual or hearing impairments.

It is also worth focusing on gamified elements in tourism, as they have recently gained significant popularity. An analysis has identified the interactive tour formats best suited for inclusive tourism [7; 38; 40]. Tourists with special needs can participate in costumed tours, theatrical

experiences, game-based excursions, and workshops. To immerse oneself in a historical atmosphere, full period costumes are not required; simply using a single accessory – such as a fan, a hat, or a saber – suffices. This approach is easily accessible to all tourists, regardless of the nature or severity of their health limitations [2; 19]. Theatrical tours are accessible to a wide range of tourists. The format varies: the entire group, a portion of it, or solely the tour guide may be involved in the theatrical performance. Interactive, game-based tours are also engaging and educational; notable examples include searching for ancient relics, collecting code words and numbers, and solving rebuses, puzzles, and crosswords. All these formats play a significant role in fostering social interaction by facilitating informal communication and the exchange of ideas; they are suitable for all age groups, allow for a detailed study of the tour sites, and can be organized either indoors or outdoors.

Geocaching is one of the most popular types of tourism-based games that can boost interest in a destination (and it is accessible to tourists with health limitations). For instance, after collecting artifacts related to a specific site, tour participants place them in a cache box along with a task for the next game; they then hide the box in a secluded spot and mark its coordinates on an interactive map. The following group locates the treasure and begins the game. This activity has existed globally for over two decades yet remains highly relevant [22]. Participants can include tour groups, solo travelers, and families with children; the game can also be incorporated into corporate events. Caches can be set up in open areas or within museums, fortresses, or other tourist attractions.

In general, many tours either lack interactive elements or limit them to workshops, which is insufficient for organizing inclusive tours [32]. Tourists quickly lose interest when relegated to the role of passive listeners – negatively affecting their overall impression of the tour – so it is crucial to encourage active participation, allow them to discover answers for themselves, and create opportunities for them to unleash their creative potential.

Quest tourism represents a promising avenue for inclusive tourism, though its development across Ukraine's regions requires addressing a wide range of challenges. The country boasts numerous venues offering gaming entertainment and quests; notably, the quest market in major cities grew by

20–30% in 2025, with demand rising by 30%. Kyiv and Lviv lead in the number of quest rooms [5; 43]. These cities offer diverse quest formats, including immersive performance-based quests and virtual reality (VR) experiences. However, due to the ongoing war, not all Ukrainian regions can currently demonstrate such impressive results. Overall, there is a need to expand the network of quest rooms and create safe gaming spaces accessible to tourists with special needs. It is crucial to ensure barrier-free access to quest rooms for this group, create comfortable environments, and implement adaptations such as accessible restrooms, widened doorways, and special handrails [36]. Implementing these measures is difficult during wartime, as many quest rooms are located in basements or buildings lacking elevators. Opening new venues or retrofitting existing ones entails significant financial costs, and achieving a return on investment is a lengthy process. Market research has also identified a shortage of qualified personnel [21]. Quest tourism offers travelers a vast array of scenarios and themes, as well as a wide variety of implementation formats. Yes, tourists with disabilities can be offered the opportunity to visit escape rooms or go on a quest-style tour.

The authors believe that event tourism could become a promising avenue for the development of inclusive tourism. Designing such tours requires a specialized approach and additional expenditure from organizers. To date, modern academic literature lacks a clear definition that fully captures the specific nature of these tours; therefore, we propose the following interpretation: an inclusive event tour is defined as a trip undertaken by a tourist or a group of tourists with disabilities to a specific locality or destination for the purpose of attending a particular event. Inclusive event tours can be categorized by scale into: international (events of global renown, such as the Olympic Games, the Brazilian Carnival, or the Cannes Film Festival); national (events of state significance, such as ethno-festivals, culinary celebrations, arts events, and concerts); and regional (events significant to a specific locality, such as Transcarpathian wine tours, Lviv jazz festivals, Hutsul ethnic events, or sporting events in Dnipro).

Inclusive tours can also be classified according to the following spheres: 1) the business sphere (congress tourism, international trade fairs and exhibitions); 2) the cultural sphere (festivals, tours involving visits to exhibitions, fashion shows, auctions, theatrical productions, musical

performances, educational tours, etc.); 3) the sports sphere (tours involving attendance at international sports competitions, tournaments, regattas, and races of various levels); and 4) the spiritual sphere (tours timed to coincide with specific religious holidays).

Overall, both during and after the war, the development of inclusive event tourism will help stabilize the revenue of tourism organizations, as this sector addresses the issue of seasonal fluctuations in leisure travel. The number of engaging events in our country is growing year by year [27; 49] – with new festivals and productions emerging and new performing artists rising to fame – making the potential of this type of tourism virtually limitless. It is worth noting that many concert, sports, and arts venues are prepared to accommodate tourists with special needs (this applies primarily to the country's major cities, which saw high tourist traffic in the pre-war years).

Inclusive event tourism will have a significant impact on the economy of a given region by stimulating activity within the tourism industry and fostering the development of related sectors. The growth of inclusive event tourism will enable many travelers to attend their favorite events after the war and connect with like-minded people.

Organizing inclusive event tours requires meeting several conditions, such as: 1) the existence of an accessible environment; 2) heightened safety standards for tourists with special needs; 3) the proximity of accommodation and dining facilities to event venues; 4) the availability of specially adapted transport; 5) the presence of accompanying persons; 6) the availability of specially trained staff capable of meeting tourists' needs (including sign language proficiency); and 7) the capacity to provide additional services.

It should also be noted that the intensity of inclusive event tourism is influenced by the schedule of mass events in the region. An event calendar can greatly simplify the process of finding a specific event and determining when it takes place. Based on this information, one can book transport tickets and accommodation in advance. Hotels, hostels, and apartments must be prepared to accommodate guests with special needs.

CONCLUSIONS

Today, the absence of barriers in the tourism and hospitality sectors is a crucial condition for ensuring accessible and comfortable travel for

all segments of the population. Even amidst a protracted war, there is a growing public understanding of the need to guarantee equal rights and create non-discriminatory living conditions for persons with disabilities. This category encompasses individuals with physical impairments – such as those affecting the musculoskeletal system, hearing, or vision – as well as those with mental disorders resulting from either congenital conditions or the aftermath of traumatic events.

Every nation implements socio-economic policies to support persons with disabilities, tailored to its own level of development, available resources, and strategic priorities. At the same time, the principles of inclusion and the creation of a barrier-free environment require a unified and regulated approach. In Ukraine, this trend is reflected in the implementation of state building codes and standards that mandate the incorporation of inclusive requirements during the design and development of tourism infrastructure.

In the post-war period, when planning tourism routes, priority should be given to regions with favorable climatic conditions; furthermore, the development of specialized cultural and leisure programs must take into account the specific needs of tourists with visual and hearing impairments. Addressing the challenges of developing inclusive event tourism requires securing funding for infrastructure projects, supporting volunteer organizations and specialized services, providing staff training, and integrating these initiatives into regional development strategies (including for the temporarily occupied territories of Ukraine). Overall, the development of inclusive tourism in our country is in its early stages. Much remains to be done to ensure that every region is prepared to welcome tourists with special needs. This sector has the potential to create new jobs and serve as a source of post-war income for local residents. It is crucial to develop the necessary documentation – including programs, regulations, and projects – aimed at creating a barrier-free environment. Addressing this challenge requires the involvement of both the business community and local authorities. Further research into this partnership is essential for the sustainable development of tourism.

References:

1. Baida, L. Yu., & Krasiukova-Enns, O. V. (Eds.). (2012). *Invalidnist ta suspilstvo* [Disability and society]. Kyiv.

2. Barna, N., & Korotieieva, A. (2020). *Inkliuzyvno-reabilitatsiinyi turyzm* [Inclusive and rehabilitation tourism]. University "Ukraina".

3. Barna, M. Yu., & Tuchkovska, I. I. (2020). Bezbarierner seredovyshche dlia osib z invalidnistiu v turyzmi [Barrier-free environment for persons with disabilities in tourism]. *Visnyk LTEU. Ekonomichni nauky* [Bulletin of LTEU. Economic Sciences], (61). DOI: https://doi.org/10.36477/2522-1205-2020-61-01

4. Barskyi, Yu., Bakota, D., & Yerko, I. (2021, April 7). *Dostupnyi (inkliuzyvnyi) turyzm: osnovni poniattia* [Accessible (inclusive) tourism: Basic concepts]. Available at: https://konfgeolutsk.wordpress.com/2021/04/07/%d0%b4%d0%be%d1%81%d1%82%d1%83%d0%bf%d0%bd%d0%b8%d0%b9-%d1%96%d0%bd%d0%ba%d0%bb%d1%8e%d0%b7%d0%b8%d0%b2%d0%bd%d0%b8%d0%b9-%d1%82%d1%83%d1%80%d0%b8%d0%b7%d0%bc-%d0%be%d1%81-%d0%bd%d0%be%d0%b2%d0%bd/

5. Bezkhlibna, A., Kuklina, T., & Zhuravliova, S. (2025). Strategic prospects for enhancing the competitiveness of Ukraine's restaurant business under martial law conditions. *Economic Space*, (201), 14–21. DOI: https://doi.org/10.30838/EP.201.14-21

6. Bezugla, L., Bieloborodova, M., & Herasymenko, T. (2022). Formuvannia inkliuzyvno-reabilitatsiinoho turyzmu v Ukraini [Formation of inclusive and rehabilitation tourism in Ukraine]. *Innovatsii ta tekhnolohii v sferi posluh i kharchuvannia* [Innovations and Technologies in the Sphere of Services and Food], (2(6)), 20–25. DOI: https://doi.org/10.32782/2708-4949.2(6.2022.4

7. Bezugla, L., Kuvayeva, T., & Herasymenko, T. (2022). Problemy ta perspektyvy rozvytku inkliuzyvnoho turyzmu v Ukraini ta Yevropi [Problems and prospects for the development of inclusive tourism in Ukraine and Europe]. *Ekonomika ta suspilstvo* [Economy and Society], (43). DOI: https://doi.org/10.32782/2524-0072/2022-43-3

8. Buhalis, D., & Moldavska, I. (2021). Voice assistants in hospitality: Using artificial intelligence for customer service. *Journal of Hospitality and Tourism Technology*, 13(3), 386–403. DOI: https://doi.org/10.1108/JHTT-03-2021-0082

9. Byelikova, M., & Bezkhlibna, A. (2025). The competitiveness of the region's ecosystem: The digitalization and tourism. In *Sustainable Development in Economics, Technology and Environmental Engineering* (pp. 177–186). Springer. DOI: https://doi.org/10.1007/978-3-031-91953-4_17

10. Byelikova, M., Bezkhlibna, A., Polyezhayev, Yu., Zaytseva, V., & Pukhalska, H. (2023). Informational and digital business security in tourism as a component of the coastal region competitiveness. In *Data-Centric Business and Applications: Modern Trends in Financial and Innovation Data Processes* (Vol. 1, pp. 117–145). Springer.

11. Chaika, S. (2022). Yevropeiski praktyky inkliuzyvnoho turyzmu: dosvid dlia Ukrainy [European practices of inclusive tourism: Experience for Ukraine]. *Visnyk Lvivskoho universytetu. Seriia filos.-politoloh. studii* [Bulletin of Lviv University. Series Philosophical and Political Studies], (43), 189–196. DOI: https://doi.org/10.30970/PPS.2022.43.24

12. Danchevska, I., & Kalaitan, T. (2024). Inkliuzyvnyi turyzm: svitovyi dosvid ta perspektyvy rozvytku v Ukraini [Inclusive tourism: World experience and development prospects in Ukraine]. *Development Service Industry Management*, (2), 96–104. DOI: https://doi.org/10.31891/dsim-2024-6(14

13. Darcy, S., & Dickson, T. (2009). A whole-of-life approach to tourism: The case for accessible tourism experiences. *Journal of Hospitality and Tourism Management*, 16(1), 32–44. DOI: https://doi.org/10.1375/jhtm.16.1.32

14. Derzhavne ahentstvo rozvytku turyzmu Ukrainy. (2025a, July 8). *Podatkovi nadkhodzhennia vid turyzmu zrosly na tretynu za pershe pivrichchia 2025 roku – industriia splatyla bilshe pivtora milyarda hryven* [Tax revenues from tourism grew by a third in the first half of 2025 – the industry paid more than 1.5 billion UAH]. Available at: https://www.tourism.gov.ua/blog/podatkovi-nadhodzhennya-vid-turizmu-zrosli-na-tretinu-za-pershe-pivrichchya-2025-roku-industriya-splatila-bilshe-pivtora-milyarda-griven

15. Derzhavne ahentstvo rozvytku turyzmu Ukrainy. (2025b, July 12). *U 2024 turystychna sfera Ukrainy prynesla v biudzhet maizhe 3 mlrd hrn* [In 2024, Ukraine's tourism sector brought almost 3 billion UAH to the budget]. Available at: https://www.tourism.gov.ua/blog/u-2024-turistichna-sfera-ukrayini-prinesla-v-byudzhet-mayzhe-3-mlrd-grn

16. Didukh, Ya. (2025). Rozvytok inkliuzyvnoho turyzmu v umovakh pisliavoiennoi transformatsii Ukrainy [Development of inclusive tourism in the conditions of post-war transformation of Ukraine]. *Ekonomika ta suspilstvo* [Economy and Society], (73). DOI: https://doi.org/10.32782/2524-0072/2025-73-39

17. Gursoy, D., Chi, O. H., Lu, L., & Nunkoo, R. (2021). Consumers acceptance of artificially intelligent (AI) device use in service delivery. *International Journal of Information Management*, 59, Article 102302. DOI: https://doi.org/10.1016/j.ijinfomgt.2021.102302

18. Inkliuzyvnyi turyzm yak vyd suchasnoho spetsializovanoho turyzmu [Inclusive tourism as a type of modern specialized tourism]. (n.d.). Available at: https://ecoacademy.org.ua/sites/default/files/theme_files/prezentaciya_1_inklyuzyvnyy_turyzm_v_ukrayini_.pdf

19. Ivanov, S., Webster, C., & Berezina, K. (2021). Adoption of robots and service automation by tourism and hospitality companies. *Revista Turismo & Desenvolvimento*, 37, 27–42.

20. Khrushch, Yu. M., Ivanova, V. M., & Medvedskyi, R. S. (2017). Turyzm dlia invalidiv: suchasni pidkhody do vyznachennia poniattia [Tourism for disabled people: Modern approaches to defining the concept]. *Naukovyi visnyk Khersonskoho derzhavnoho universytetu* [Scientific Bulletin of Kherson State University], (6), 206–211.

21. Kostynets, V. (2025). Inkliuzyvnyi turyzm v Ukraini: vyklyky ta mozhlyvosti v umovakh voiennoho ta pisliavoiennoho periodu [Inclusive tourism in Ukraine: Challenges and opportunities in the period of war and post-war period]. *Aktualni problemy ekonomiky* [Actual Problems of Economics], 2(1), 177–182. DOI: https://doi.org/10.32752/1993-6788-2025-2-283-177-182

22. Kravchenko, O., & Voitovska, A. (2022). *Inkliuzyvnyi turyzm* [Inclusive tourism]. TsP Komprynt.

23. Kuklina, T., Tsviliy, S., & Zhuravlova, S. (2022). Zahalni tendentsii rozvytku svitovoho turyzmu: vid koronavirusu do viiskovoi ahresii [General trends in the development of global tourism: From coronavirus to military aggression]. *Pidpryiemnytstvo ta innovatsii* [Entrepreneurship and Innovation], (23), 12–15.

24. Ladonko, L., & Pereverzieva, A. (2021). Poniatiino-terminolohichni osnovy inkliuzyvnoho turyzmu yak novoho napriamu rozvytku rehionalnoi ekonomiky [Conceptual and terminological foundations of inclusive tourism as a new direction for the development of regional economy]. *Ekonomika ta suspilstvo* [Economy and Society], (28). DOI: https://doi.org/10.32782/2524-0072/2021-28-51

25. Li, J., Bonn, M. A., & Ye, B. H. (2021). Hotel employee's artificial intelligence and robotics awareness and its impact on turnover intention. *Tourism Management*, 85, Article 104322. DOI: https://doi.org/10.1016/j.tourman.2021.104322

26. Marusei, T. V. (2025). Bezbariernist v turyzmi ta hostynnosti v umovakh siohodennia: rehionalnyi aspekt [Barrier-freeness in tourism and hospitality today: Regional aspect]. *Ahrosvit*, (8), 147–153. DOI: https://doi.org/10.32702/2306-6792.2025.8.147

27. Motsa, A. A., Korinets, R. Ya., & Horiunova, K. A. (2024). Perspektyvy rozvytku turyzmu dlia liudei z invalidnistiu pislia zakinchennia rosiisko-ukrainskoi viiny [Prospects for the development of tourism for people with disabilities after the end of the Russian-Ukrainian war]. *Akademichni vizii* [Academic Visions], (33), 1–8. DOI: https://doi.org/10.5281/zenodo.13268295

28. OpenDataBot. (2025, July 10). *U pershomu pivrichchi 2025 roku turystychnyi zbir zris na 33%* [In the first half of 2025, tourist tax grew by 33%]. Available at: https://opendatabot.ua/analytics/tourist-fee-2025

29. Opytuvannia DART: tilky 23% zasobiv rozmishchennia v Ukraini maiut nomery, obladnani dlia osib z invalidnistiu [DART survey: Only 23% of accommodation facilities in Ukraine have rooms equipped for persons with disabilities]. (n.d.). State Agency for Tourism Development of Ukraine. Available at: https://www.tourism.gov.ua/blog/opituvannya-dart-tilki-23-zasobiv-rozmishchennya-v-ukrayini-mayut-nomeri-obladnani-dlya-osib-z-invalidnistyu

30. Petrunchak, D., Banieva, I., & Matviienko, S. (2025). Sotsialni aspekty inkliuzyvnoho turyzmu: udoskonalennia dostupnosti hotelno-restorannoho sektoru v Ukraini [Social aspects of inclusive tourism: Improving accessibility of the hotel and restaurant sector in Ukraine]. *Infrastruktura rynku* [Market Infrastructure], (83), 325–331. DOI: https://doi.org/10.32782/infrastruct83-57

31. Ribas Hotels Group. (2024, August 28). *Turyzm v Ukraini: pidsumky ta perspektyvy rozvytku u 2024 rotsi* [Tourism in Ukraine: Results and development prospects in 2024]. Available at: https://ribashotelsgroup.ua/blog/6313/

32. Rohovska, O., & Tsarok, A. (2024). Inkliuzyvnyi turyzm yak zasib sotsialnoi reabilitatsii osib z invalidnistiu [Inclusive tourism as a means of social rehabilitation of persons with disabilities]. *Vìsnyk Pryazovs'koho derzhavnoho tekhnichnoho universytetu* [Reporter of the Priazovskyi State Technical University], 1(12). DOI: https://doi.org/10.31498/2617-2038.2024.12.320562

33. Samara, D., Magnisalis, I., & Peristeras, V. (2020). Artificial intelligence and big data in tourism: A systematic literature review. *Journal of Hospitality and Tourism Technology*, 11(2), 343–367. DOI: https://doi.org/10.1108/JHTT-12-2018-0118

34. Sazonets, O. M., & Hessen, A. Ye. (2025). Standarty formuvannia bezbarierho prostoru v hoteliakh Ukrainy na osnovi inkliuzyvnykh pidkhodiv [Standards of barrier-free space formation in Ukrainian hotels based on inclusive approaches]. *Ahrosvit*, (7), 27–32. DOI: https://doi.org/10.32702/2306-6814.2025.7.27

35. Skilky-Skilky. (2024, July 15). *U I pivrichchi 2024 roku v Ukrainu viikhalo 1,19 mln inozemtsiv* [In the 1st half of 2024, 1.19 million foreigners entered Ukraine]. Available at: https://skilky-skilky.info/u-i-pivrichchi-v-ukrainu-v-ikhalo-7-6-tysiachi-rosiian

36. Skrypnyk, A., & Kucherov, H. (2024). Inkliuzyvnyi turyzm yak zasib reabilitatsii osib iz osoblyvymy potrebamy: teoretychnyi skladnyk mekhanizmu [Inclusive tourism as a means of rehabilitation of persons with special needs: Theoretical component of the problem]. *Inkliuziia i suspilstvo* [Inclusion and Society], (3(8)), 72–79. DOI: https://doi.org/10.32782/2787-5137-2024-3-10

37. Slatvinska, L. (2020). Perspektyvy rozvytku inkliuzyvnoho turyzmu v Ukraini [Prospects for the development of inclusive tourism in Ukraine]. *Derzhavne upravlinnia: udoskonalennia ta rozvytok* [Public Administration: Improvement and Development], (5). DOI: https://doi.org/10.32702/2307-2156-2020.5.59

38. Tkach, U., & Danylenko-Kulchytska, V. (2024). Inkliuzyvnyi turyzm yak faktor sotsialnoi intehratsii: suchasni pidkhody ta vyklyky u zabezpechenni dostupnosti turystychnykh posluh dlia osib z invalidnistiu [Inclusive tourism as a factor of social integration: Modern approaches and challenges in ensuring the accessibility of tourist services for persons with disabilities]. *Inkliuzyvna ekonomika* [Inclusive Economics], (4(6)), 41–46. DOI: https://doi.org/10.32782/inclusive_economics.6-6

39. Topalova, O. I. (2016). *Suspilno-heohrafichni peredumovy ta perspektyvy rozvytku adaptyvnoho turyzmu v Ukraini* [Socio-geographical prerequisites and prospects for the development of adaptive tourism in Ukraine] [Doctoral dissertation summary, Taras Shevchenko National University of Kyiv].

40. Trunina, I., & Sosnovska, Yu. (2019). Stan mizhnarodnoho turyzmu dlia osib z invalidnistiu v Ukraini [The state of international tourism for persons with disabilities in Ukraine]. *Modern Economics*, 15(2019), 191–195. DOI: https://doi.org/10.31521/modecon.V15(2019)-27

41. Trusova, N. V., & Tsviliy, S. M. (2022). Bezpechnyi stan innovatsiinoho rozvytku turystychnoi industrii v ekonomichnii systemi derzhavy [Secure state of innovative development of the tourism industry in the economic system of the state]. *Economy and Society*, (45). DOI: https://doi.org/10.32782/2524-0072/2022-45-75

42. Trusova, N. V., & Tsviliy, S. M. (2023). Stiikyis bezpechnyi innovatsiinyi rozvytok u vitchyznianii terytorialnii turystychnii destynatsii [Sustainable safe innovative development in the domestic territorial tourist destination]. *Intellect XXI*, (2), 42–50. DOI: https://doi.org/10.32782/2415-8801/2023-2.7

43. Tsviliy, S. (2023a). Analiz i otsinka instrumentiv stymuliuvannia rozvytku investitsiinoho potentsialu turystychnoi industrii [Analysis and evaluation of tools to stimulate the development of investment potential of the tourism industry]. *Sustainable Development of Economy*, (1), 149–154. DOI: https://doi.org/10.32782/2308-1988/2023-46-21

44. Tsviliy, S. (2023b). Metodychnyi pidkhid do kompleksnoi otsinky rozvytku investytsiinoho potentsialu industrii turyzmu [Methodological approach to a comprehensive assessment of the development of the investment potential of the tourism industry]. *Intelekt XXI* [Intellect XXI], (4), 53–64. DOI: https://doi.org/10.32782/2415-8801/2023-4.10

45. Tsviliy, S. (2024). Konstruktyvna model realizatsii potentsialu industrii turyzmu Ukrainy v yevropeiskomu heoekonomichnomu prostori [Constructive model of realizing the potential of Ukraine's tourism industry in the European geoeconomic space]. *Zbirnyk naukovykh prats TDATU imeni Dmytra Motornoho (ekonomichni nauky)* [Collection of Scientific Papers of TSAU named after Dmytro Motornyi (Economic Sciences)], (1(50)), 57–69. DOI: https://doi.org/10.32782/2519-884X-2024-50-7

46. Tsviliy, S., Gurova, D., & Bulatov, S. (2020). Reserves for reduction of labor capacity of hotel and restaurant product and their effective use in the enterprise personnel management system. *Market Infrastructure*, (47), 123–128.

47. Tsviliy, S., Gurova, D., & Kuklina, T. (2021). Research of the specifics of providing tourist education in the latest conditions: Marketing approach. In *Role of science and education for sustainable development* (Monograph, Part 2.13, pp. 252–266). University of Technology, Katowice.

48. Tsviliy, S., Korniienko, O., Mamotenko, D., Hres-Yevreinova, S., & Gurova, D. (2024). Transformation of the tourism industry in the context of the development of digital technologies. In I. Tatomyr & L. Kvasnii (Eds.), *Green and digital economic transformation: A synthesis of the future* (Monograph, pp. 172–187). Oktan Print. DOI: https://doi.org/10.46489/gadetas-24-47

49. Tsviliy, S. M., Kuklina, T. S., & Zhylko, O. V. (2022). Organizatsiini komponenty v upravlinni biznesom vitchyznianoho turystychnoho pidpryiemstva [Organizational components in business management of a domestic tourism enterprise]. *Economy and Society*, (36). Available at: https://economyandsociety.in.ua/index.php/journal/article/view/1168

50. Tsviliy, S., Vasylychev, D., & Gurova, D. (2020). Introduction of process management into the management system of the tourist company on the basis of informatization of business processes. In M. Gawron-Lapuszek & A. Karpenko (Eds.), *The role of technology in the socio-economic development of the post-quarantine world* (Monograph, pp. 37–46). Katowice.

51. Tsviliy, S. M., Vasylychev, D. V., & Gurova, D. D. (2020). Improvement of the qualification of small and micro-enterprise staff in the crisis conditions of business transformation. *Economic Bulletin of the Ukrainian State University of Chemical Technology*, (1), 50–60.

52. Tyshchenko, S. V., Chernyshova, T. M., & Osipchuk, A. S. (2021). Turyzm yak zasib psykholohichnoi ta sotsialnoi pidtrymky hrup ryzyku ta liudei z

osoblyvymy potrebamy [Tourism as a means of psychological and social support for risk groups and people with special needs]. *Ekonomika ta upravlinnia natsionalnym hospodarstvom* [Economics and Management of the National Economy], (51), 73–81. DOI: https://doi.org/10.32743/infrastruct51-11

53. UNIAN. (2025, July 5). *V Ukraini pid chas viiny rekordnymy tempamy vidnovliuietsia turystychna haluz* [In Ukraine, during the war, the tourism industry is recovering at record rates]. Available at: https://www.unian.ua/tourism/news/v-ukrajini-pid-chas-viyni-rekordnimi-tempami-vidnovlyuyetsya-turistichna-galuz-13126254.html

54. Vlashchenko, N. M. (2018). Problemy ta perspektyvy rozvytku infrastruktury dlia potreb inkliuzyvnoho turyzmu [Problems and prospects for the development of infrastructure for the needs of inclusive tourism]. *Biznes Inform* [Business Inform], (9), 122–126. Available at: http://jnas.nbuv.gov.ua/article/UJRN-0000934384

55. Yakubovskiy, S., & Kyrychenko, O. (2024). The role of digitalization in the development of the global tourism industry. *Visnyk ONU* [ONU Bulletin], 29(4), Article 15. DOI: https://doi.org/10.32782/2304-0920/4-102-15

56. Zakharov, D., & Kupach, T. (2024). Doslidzhennia mozhlyvostei stvorennia ta pidtrymky inkliuzyvnykh turystychnykh servisiv [Research into the possibilities of creating and supporting inclusive tourism services]. *Konstruktyvna heohrafiia ta ratsionalne vykorystannia pryrodnykh resursiv* [Constructive Geography and Rational Use of Natural Resources], (5(1)), 49–53. DOI: https://doi.org/10.17721/2786-4561.2024.5.1.-6/12

57. Zhurylo, M., Antonov, S., & Tkachek, V. (2024). Formuvannia inkliuzyvnoho turystychnoho seredovyshcha v Ukraini [Formation of an inclusive tourism environment in Ukraine]. *Ukrainskyi zhurnal prykladnoi ekonomiky ta tekhniky* [Ukrainian Journal of Applied Economics and Technology], 9(4), 288–291. DOI: https://doi.org/10.36887/2415-8453-2024-4-43

Izdevniecība “Baltija Publishing”
Avotu iela 8 k-1 – 25, Riga, Latvia, LV-1011
E-mail: office@baltijapublishing.lv

Iespiests tipogrāfijā SIA “Izdevniecība “Baltija Publishing”
Parakstīts iespiešanai: 2026. gada 30. oktobrī
Tirāža 300 eks.