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Rubna 716/24
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Východoevropské centrum
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IMPACT OF GLOBAL CHANGES AND DIGITALIZATION ON HUMAN RESOURCE MANAGEMENT SYSTEM

Nataliia Bieliaieva,
Ph.D. in Economics, Associate Professor,
State University of Trade and Economics, Ukraine,
nswork@ukr.net; ORCID: 0000-0001-8833-1493

Annotation. *The paper investigates the impact of global changes and digitalization on human resource management system. Based at the international experience it is researched that international companies have distinctive characteristics in HRM due to the various cultural, economic, and legal disparities among the countries in which they operate. When transitioning to an international level, companies must adhere to the rules of the international business game. It was stated that research by the "Deloitte" company has confirmed the impact of globalization on human resource management in Ukraine. It was formulated main tasks in HR Management, that are basic to the modern big business conduction, and on the base of it characterize the main trends of HRM digitalization. Among the main issues in the HR field, the need for developing future leaders and transferring knowledge to them is identified. It is described how digitization has a significant impact on the main HRM processes and formulated recommendations for the effective use of digital technologies in HRM system.*

Keywords: *global changes, digitalization, globalization, human resource management system, HRM, HRM system, HR capital, personnel management, employment, labor market, HR field, HRM processes.*

Problem statement. The impact of global changes on international business and HR management systems is a crucial concern in today's world. In the conditions of rapid development of digital technologies, personnel management is also undergoing significant changes. Changes in technology, market globalization and digitalization, political dynamics, and diverse cultural differences require companies to adapt to these new conditions and develop effective strategies for managing their HR capital. Digital technologies allow automating and optimizing many personnel management processes, as well as increasing the efficiency of interaction between employees and management.

Over the past 10 years, significant changes have occurred in the global business landscape. These changes encompass company mergers, acquisitions, and the reevaluation of intercompany relationships, rendering businesses more competitive on the international market. These transformations have also led to the establishment of overseas company branches, where both local and foreign employees work. This has necessitated the development of new HRM approaches that account for the diversity in global economic development, cultural differences, religious beliefs, values, social structures, and expectations.

The research objective. The purpose of this article is to study the impact of global

changes and digitalization on human resource management system and developing recommendations for the improving use of digital technologies in this process.

Literature review. Strohmeier S. [18] in his work references general literature on digital organizations to develop a terminology and typology of digital human resource management. The terminology and typology clarify the concept of digital human resource management and related concepts, uncover digital human resource management as an evolutionary advancement of previous conceptualizations of technology-based human resource management, and provide a conceptual basis for future work on digital human resource management.

Mohan T. [12] critically analyzes Digital HR in terms of where it is now (degree of alignment between external demands and internal capabilities), where it should be (future-focused HR technology strategy), and how it can reach there (implementation road map). As an example, Al-Alavi A.I. and others [1] discover the factors related to human resource (HR) digital transformation (DT) in Bahrain during coronavirus disease 2019 (COVID-19) and to analyze the impact of e-human resource management (e-HRM) on organizational performance. Johnson R. and others [8] have also presenting interesting research about investigating how hospitality and tourism organizations can use electronic human resource management (eHRM) and artificial intelligence (AI) to help recruit and select qualified employees, increase individual retention rates and decrease the time needed to replace employees.

It's interesting to note, that in 2011 E.Parry [13] in his own research was presenting results from a large-scale survey across 12 countries showed that e-HRM may help HR to increase its value by becoming more strategic, but found no evidence of cost savings due to reductions in HR headcount. This suggests that organizations are using e-HRM in order to redeploy HR practitioners from transactional work to more strategic and value-added activities. However, in 2023 Parry E. and Battista V. examine what the evidence is in relation to the impact of emerging technologies on work and the role of the human resource (HR) function in helping employees and organizations to navigate these changes. There are lots of existing researches in HR field, however it's always arisen new approaches on the base of continuous globalization changes, that is way the problem is still relevant.

Main results of the study. When transitioning to an international level, companies must adhere to the rules of the international business game. This entails managing diverse employees with varying knowledge and skills who collaborate together. Specialized management strategies are required to optimize personnel diversity for the creation of competitive products and services that can compete both locally and globally. For example, research conducted by major American companies indicates that organizations with diverse workforces generally achieve better results [13].

International companies have distinctive characteristics in HRM due to the various cultural, economic, and legal disparities among the countries in which they operate [7]. For instance, people from different countries may respond differently to managerial actions and decisions. Additionally, disparities in salaries, working conditions, and

regulations may exist in different countries. Understanding these differences and adjusting management strategies accordingly is crucial. All these aspects pertain to how managers perceive and interact with their personnel in international companies.

The concept of globalization significantly influences various aspects of international business. It leads to increased competition for product quality, pricing, and market adaptation, while also promoting higher levels of knowledge and technology. Globalization offers numerous opportunities for development, such as access to different industries and resources, increased foreign investments, and cost savings through economies of scale. Information has become a key resource for achieving success on global markets. Consequently, strategic management and marketing are of paramount importance, and multinational companies must develop personnel management skills.

Globalization affects all facets of international business. It leads to changes in industry, finance, economy, politics, and information. The movement toward multinational operations brings substantial changes to the global economic structure, shifting towards a global distribution of resources. This process is driven by the interaction between productive forces and the nature of production relations [7]. New technologies impact economic relations and contribute to the development of modern approaches in international business, new products, relationships between sellers and buyers, and competitive strategies.

Research by the "Deloitte" company has confirmed the impact of globalization on human resource management in Ukraine. According to the study's results, most managers wish to improve the field of human resource management and the personnel potential of their companies. Only 3% consider their HR programs international, while 34% believe that they need substantial changes, and 25% consider these changes radical [4].

Main tasks in HR Management, that is basic to the modern big business conduction (Table 1).

Table 1

Main tasks in HR Management

Main tasks	Characteristics
Talent Acquisition and Recruitment	• Develop and implement strategies for attracting and recruiting qualified candidates. • Conduct job analyses and define job requirements to facilitate effective hiring processes.
Employee Onboarding and Orientation	• Design and oversee onboarding programs to integrate new employees into the organization. • Provide orientation sessions to familiarize new hires with company policies, culture, and expectations
Performance Management	• Establish performance appraisal systems to assess employee performance and set performance goals. • Provide feedback and coaching to employees to enhance their performance and professional development.

Training and Development	• Identify training needs within the organization and develop training programs accordingly. • Implement continuous learning initiatives to enhance employee skills and competencies.
Workforce Planning	• Analyze current workforce trends and anticipate future staffing needs. • Develop succession plans to ensure a pipeline of talent for key positions.
Employee Relations	• Mediate and resolve conflicts between employees and between employees and management. • Foster positive employer
Compensation and Benefits Administration	• Develop and administer competitive compensation and benefits packages. • Conduct regular salary reviews and ensure compliance with legal regulations.
Health and Safety Compliance	• Implement health and safety programs to ensure a safe working environment. • Stay updated on relevant occupational health and safety regulations and compliance requirements.
Diversity and Inclusion Initiatives	• Develop and implement strategies to promote diversity and inclusion in the workplace. • Monitor and assess the effectiveness of diversity and inclusion programs.
Employee Engagement and Satisfaction	• Implement initiatives to enhance employee engagement and job satisfaction. • Conduct employee surveys and gather feedback to identify areas for improvement.
Conflict Resolution and Employee Counseling	• Provide counseling and support to employees facing personal or professional challenges. • Develop and implement conflict resolution strategies to maintain a positive work environment.
Policy Development and Implementation	• Develop and update HR policies in accordance with legal and organizational requirements. • Communicate and ensure the implementation of HR policies across the organization.
Labor Law Compliance	• Stay informed about changes in labor laws and regulations. • Ensure organizational compliance with labor laws in all HR practices.
Employee Records and Information Management	• Establish and maintain accurate and confidential employee records. • Implement efficient systems for managing HR information and documentation.

Succession Planning	• Identify key positions within the organization and develop plans for succession. • Provide training and development opportunities for employees in line with succession plans.
Employee Recognition Programs	• Develop and implement employee recognition programs to acknowledge achievements and contributions. • Foster a culture of appreciation and acknowledgment within the organization.
Remote Work Policy Implementation	• Establish and communicate policies and guidelines for remote work. • Provide support and resources to ensure the success of remote work arrangements.
Advisory Role to Management	• Provide strategic HR advice to organizational leadership. • Collaborate with management to align HR strategies with overall business goals.

Source: data based on the processing sources [4; 12; 14-15]

If to connect presented information, so the main trends of HRM digitalization are:

• automation and optimization of HRM processes. Digital technologies make it possible to automate such processes as personnel selection, performance evaluation, career management, training and personnel development. This frees up the time of personnel department employees for more creative and strategic work.

• personalized approach to HRM. Digital technologies make it possible to accumulate and analyze large volumes of data about employees. This allows HR personnel to gain better insights into employee needs and motivations, and to develop more personalized HR programs.

• development of new forms of interaction between employees and management. Digital technologies allow creating new forms of interaction between employees and management, such as chatbots, virtual offices, and social networks. This allows to increase the efficiency of communication and cooperation.

Among the main issues in the HR field, the need for developing future leaders and transferring knowledge to them is identified. Another crucial issue is employee motivation. The importance of managing the execution of strategic tasks and changing leadership "rules of the game" is also emphasized [4]. These issues indicate the necessity of implementing global practices and innovations in personnel management in Ukraine, as our enterprises must adapt to global trends in this field.

The multifaceted exploration of contemporary challenges and opportunities in HRM has revealed the imperative for organizations to redefine their strategies in the face of rapid technological advancements, globalization, and evolving workforce expectations. The key tasks identified in talent acquisition, employee experience, agile HR practices, data-driven decision-making, cultural diversity, leadership development, employee well-being, cybersecurity, and strategic alignment underscore the breadth and complexity of responsibilities within the realm of HRM, so:

1. Enhancing labor productivity.
2. Increasing the qualification and requalification of employees.
3. Creating a positive workplace atmosphere.
4. Fostering a creative environment and supporting employees' creative ideas.
5. Leveraging individual talents, with a particular focus on this aspect.
6. Adapting personnel to innovations and changes.
7. Aligning employees' personal goals with the company's objectives.
8. Maintaining unity and cohesiveness within the team.

Evaluating the effectiveness of HRM involves measuring the costs and benefits associated with HRM programs to compare their outcomes with enterprise performance indicators. It also requires assessing the effectiveness at the individual employee, management structure, and company management system levels. Such assessment typically demands a systematic approach and benchmarking against competitors and company objectives [5].

Some countries employ assessment centers for evaluating management personnel; however, such centers may have shortcomings and do not guarantee error-free outcomes.

HR management in international enterprises requires consideration of cultural differences, fair treatment of employees, and the utilization of expectancy theory. Work positions should align with the cultural peculiarities of the region where the company is located.

Managers worldwide use rewards to motivate their personnel, which can be monetary compensation or non-monetary recognition methods. However, cultural differences can affect which reward systems are most suitable in various countries [8]. For instance, in Japan, Korea, and Taiwan, individualism is not popular, so individual reward systems may not always work effectively. Measures such as salary increases, bonuses, or stock options might be more effective in Western environments.

On a global scale, knowledge and skills among employees are on the rise, particularly in countries like India and China. This is accompanied by increased labor mobility. Unfortunately, increased human mobility leads to higher epidemic risks, increasing health-related costs for workers and affecting government and company budgets. Moreover, there is a shortage of skilled workers in developed countries. To adapt to changing market conditions, organizations use flexible approaches in social-labor relations and employment. Investing in personnel and developing employee skills are key factors in competitiveness.

These factors impact HRM in Ukraine across companies of different sizes and industries [17]. They are interrelated, and changes in one aspect affect others. Demographic challenges and global economic changes significantly influence personnel management, particularly in the competition for skilled workers. Technological advancements and climate change alter the organization of work positions and demand new approaches.

So, digitization has a significant impact on the main HRM processes, in particular:

• personnel selection. Digital technologies allow the use of such selection methods as online testing, video interviews, and social network analysis. This makes it possible to increase the efficiency of selection and find the most suitable candidates.

• assessment of labor efficiency. Digital technologies allow the use of such evaluation

methods as electronic monitoring of working hours, evaluation of work results using quantitative indicators. This makes it possible to more objectively evaluate the efficiency of the employees.

• career management. Digital technologies allow the use of such tools as talent management systems and career advisors. This allows employees to better understand their opportunities and develop their careers.

• staff training and development. Digital technologies allow the use of such forms of education as online courses, virtual training centers. This allows employees to learn at a time and place convenient for them.

Based on that, it can be formulated recommendations for the effective use of digital technologies in HRM system:

• develop a strategy for digitalization of personnel management. This strategy should define the goals and objectives of digitization, as well as the resources that will be needed for its implementation.

• introduce digital technologies gradually. It is important to conduct thorough testing of digital technologies before their large-scale implementation.

• to ensure the training of employees in the use of digital technologies. Employees must have the necessary knowledge and skills to effectively use digital technologies.

Conclusions and recommendations. The influence of global changes on international business significantly affects HR systems both in Ukraine and worldwide. Issues related to developing future leaders, motivating employees, executing strategic tasks, and adapting to changes in leadership require the implementation of global practices and innovations in personnel management. Effectively managing personnel in a global environment necessitates flexibility and readiness to adapt to technological and demographic transformations, considering global trends and business challenges.

Crucially, the digitalization recognizes not merely as a disruptor but as an enabler of innovative practices. The convergence of technology, globalization, and evolving workforce expectations presents organizations with unprecedented opportunities to cultivate resilient, adaptive, and thriving work environments. It calls for a paradigm shift in how organizations perceive and approach personnel management, emphasizing the strategic alignment of HR practices with broader organizational goals. Digitization has a significant impact on personnel management. It allows you to automate and optimize personnel management processes, increase the efficiency of interaction between employees and management, and develop more personalized personnel management programs. For the effective use of digital technologies in personnel management, it is necessary to develop a strategy for digitalization of personnel management, introduce digital technologies gradually and ensure the training of employees for their use.

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SIMULATION OF THE SYSTEM OF SOCIALLY ORIENTED PERSONNEL MANAGEMENT OF HIGHLY ADAPTIVE ENTERPRISES

Dmytro Dyachkov,
Doctor of Economic Sciences, Professor,
Director of the Educational and Scientific Institute of
Economics, Management, Law and Information Technologies,
Poltava State Agrarian University, Ukraine,
dmytro.dyachkov@pdau.edu.ua; ORCID: 0000-0002-2637-0099
Viktoriia Skrypnyk,
Ph.D. in Economics, Associate Professor,
Luhansk Taras Shevchenko National University, Poltava, Ukraine,
viktoriaskrypnyk777@gmail.com; ORCID: 0000-0003-1813-1749
Serhii Yanechko,
Ph.D. student,
Kyiv National University of Technologies and Design, Ukraine,
syanechko@gmail.com; ORCID: 0009-0002-2115-3287

Annotation. *With the help of game theory, the size of the optimal monetary incentive was investigated depending on the type of additional payments on the example of specific highly adaptive enterprises in the context of socially oriented personnel management. The strategy for the development of enterprises at different levels of management, which under any external conditions will provide an opportunity to obtain even a minimal, but guaranteed profit, has been determined.*

Keywords: *modeling, system, socially oriented management, personnel management, adaptive management, enterprises.*

Formulation of the problem. The financial and economic development of macro-, meso- and micro-systems, in particular at the level of a highly adaptive enterprise, is a complex, multifactorial process, so every business entity faces the question of assessing development prospects, taking into account all factors affecting the final result. One of the important links in the strategic development of a highly adaptive enterprise of any level is personnel management in the management system. Therefore, an important aspect of managing any economic system is the availability of tools for assessing the main indicators of system development and achieved results, the possibility of comparing them with other entities, as well as the possibility of constant control over the dynamics and directions of change of key development indicators. In this connection, there is a need to choose the most effective methods for research, analysis and forecasting of each of the structural elements of a highly adaptive enterprise at different levels of management. The use of effective evaluation tools will contribute to the strengthening of the motivational mechanism, as one of the key factors of socially oriented personnel management, and

as a consequence to the increase of labor productivity, product quality and ensuring the competitiveness of the economic entity in general. Therefore, it is important to effectively manage the motivational mechanism of personnel as the basis for increasing efficiency, which should not be considered as a narrow complex of economic and organizational components, united only with the formation of personal earnings, but more broadly and more fully as a system that is a component of the organizational, economic and social mechanism of enterprise functioning.

Analysis of recent research and publications. Lozhachevska O. et al. (2021) in the management system of logistics and marketing behavior of innovative clusters of territorial communities in the conditions of digitalization of society and the online market emphasize the systematization of concepts of socially oriented management [4]. Bazeliuk V. et al. (2021) investigate the system of forming and diagnosing the levels of innovative and entrepreneurial competence of future managers of education in the conditions of the knowledge economy [1]. Zoria O. et al. (2022) analyze the theoretical and methodological foundations of investment support for innovation-oriented development of agricultural production at highly adaptive enterprises [10]. Hutorov A. O. et al. (2019) model the cycle of the reproductive process in the agricultural sector of the economy of Ukraine from the standpoint of socially oriented management [3]. Oseredchuk O. et al. (2022) update new approaches to monitoring the quality of higher education in the process of distance learning, in particular the provision of social competencies [7]. Voznyuk A. et al. (2021) focus on interdisciplinary educational technology based on the social concept [9]. Bilan Y. et al. (2017) study the design of the social component of effective land resource management [2]. Mykhailichenko M. et al. (2021) systematize competitive personnel management strategies in the business processes of agricultural enterprises focused on digitization [5].

In the complex of personnel management in the system of socially oriented management, there is not only the management of the motivational mechanism of personnel, but also the study, research, analysis of other aspects of personnel management at the financial, economic, and production levels. In particular, justification at the economic-mathematical level using research methods and models and modeling of management processes. One such method is game theory. The study of the elements of game theory and the wide application of this theory in solving problems of enterprise management allows to significantly reduce the level of uncertainty when making management decisions in order to ensure targeted actions to increase the efficiency of the business entity. Game theory methods allow finding the best guaranteed outcome from the worst possible options. This makes it possible to choose a strategy for the development of a highly adaptive enterprise at different levels of management, which, under any external conditions, will provide an opportunity to obtain, albeit minimal, but guaranteed profit [6; 8].

Setting the purpose and objectives of the study – to investigate the simulation of the system of socially oriented personnel management of highly adaptive enterprises.

The main research material. With the help of game theory, we will determine and

analyze the size of the optimal monetary incentive depending on the type of additional payments based on the example of specific highly adaptive enterprises. Three enterprises of the Poltava region were selected – SE EF "Stepne", PAC "Zlagoda", PE "named after Kalashnikov", which are approximately the same in terms of size, specialization, production direction, number of management and production personnel. During the study, we take into account the seasonality of production, the complexity and tension in some production areas, and the forms of remuneration, compensation, benefits and staff incentives.

Thus, a staff survey was conducted in the studied enterprises and a list of benefits aimed at the social protection of employees was formed. Each hryvnia benefit = 1 point – the maximum number of points is 10,000 per year (Table 1).

Table 1

Proposed volumes and types of social benefits for the studied enterprises, 2024

Types of benefits	Cost, UAH	Points (1 UAH = 1 point)	Dependence on labor productivity growth, % - UAH
Tickets for concerts, cinema, theater, excursions	up to 2,000	up to 2,000	5% increase – 5,000 UAH
Payment of a subscription to a swimming pool, fitness room, etc	up to 2,000	up to 2,000	
Education (seminars, trainings)	up to 4,000	up to 4,000	
Mobile payment	up to 1,000	up to 1,000	6-10% increase – 7,500 UAH
Payment for own vacation (sanatorium, resort)	up to 10,000	up to 10,000	
Payment for rest (rehabilitation) of the child	up to 10,000	up to 10,000	
Compensation for the payment of communal services	up to 10,000	up to 10,000	11-15% increase – 10,000 UAH
The possibility of receiving one-time assistance	up to 10,000	up to 10,000	

Source: developed by the authors

The type of benefits provided by the company can be drawn up by the employee himself at the beginning of the year of using them. In monetary terms, the employee cannot take away the granted benefit, that is, only receive the benefit paid by the company. Surcharges are a variable part of the tariff system and social incentives and depend on production conditions.

Therefore, the optimal amount of monetary incentives for various types of benefits of the investigated enterprises, as previously mentioned, will be calculated using game theory.

The amounts of additional payments for different types of benefits of the three investigated enterprises are presented in the table. 2.

Since each of the three types of benefits has a different amount of additional payments, we will bring the production model to a mathematical form and denote by x1, x2 and x3 the probabilities of receiving the incentive with the smallest, average and largest size, respectively.

Table 2

Amounts of additional payments for different types of benefits of the researched enterprises, 2024

Activity	Type of stimulation		
	The smallest amount of additional payment	The average amount of the surcharge	The maximum amount of the surcharge
SE EF "Stepne" Poltava district			
Tickets for concerts, cinema, theater, excursions	3,000	4,000	5,000
Payment of a subscription to a swimming pool, fitness room, etc	3,000	4,000	5,000
Education (seminars, trainings)	3,000	4,000	5,000
Mobile payment	5,000	6,000	7,500
Payment for own vacation (sanatorium, resort)	5,000	6,000	7,500
Payment for rest (rehabilitation) of the child	5,000	6,000	7,500
Compensation for the payment of communal services	8,000	9,000	10,000
The possibility of receiving one-time assistance	8,000	9,000	10,000
PAC "Zlagoda" of Poltava district			
Tickets for concerts, cinema, theater, excursions	4,200	5,000	7,000
Payment of a subscription to a swimming pool, fitness room, etc	3,000	4,500	5,500
Education (seminars, trainings)	3,600	4,200	5,100
Mobile payment	4,800	5,000	7,000
Payment for own vacation (sanatorium, resort)	6,000	7,000	7,800
Payment for rest (rehabilitation) of the child	4,700	5,900	7,100
Compensation for the payment of communal services	7,300	7,900	8,400
The possibility of receiving one-time assistance	8,500	9,000	9,500
PE "named after Kalashnikov" of the Poltava district			
Tickets for concerts, cinema, theater, excursions	3,500	3,900	4,000
Payment of a subscription to a swimming pool, fitness room, etc	3,500	3,800	4,000
Education (seminars, trainings)	3,800	4,000	4,400
Mobile payment	3,600	3,800	4,000
Payment for own vacation (sanatorium, resort)	5,000	5,500	6,200
Payment for rest (rehabilitation) of the child	5,000	5,400	6,000
Compensation for the payment of communal services	6,000	6,500	7,100
The possibility of receiving one-time assistance	8,000	8,400	9,000

Source: developed by the authors

Then $x_1 + x_2 + x_3 = 1$.

The contribution of x_1, x_2 and x_3 to the amount of additional payments is described by the inequalities for the studied agricultural enterprises in the table. 3.

where V is the optimal size of the surcharge.

$V = Z_{max}$.

We carry out mathematical operations and transfer V to the left side of the inequalities, and we have the following problem of linear programming of the amounts of surcharges for different types of benefits of the three researched agricultural enterprises of the Poltava region, 2024 (Table 4).

Table 3

Mathematical formulation of the amounts of additional payments for different types of benefits of the researched enterprises, 2024

Inequalities		
SE EF "Stepne" Poltava district	PAC "Zlagoda" of Poltava district	PE "named after Kalashnyk" of Poltava district
$3{,}000x_1+4{,}000x_2+5{,}000x_3 \geq V$	$4{,}200x_1+5{,}000x_2+7{,}000x_3 \geq V$	$3{,}500x_1+3{,}900x_2+4{,}000x_3 \geq V$
$3{,}000x_1+4{,}000x_2+5{,}000x_3 \geq V$	$3{,}000x_1+4{,}500x_2+5{,}500x_3 \geq V$	$3{,}500x_1+3{,}800x_2+4{,}000x_3 \geq V$
$3{,}000x_1+4{,}000x_2+5{,}000x_3 \geq V$	$3{,}600x_1+4{,}200x_2+5{,}500x_3 \geq V$	$3{,}800x_1+4{,}000x_2+4{,}400x_3 \geq V$
$5{,}000x_1+6{,}000x_2+7{,}500x_3 \geq V$	$4{,}800x_1+5{,}000x_2+7{,}000x_3 \geq V$	$3{,}600x_1+3{,}800x_2+4{,}000x_3 \geq V$
$5{,}000x_1+6{,}000x_2+7{,}500x_3 \geq V$	$6{,}000x_1+7{,}000x_2+7{,}800x_3 \geq V$	$5{,}000x_1+5{,}500x_2+6{,}200x_3 \geq V$
$5{,}000x_1+6{,}000x_2+7{,}500x_3 \geq V$	$4{,}700x_1+5{,}900x_2+7{,}100x_3 \geq V$	$5{,}000x_1+5{,}400x_2+6{,}000x_3 \geq V$
$8{,}000x_1+9{,}000x_2+10{,}000x_3 \geq V$	$7{,}300x_1+7{,}900x_2+8{,}400x_3 \geq V$	$6{,}000x_1+6{,}500x_2+7{,}100x_3 \geq V$
$8{,}000x_1+9{,}000x_2+10{,}000x_3 \geq V$	$8{,}500x_1+9{,}000x_2+9{,}500x_3 \geq V$	$8{,}000x_1+8{,}400x_2+9{,}000x_3 \geq V$

Source: developed by the authors

Table 4

Linear programming models and the objective function of the amounts of surcharges for different types of benefits of the researched enterprises, 2024

Linear programming models and objective function		
SE EF "Stepne" Poltava district	PAC "Zlagoda" of Poltava district	PE "named after Kalashnyk" of Poltava district
$3{,}000x_1+4{,}000x_2+5{,}000x_3-V \geq 0$	$4{,}200x_1+5{,}000x_2+7{,}000x_3-V \geq 0$	$3{,}500x_1+3{,}900x_2+4{,}000x_3-V \geq 0$
$3{,}000x_1+4{,}000x_2+5{,}000x_3-V \geq 0$	$3{,}000x_1+4{,}500x_2+5{,}500x_3-V \geq 0$	$3{,}500x_1+3{,}800x_2+4{,}000x_3-V \geq 0$
$3{,}000x_1+4{,}000x_2+5{,}000x_3-V \geq 0$	$3{,}600x_1+4{,}200x_2+5{,}500x_3-V \geq 0$	$3{,}800x_1+4{,}000x_2+4{,}400x_3-V \geq 0$
$5{,}000x_1+6{,}000x_2+7{,}500x_3-V \geq 0$	$4{,}800x_1+5{,}000x_2+7{,}000x_3-V \geq 0$	$3{,}600x_1+3{,}800x_2+4{,}000x_3-V \geq 0$
$5{,}000x_1+6{,}000x_2+7{,}500x_3-V \geq 0$	$6{,}000x_1+7{,}000x_2+7{,}800x_3-V \geq 0$	$5{,}000x_1+5{,}500x_2+6{,}200x_3-V \geq 0$
$5{,}000x_1+6{,}000x_2+7{,}500x_3-V \geq 0$	$4{,}700x_1+5{,}900x_2+7{,}100x_3-V \geq 0$	$5{,}000x_1+5{,}400x_2+6{,}000x_3-V \geq 0$
$8{,}000x_1+9{,}000x_2+10{,}000x_3-V \geq 0$	$7{,}300x_1+7{,}900x_2+8{,}400x_3-V \geq 0$	$6{,}000x_1+6{,}500x_2+7{,}100x_3-V \geq 0$
$8{,}000x_1+9{,}000x_2+10{,}000x_3-V \geq 0$	$8{,}500x_1+9{,}000x_2+9{,}500x_3-V \geq 0$	$8{,}000x_1+8{,}400x_2+9{,}000x_3-V \geq 0$
$x_1+x_2+x_3+0V=1$	$x_1+x_2+x_3+0V=1$	$x_1+x_2+x_3+0V=1$
$0x_1+0x_2+0x_3+1V=Zmax$	$0x_1+0x_2+0x_3+1V=Zmax$	$0x_1+0x_2+0x_3+1V=Zmax$

Source: developed by the authors

Next, we solve the problem in the Microsoft Excel environment using the Solver tool, executed by the Data→Solver command

As a result, we get the following result:

$x_1 = 0$; $x_2 = 0$; $x_3 = 1$; V = 5,000 SE EF "Stepne" of Poltava district.

$x_1 = 0$; $x_2 = 0$; $x_3 = 1$; V =5,100 PAC "Zlagoda" of Poltava district

$x_1 = 0$; $x_2 = 0$; $x_3 = 1$; V = 4,900 PE "named after Kalashnyk" of Poltava district

That is, the optimal amount of additional payments in the investigated agricultural enterprises is:

SE EF "Stepne" Poltava district 5,000 UAH.

PAC "Zlagoda" Poltava district 5,100 UAH.

PE "named after Kalashnikov" of Poltava district 4,900 UAH.

So, summing up, it should be noted that the use of economic-mathematical modeling, in particular optimization problems and problems of game theory, in the conditions of specific enterprises allows modeling the management of the motivational mechanism of

personnel, which can stimulate socially and in production activity as a whole.

Connecting the conducted research, modeling and forecasting of the elements of personnel management, we will continue with a more detailed analysis of the factors influencing the personnel management on the results of the enterprise.

So, using the financial statements of the investigated agricultural enterprises, the study, research, analysis, modeling and forecasting of the main factor characteristics of personnel management and the effective indicator of production activity were carried out using multiple production regression.

It is known that dependencies of this type can be described by a multiple linear production function of the type:

$$\hat{Y} = a_0 + a_1X_1 + a_2X_2 + \ldots + a_nX_n. \quad (1)$$

The main task of multiple production regression is the study of the influence of the main factors on the result of the economic entity.

So, we determine the main factors and factors of influence of three agricultural enterprises of the SE EF "Stepne" of the Poltava District, PAC "Zlagoda" of the Poltava District and PE "named after Kalashnikov" of Poltava district:

- the level of staff stability, % – the ratio of the number of employees with more than one year of experience in the organization (for a certain period) to the average registered number of employees for the corresponding period.

- personnel turnover ratio, % - the ratio of the number or number of employees dismissed for absenteeism and other violations of labor discipline, due to their health and at their own will to the average number of employees.

- amount of monetary incentive, UAH.

The result indicator in the study is the labor productivity of the 1st average annual employee, thousand UAH. Research, data processing, analysis, modeling of the proposed factors of three economic entities are carried out on the basis of multiple linear regression over the past seven years in several stages: presentation of the dynamics of the main factors and performance indicators, formulation of a mathematical model, analytical characteristics of the obtained results and forecasting for the next period.

At the first stage of the research, we will conduct an analysis of factors and indicators on the basis of which we will conduct calculations. The dynamics of influencing factors on the performance indicator and the indicator for the last seven years are presented in the table. 5.

For further calculation and bringing the production models to a mathematical form, we denote the factors and the indicator as variables:

X_0 is a fictitious factor (must be used when calculating the regression);

X_1 – staff stability level, %;

X_2 – personnel turnover ratio, %;

X_3 – amount of monetary incentive, UAH

Y– labor productivity of the 1st average annual employee, thousand UAH.

Further calculations are carried out using Microsoft Excel spreadsheets, built-

in statistical and mathematical functions, arrays, namely CORREL; MDETERM, MINVERSE, CHIINV, TRANSPOSE, MMULT, FINV and LINEST.

Table 5

Dynamics of the main factors of personnel management and labor productivity of the 1st average annual employee of the researched enterprises, 2016-2022

Years	Staff stability level, %	Staff turnover rate, %	Amount of monetary incentive, UAH.	Labor productivity of the 1st average annual employee, thousand UAH.
SE EF "Stepne" Poltava district				
2016	55.64	36.70	1,000	149.36
2017	69.57	29.10	1,040	254.53
2018	66.09	48.30	1,200	327.60
2019	49.15	51.30	1,300	319.43
2020	51.97	43.50	2,500	344.57
2021	52.59	52.52	3,000	354.67
2022	56.14	56.10	3,200	353.78
PAC "Zlagoda" of Poltava district				
2016	58.21	35.80	950	182.24
2017	68.00	33.20	1,080	234.17
2018	67.86	38.30	1,200	262.13
2019	51.28	41.20	1,350	314.40
2020	53.91	42.00	1,500	352.54
2021	50.62	42.80	2,500	367.63
2022	53.39	45.31	2,800	364.88
PE "named after Kalashnyk" of Poltava district				
2016	61.15	34.80	1,100	223.21
2017	63.64	33.90	1,300	252.05
2018	62.03	33.00	2,400	267.03
2019	62.50	42.10	2,500	295.00
2020	63.00	39.40	3,500	320.04
2021	60.71	41.86	3,500	332.67
2022	60.66	43.60	4,000	352.41

Source: developed by the authors

Next, when studying multiple linear models, we check multicollinearity using the algorithm of the Farrar-Glober method. The term "multicollinearity" means that in a multiple regression model, two or more independent variables (factors) are linearly related to each other, or, in other words, have a high degree of correlation. This phenomenon is considered negative in the economic analysis of multiple production regression.

If the calculated value of $Xi^2_{calculated}$ is greater than its critical tabular value, then the general multicollinearity of the matrix of factors exists, and if it is the opposite, then it does not exist.

In our study, the general multicollinearity of the matrix of factors:

SE EF "Stepne" of Poltava district does not exist (Xi^2 (3.99)< Xi^2kp (7.81);

PAC "Zlagoda" of Poltava district exists (Xi^2 (8.85)>Xi^2kp(7.81);

PE "named after Kalashnikov" of the Poltava district does not exist (Xi^2(4.86)<Xi^2kp (7.81);

Fisher's F-test with a reliability of P = 0.95 examines the multicollinearity of each factor with a set of other factors. For this, the critical and calculated values of the F-criterion

for each factor are determined. In our case, there is multicollinearity of each factor with a number of other factors.

Next, we compare the calculated values of the t-statistic with its critical value to determine the presence of multicollinearity of a pair of factors.

If the modulus of the estimated value is greater than the critical value, then with a probability of error of 5% it can be concluded that there is multicollinearity of this pair of factors.

In this case, multicollinearity of each factor with a set of other factors does not exist, because the critical value of the t-statistic is greater than its calculated value.

As previously mentioned, the phenomenon of multicollinearity is a negative phenomenon in econometric analysis, and to eliminate it, the method of excluding one of the factors from consideration is used by calculating paired correlation coefficients, but in our case, the task is to analyze in detail which factors affect the performance indicator. Therefore, from this point of view, we will not exclude any of the studied factors from further econometric analysis.

Next, we calculate pairwise correlation coefficients. Paired correlation coefficients indicate the influence of individual factors on the Y indicator, i.e. the labor productivity of the 1st average annual employee of the studied enterprises. As for pairwise correlation coefficients, it is known that the obtained dependencies are evaluated according to the level of indicators of closeness of connection. If their absolute value is less than 0.3, the connection is weak; when it is in the range of 0.3-0.7 - average, if 0.7 - tight and when the absolute value is equal to 1 - then this indicates a practical-functional connection.

Characterizing the paired correlation coefficients, it should be noted that the correlation coefficients are different and each of the factors has an impact on the performance indicator. Also, in models of multiple production functions, partial correlation coefficients are defined, which, like paired ones, characterize the relationship between variables. But unlike even partial coefficients, partial coefficients characterize the closeness of the relationship, provided that other independent variables remain constant (Table 6).

Next, we calculate the transposed matrix, the product of matrices, the coefficients of the equation of multiple production functions to determine the theoretical and forecast values of the performance indicator of the studied enterprises - the labor productivity of the 1st average annual employee.

As a result of calculations, multiple production linear regressions have the form:

- the multiple production function of the influence of the main factors of personnel management on the productivity of the 1st average annual employee of the SE EF "Stepne" State Enterprise, Poltava District, 2016-2022.

$Y_r = -151.26+3.01X_1+4.81X_2+0.03X_3$

- multiple production function of the influence of the main factors of personnel management on the productivity of the 1st average annual employee of PAC "Zlagoda" of Poltava district, 2016-2022.

$Y_r = -283.17+0.44X_1+13.13X_2+0.02X_3$

- multiple production function of the influence of the main factors of personnel

management on the labor productivity of the 1st average annual employee of PE "named after Kalashnikov" of the Poltava district, 2016-2022.

Y_r=-101.77+3.20X_1+2.85X_2+0.03X_3

Table 6

The results of the study of paired and partial correlation coefficients of the influence of the main factors of personnel management on the labor productivity of the 1st average annual employee of the studied enterprises, 2016-2022

Factors	Effective indicator: Labor productivity of the 1st average annual employee, thousand UAH, Y			
	Partial correlation coefficients, r_{12}, r_{13}, r_{23}	Characteristics of partial correlation coefficients	Pairwise correlation coefficients, r_{YX1}, r_{YX2}, r_{YX3}	Characteristics of paired correlation coefficients
SE EF "Stepne" of Poltava district				
Staff stability level, %, X_1	0.38	The relationship is medium, provided that other independent variables are constant	0.77	The connection is close, the direct influence of the factor on the performance indicator
Personnel turnover rate, % X_2	0.14	The relationship is weak, provided that other independent variables are constant	0.72	The connection is close, the direct influence of the factor on the performance indicator
Amount of monetary incentive, UAH, X_3	-0.55	The relationship is mean inverse, provided that other independent variables are constant	0.69	The connection is average, the direct influence of the factor on the performance indicator
PAC "Zlagoda" of Poltava district				
Staff stability level, %, X_1	0.64	The relationship is medium, provided that other independent variables are constant	0.67	The connection is average, the direct influence of the factor on the performance indicator
Personnel turnover rate, % X_2	-0.15	The relationship is weakly inverse, provided that other independent variables are constant	0.90	The connection is close, the direct influence of the factor on the performance indicator
Amount of monetary incentive, UAH, X_3	-0.73	The relationship is close, inverse, provided that other independent variables are constant	0.81	The connection is close, the direct influence of the factor on the performance indicator
PE "named after Kalashnikov" of the Poltava district				
Staff stability level, %, X_1	0.21	The relationship is weakly direct, provided that other independent variables are constant	0.84	The connection is close, the direct influence of the factor on the performance indicator
Personnel turnover rate, % X_2	0.10	The relationship is weak, direct, almost absent, provided that other independent variables are constant	0.86	The connection is close, the direct influence of the factor on the performance indicator
Amount of monetary incentive, UAH, X_3	-0.74	The relationship is close, inverse, provided that other independent variables are constant	0.97	The connection is close, the direct influence of the factor on the performance indicator

Source: developed by the authors

The parameters of the equations were calculated by the method of least squares. Each coefficient of the equation indicates the degree of influence of the corresponding factor on the performance indicator at a fixed position of the rest of the factors, that is, how the performance indicator changes with a change in a separate factor by one unit. The free term of the multiple regression equation has no economic meaning.

We determine the general coefficient of determination, which indicates the closeness of the relationship between the studied factors and the indicator and the variation of the indicator.

- SE EF "Stepne" Poltava district,

$Y_r = -151.26+3.01X_1+4.81X_2+0.03X_3$. The overall coefficient of determination R2=0.67. The general coefficient of determination indicates the average relationship between the investigated factors and the indicator, the variation of the labor productivity of the 1st average annual employee is determined by 66.54% of the investigated factors entered into the correlation model. Factors have an indirect effect on the investigated indicator.

- PAC "Zlagoda" of Poltava district,

$Y_r = -283.17+0.44X_1+13.13X_2+0.02X_3$ The overall coefficient of determination R2=0.83. The general coefficient of determination indicates the average relationship between the investigated factors and the indicator, the variation of the labor productivity of the 1st average annual employee is determined by 82.75% of the investigated factors entered into the correlation model. The factors were selected successfully and have a significant impact on the studied indicator.

- PE "named after Kalashnikov" of the Poltava district,

$Y_r = -101.77+3.20X_1+2.85X_2+0.03X_3$ The overall coefficient of determination R2=0.98. The general coefficient of determination indicates the average relationship between the investigated factors and the indicator, the variation of the labor productivity of the 1st average annual employee is determined by 97.75% of the investigated factors entered into the correlation model. The factors were selected successfully and have a significant impact on the studied indicator.

In order to determine the quality of the calculated models, it is necessary to conduct an analysis of Fisher's F-criterion. If the calculated value of Fisher's F-criterion is greater than its tabular value, then the multiple linear econometric model with a reliability of P = 0.95 can be considered adequate experimental data, and based on the accepted models, economic analysis and forecasting of the effective labor productivity indicator of the 1st average annual employee can be carried out. In our study of the influence of the main factors of personnel management on the productivity of the 1st average annual employee over the past seven years, the estimated value of Fisher's F-criterion is greater than the tabular value, the model is adequate to the experimental data.

The next stage is a comparative characterization of statistical parameters and coefficients of production linear regressions of the influence of the main factors of personnel management on the productivity of the 1st average annual employee of the studied enterprises using the built-in statistical function LINEST (Table 7).

Table 7

Calculation of statistical parameters and coefficients of production linear regressions of the influence of the main factors of personnel management on the labor productivity of the 1st average annual employee of the studied agricultural enterprises using the built-in statistical function LINEST

Statistical parameters and coefficients of production linear regressions	a_3	a_2	a_1	a_0
The multiple of the production function of the influence of the main factors of personnel management on the labor productivity of the 1st average annual employee of the SE EF "Stepne" Poltava District, 2016-2022. *Yr=-151.26+3.01X₁+4.81X₂+0.03X₃*				
	0.03	**4.81**	**3.01**	**-151.26**
Se a_i	0.03	3.75	3.99	328.44
R^2→	0.67	61.40	no data	no data
Fp→	1.99	3.00	no data	no data
SSR→	22,456.15	11,309.80	no data	no data
The multiple of the production function of the influence of the main factors of personnel management on the productivity of the 1st average annual employee of PAC "Zlagoda" of Poltava district, 2016-2022. *Yr=-283.17+0.44X₁+13.13X₂+0.02X₃*				
	a_3	a_2	a_1	a_0
	0.02	**13.13**	**0.44**	**-283.17**
Se a_i	0.04	9.50	3.74	504.54
R^2→	0.83	42.44	no data	no data
Fp→	4.80	3.00	no data	no data
SSR→	25,914.43	5,402.75	no data	no data
The multiple of the production function of the influence of the main factors of personnel management on the productivity of the 1st average annual employee of the PE "named after Kalashnikov" of the Poltava district, 2016-2022. *Yr=-101.77+3.20X₁+2.85X₂+0.03X₃*				
	a_3	a_2	a_1	a_0
	0.03	**2.85**	**3.20**	**-101.77**
Se a_i	0.01	1.52	3.86	256.98
R^2→	0.98	9.89	no data	no data
Fp→	43.47	3.00	no data	no data
SSR→	12,754.91	293.40	no data	no data

Source: developed by the authors

Therefore, it can be concluded that the use of the built-in statistical function LINEST of Microsoft Excel spreadsheets for automation, optimization of processing and analysis of the influence of the main factors of personnel management on the effective indicator of labor productivity of the 1st average annual employee is an alternative in economic and mathematical modeling and management decision-making.

Next, we forecast the main factors of personnel management and labor productivity of the 1st average annual employee of the three studied enterprises for 2024. The forecast was made for the short-term period of 2024.

SE EF "Stepne" Poltava district: staff stability level 57.30%; staff turnover rate 55.74% (built-in TREND statistical function, accurately calculates factor characteristics in dynamics); the amount of monetary incentive is UAH 5,000. (predetermined using game theory).

PAC "Zlagoda" of Poltava district: staff stability level 53.78%; staff turnover rate 45.13% (built-in TREND statistical function, accurately calculates factor characteristics in

dynamics); the amount of monetary incentive is 5,100 UAH. (predetermined using game theory).

PE "named after Kalashnyka" of Poltava district: staff stability level 61.27%; staff turnover rate 42.73% (built-in TREND statistical function, accurately calculates factor characteristics in dynamics); the amount of monetary incentive is UAH 4,900 (predetermined using game theory).

In the studied agricultural enterprises, we observe an increase in the level of staff stability and the amount of monetary incentives and a decrease in the staff turnover rate in the short-term forecast period.

We will graphically present the actual values of the main personnel management factors and the received forecast for 2024 (Fig. 2-4).

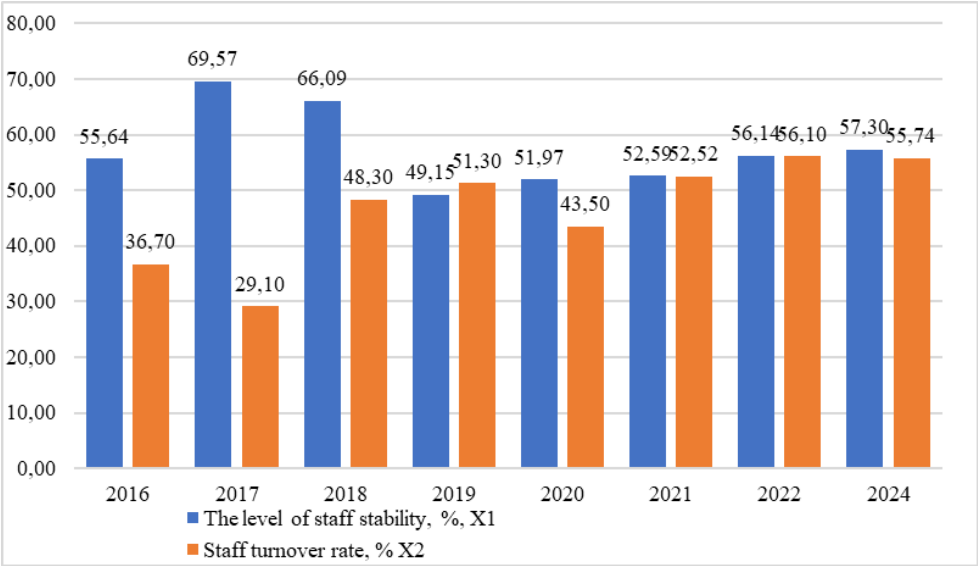

Fig. 2. The actual and forecast value of the main factors of personnel management of the SE EF "Stepne" Poltava District, 2016-2022, 2024.

Source: developed by the authors

As a result of the predicted factor characteristics, the effective indicator of the labor productivity of the 1st average annual employee of the three studied agricultural enterprises in 2024 is also increasing, but it should be emphasized about the influence of other factors of an external and internal nature and take into account that the data of the study are based on economic and mathematical methods and models.

The actual, theoretical and forecast levels of labor productivity of the 1st average annual employee of the three researched agricultural enterprises, 2016-2022, 2024, are presented in the table. 8.

Graphically, multiple linear regressions of labor productivity of the 1st average annual employee of the studied agricultural enterprises are presented in fig. 5-7, which shows the actual, theoretical and forecast levels of labor productivity of the 1st average annual employee of the studied agricultural enterprises, 2016-2022, 2024.

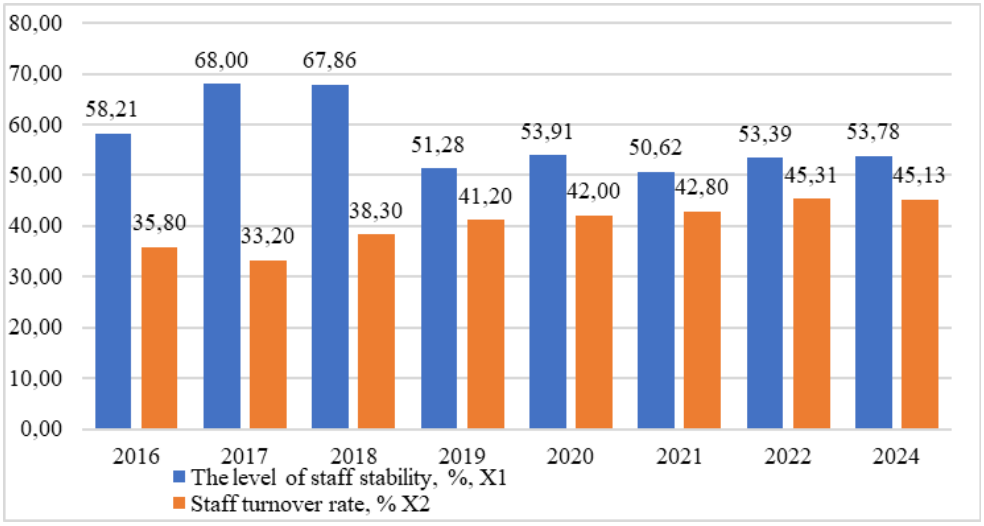

Fig. 3. The actual and forecast value of the main personnel management factors of PAC "Zlagoda" of Poltava district, 2016-2022, 2024.

Source: developed by the authors

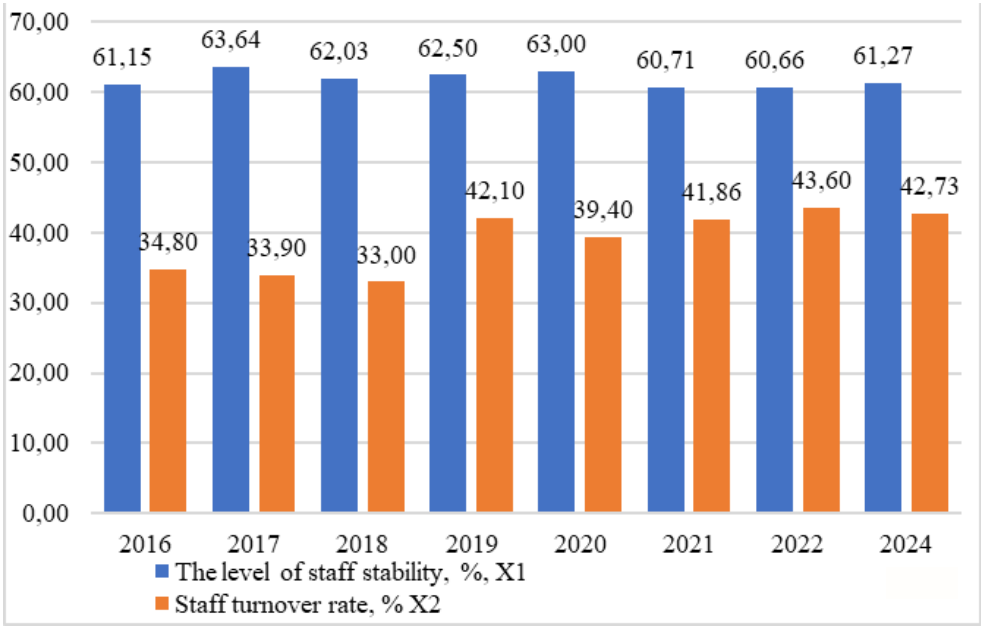

Fig. 4. The actual and forecast value of the main personnel management factors of PE "named after Kalashnikov" of Poltava district, 2016-2022, 2024.

Source: developed by the authors

Table 8

Actual, theoretical and forecast levels of labor productivity of the 1st average annual employee of the three researched agricultural enterprises, 2016-2022, 2024

Years	Labor productivity of the 1st average annual employee, thousand UAH, Y	Theoretical level of labor productivity of the 1st average annual employee, thousand UAH, Ŷi	Forecast level of labor productivity of the 1st average annual employee, thousand UAH, Ŷi
SE EF "Stepne" Poltava district			
2016	149.36	224.94	
2017	254.53	231.55	
2018	327.60	318.63	
2019	319.43	285.39	
2020	344.57	295.35	
2021	354.67	356.84	
2022	353.78	391.24	
2024			451.51
PAC "Zlagoda" of Poltava district			
2016	182.24	231.17	
2017	234.17	203.87	
2018	262.13	273.16	
2019	314.40	306.99	
2020	352.54	321.62	
2021	367.63	350.50	
2022	364.88	390.66	
2024			434.00
PE "named after Kalashnikov" of the Poltava district			
2016	223.21	229.04	
2017	252.05	241.02	
2018	267.03	269.62	
2019	295.00	300.34	
2020	320.04	327.24	
2021	332.67	326.93	
2022	352.41	348.21	
2024			377.40

Source: developed by the authors

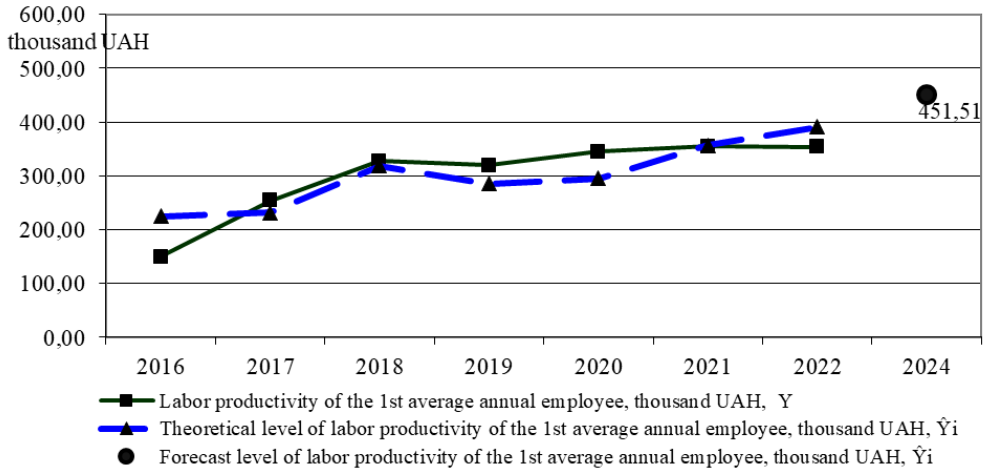

Fig. 5. Actual, theoretical, and forecast levels of labor productivity of the 1st average annual employee of the SE EF "Stepne" Poltava district, 2016-2022, 2024.

Source: developed by the authors

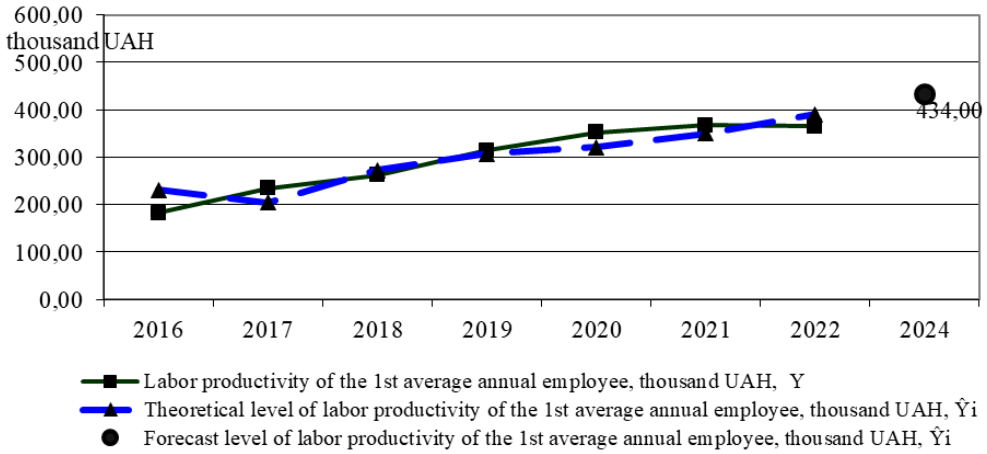

Fig.6. Actual, theoretical and forecast levels of labor productivity of the 1st average annual employee of PAC "Zlagoda" of Poltava district, 2016-2022, 2024.

Source: developed by the authors

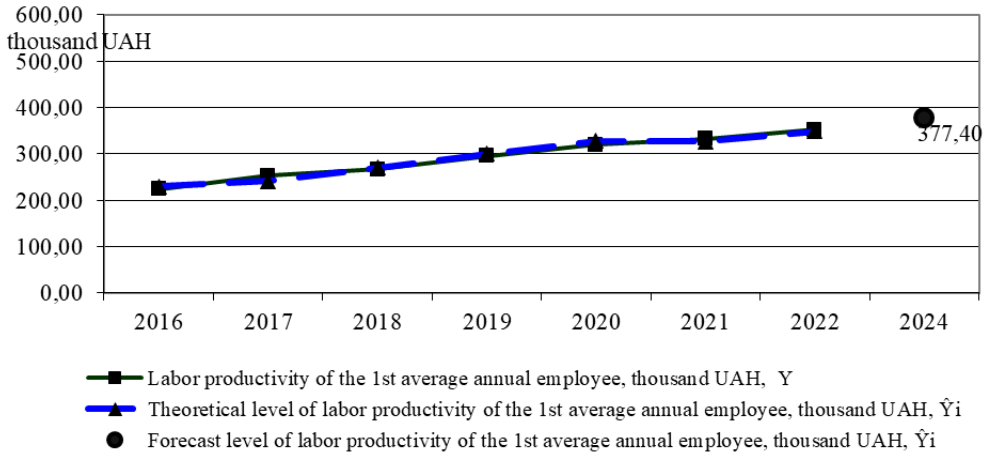

Fig. 7. Actual, theoretical and forecast levels of labor productivity of the 1st average annual employee of PE "named after Kalashnikov" of Poltava district, 2016-2022, 2024.

Source: developed by the authors

Conclusions. With the help of game theory, we will determine and analyze the size of the optimal monetary incentive depending on the type of additional payments, using the example of specific socially oriented personnel management of highly adaptive enterprises. In continuation of the study, research, analysis, modeling and forecasting of the impact of the main personnel management factors on the productivity of the 1st average annual employee of three agricultural enterprises, we will conduct a detailed forecasting of the performance indicator taking into account the level of staff stability and the staff turnover rate based on previous statistical data. Research and forecasting will be carried out using linear and non-linear production functions.

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SPECIFICS OF LABOR MARKET TRANSFORMATION UNDER THE INFLUENCE OF THE DIGITAL ECONOMY

Irina Ignatieva,
Doctor of Economic Sciences, Professor,
National University of «Kyiv-Mohyla Academy», Ukraine,
iignatyva@ukr.net; ORCID: 0000-0002-9404-2556
Vladyslav Holota,
National University of Life and Environmental Sciences of Ukraine,
kn23-v.holota@nubip.edu.ua; ORCID: 0009-0009-1349-287X

Annotation. *Ukraine, like the rest of the world, is in the process of transitioning to a digital economy and society. This transition has been underway for almost half a century, but the pace of change has accelerated as digital infrastructure continues to expand, smartphones become more widespread, enabling universal computerization, and huge amounts of information of all kinds are generated. These changes have turned data into a strategically important asset. We are talking about a change in the global socio-technological order, which results in a complete reformatting of the systems we are used to, the formation of new social and economic strategies of business entities at various levels. At the same time, the technological paradigm is changing, governance models and social norms are changing, and large-scale demographic shifts are taking place. However, the problem is not that the transition to a new model of economic development is taking place in principle. The problem is that this transition is happening at an extremely fast pace - not over millennia, like the agrarian way, not over centuries, like the industrial way, but in just a few decades. In the context of these changes, a new specific digital labor market is emerging. The active development and spread of information technology in society has led to the formation of a new social and labor structure characterized by innovative forms of employment. The emergence of new forms of labor activity, different from those existing in the industrial era, raises questions about their functioning, problematization and deformation. Currently, the social structure of business entities is being transformed; rapid technological progress is creating new requirements for all labor market players; the methodology of hiring employees is changing; flexibility and mobility are increasing; and the level of educational requirements is rising. In all countries of the world, there is a tendency for accelerated growth in the number of groups with intermediate status, which are on the verge of employment, unemployment and economic inactivity. Therefore, it is relevant and timely to study the peculiarities of the digital labor market. The study was based on the use of: method of comparison, generalization - to clarify and formalize the essence of the concept, graphoanalytical method - to provide clarity of the material and schematic representation of a number of theoretical and practical provisions of the study.*

Keywords: *labor market, digital economy, corporate social responsibility, civil market development, employment.*

Introduction. The article analyzes the peculiarities of the labor market development, in particular, under the influence of the digital economy. The current situation in the business environment of Ukraine requires comprehension and development of certain management and economic tools for adaptation of business entities to new conditions. The

article outlines the main directions of changes in the labor market in connection with the development of the digital market.

Results and their analysis. In the context of the rapid transformation of the economic environment of various business entities, driven by the development of digital technologies and the spread of digitalization in all aspects of society, the activities of specialists who create digital technologies, i.e. IT professionals, are of particular importance. The transition to the digital economy is significantly changing the labor market. The active development and spread of information technology in society has led to the formation of a new social and labor structure characterized by innovative forms of employment. The emergence of new forms of labor activity, different from those existing in the industrial era, raises questions about their functioning, problematization and deformation. Currently, the social structure is being transformed; rapid technological progress is creating new requirements for all labor market players; hiring practices are changing; flexibility and mobility are increasing; and the level of educational requirements is rising. In all countries of the world, there is a tendency for accelerated growth in the number of groups with intermediate status, which are on the verge of employment, unemployment and economic inactivity.

In order to understand the trends in the development of IT professionals and employees in the context of digital economic transformation, it is first of all necessary to clearly outline the main processes and megatrends that determine the profile of the future labor market and will influence changes in economic and social relations.

Summarizing the numerous studies on the image of future employment that exist today, researchers identify a number of global trends that will determine the accounting of the digital labor market in the near future [1,2,3]. It is digitalization that is transforming the structure of the economy and, accordingly, various sectors of the economy. What is digital transformation? In this matter, it is advisable to agree with the conclusions of French researchers that digitalization, in turn, is the use of data and digital technologies, as well as means of ensuring interconnectivity, which leads to the emergence of new activities or changes in existing ones, while the concept of digital transformation refers to the economic and social consequences of the use of data digitization and digitalization technologies [4]. Data is central to digital transformation processes. Working with data is nothing new, but before it became digital, collecting, storing, and managing data was a cumbersome and time-consuming task. Standards for categorizing, structuring, linking, and moving digital data have made it suitable for algorithmic management, which has transformed data into a more meaningful, useful, and therefore valuable resource.

The transition to digital products, digital markets, and their interactions has clear underlying advantages that are manifested in comparison to the previous properties of analog or physical equivalents. These advantages, which are often disruptive in nature, can influence the formation of business strategies in different ways. In order for strategies to be effective in the digital economy and society, they must take these properties into account, and therefore it is advisable to focus on the vectors of the digital transformation of the economy: scale, coverage and speed; property, assets and economic value; relationships, markets and ecosystems. It is digital technologies that have become the driving force behind development in three interrelated dimensions: scale, reach, and speed. Rapid progress in each of these dimensions of these dimensions has, in turn, spurred digital innovation. The fundamental driver for this has been the exponential (rather than linear)

growth of computing power over the past half century, with the number of transistors per square inch in an integrated circuit doubling every 18 to 24 months. Digital products have a significant distinctive advantage of an inverted cost structure. Unlike physical products, which typically have low fixed costs and significant variable costs that decline as production scales up, digital products are more characterized by predominantly fixed costs with low, near-zero variable costs. This characteristic, combined with the global distribution capabilities of the Internet, allows successful businesses to scale rapidly, with access to international markets and sometimes with very few employees or physical assets. Digitalization also accelerates the economic and social activity of businesses. Markets are changing rapidly, innovative ideas are spreading faster, and the time buffer associated with distance is shrinking, as is the time required to identify, engage, and develop a community. Increasingly, the advantage is being gained by pioneers and their followers through agility enhanced by rapid iterative learning.

Another advantage is the change in priorities in investment and attitudes toward property. Thanks to digital coding and modulation, the vectors of scale, reach and speed are combined in many ways, often reinforcing each other. While in the 20th century real investment was the predominant form of investment and fixed assets accounted for the majority of asset value, since the middle of the first decade of the 2000s, an increasing share of business investment has been in intangible (intellectual) capital rather than traditional tangible assets [5]. According to a report on the global situation with intangible capital prepared by Brand Finance, the global value of intangible assets increased from USD 61 trillion in 2019 to USD 75 trillion in 2021. In addition, according to a study conducted by Ocean Tomo, intangible assets account for 90% of the value of companies included in the S&P 500 index.

Thus, this advantage provides a competitive advantage and shifts investment flows towards intangible assets, many of which can be digitized. Finally, as a general-purpose infrastructure, the Internet has become a revolutionary departure from analog communications such as telephone and radio broadcasting. Before the Internet, there was no single infrastructure to connect users, digital assets, and physical objects. The principle of "end-to-end access" on the Internet means that any user can connect to any other user. Thus, digitization is changing the nature of products, and the Internet is enabling changes in the formation, maintenance, and nature of relationships. First, the Internet has made digital products available and usable around the world, radically reducing communication and transaction costs.

This has enabled a shift in production to extended supply chains and global value chains or "clusters", Combined with the fact that digital products can contain and transmit various forms of information - addresses, code, content, metadata - this has greatly enhanced the ability to interact and exchange data between individuals, businesses, organizations and governments wherever they are located. This not only helps to strengthen bilateral relations, but also supports and enhances the work of markets. Markets are becoming larger, more information-rich, efficient, and complete; they can be managed as massive private enterprises that bring together disparate interests and objects on technologically sophisticated platforms.

Taking into account the above vectors of the digital world, we identify the trends that will shape the scope of future labor relations (Table 1).

Table 1

Digital transformation trends that are changing labor relations

Key trends transforming the labor market	Consequences of changes in labor relations
Technological progress, automation and robotization	Technological innovations, robotics and artificial intelligence are developing rapidly, which will significantly transform the quality and quantity of available jobs. Technology can make life easier, increase its productivity, quality and duration
Cloud technologies and cloud computing	This provides great opportunities for remote work and the involvement of third-party contractors, connecting them to a single system with the ability to monitor and control all processes
Digitalization of personal space	Digitalization technologies are penetrating all areas of human activity, Augmented reality is used at workplaces in complex industries, creating new ways of working, communicating and collaborating across the enterprise, which leads to the development of new competencies among employees
Big Data and the Internet of Things.	Total industrial and household computerization has led to the emergence of big data, which opens up new opportunities for the development of artificial intelligence technologies, which implies the ability of computing devices to solve complex problems on their own. Due to the constant growth of computer performance and the development of machine learning technologies, huge streams of digitized data have become the material for training artificial neural networks
Gig economy	The essence of the phenomenon is a fundamental change in the labor market, its transition from the availability of permanent jobs with one employer to temporary projects from different companies with one independent employee. The new model of labor relations is based on short-term contracts or informal arrangements - "contingent workforce management". Networks of people who work without any formal labor agreement. To prevent exploitation, there are issues of worker protection, income security, benefits, access to credit, training, and incentives. Training initiatives will also be needed to integrate low-skilled workers into the gig economy

Formation of a network society and network economy	The network society implies the elimination of various intermediaries when registering or recording ownership rights to any property, as well as when concluding any transactions with tangible or intangible assets. This leads to significant changes in the state and corporate bureaucracy, as well as to the complete large-scale democratization of the financial sector. In a world connected by networks, the need to go to the office on a stable schedule and work for one company is gradually disappearing. More and more people are becoming freelancers.
Development of neurotechnologies, bio- and neurointerfaces	The ability to quickly analyze and transmit information about a person's condition. Implantation of sensors that transmit data on the state of the body (for example, sugar levels, hormones, organ function) to your own smartphone or doctor. In the foreseeable future, these technologies are expected to be enhanced by the development of neurointerfaces that allow for the reading and interpretation of brain signals. Researchers see the development of neurotechnologies as an important technological milestone, which, if overcome, could dramatically change society in the coming decades
Demographic changes.	Older employees will be forced to learn new skills and work longer hours. Labor shortages in rapidly aging economies will create an urgent need for automation and productivity improvements. The growing role of women in the economy and changing patterns of childhood will set a new social standard
Rapid urbanization.	Rapid growth of the urban population. The future of the world is already seen in relations between cities, not countries
Resource scarcity and climate change	To meet the needs, new jobs are expected to be created in areas such as alternative energy production, new technologies, new product development, waste recycling and the use of secondary resources. Accordingly, millions of people will have to retrain and acquire new professions throughout their lives
Increasing speed of change	The speed of change forces people to change professionally. In this context, the concept of lifelong learning, personal development, etc. is gaining ground.
Globalization (economic, technological and cultural).	Globalization has increased the level of competition between representatives of innovative human capital and the requirements for acquiring new competencies.

Source: generalized by the authors on the basis of [2,3,4]

Thus, in the digital economy, both the nature of labor and the entire system of labor relations are changing. Digital technologies create a specific labor process and make significant changes to its elements: subject matter, means, technology, organization, and results. In the modern information economy, it is information that is the subject of labor. A feature of the digital labor market is its global nature. The digital labor market involves the interaction of an employer with an employee on a digital platform in the mode of remote work. Employees can be employed remotely across territorial borders wherever their competitiveness and working conditions allow.

The conducted research allows us to formulate that the main difference between the digital market is that the interaction of the digital labor market actors takes place through various online platforms, which are a meeting place for employees and employers, as well as a place to agree on remuneration for services rendered. A product sold in the digital labor market is a labor service created with the help of information and computer technologies.

In order to understand the development of the digital market, it is advisable to analyze global trends. According to the World Economic Forum (WEF), published in The Future of Jobs Report 2023, technology adoption will remain a key driver of business transformation over the next five years. More than 85% of the organizations surveyed in the study identify increased adoption of new and emerging technologies and increased digital access as the trends most likely to drive transformation in their organizations. The wider application of environmental, social and governance (ESG) standards within their organizations will also have a significant impact will also have a significant impact on the wider application of environmental, social and governance (ESG) standards within their organizations. The next most influential trends are macroeconomic: rising cost of living and slow economic growth. The impact of investment on driving the green transition was ranked as the sixth most influential macro trend, followed by supply shortages and consumer expectations around social and environmental issues. The largest job creation and destruction effects come from environmental, technological and economic trends. As expected, technological progress due to the wider adoption of information and new technologies and increased

digital access is expected to contribute to job growth in more than half of the surveyed companies, offset by the expected job losses in one-fifth of the companies due to other factors. [1] Within technology adoption, big data, cloud computing and AI feature highly on the likelihood of adoption. More than 75% of companies are looking to adopt these technologies in the next five years. The data also shows the impact of the digitalization of commerce and trade. Digital platforms and apps are the technologies most likely to be adopted by the organizations surveyed, with 86% of companies expecting to incorporate them into their operations in the next five years. E-commerce and digital trade are expected to be adopted by 75% of businesses. The second-ranked technology encompasses education and workforce technologies, with 81% of companies looking to adopt these technologies by 2027. The adoption of robots, power storage technology and distributed ledger technologies rank lower on the list. Modern organizations estimate that 34% of all business-related tasks are performed by machines, and the remaining 66% are performed by people. This is a 1% increase over the level of automation estimated by

respondents to the 2020 Future of Work survey. This pace of automation contradicts the expectation of 2020 respondents that almost half of business tasks would be automated over the next five years, perhaps reflecting the view that machines and algorithms have increased human efficiency rather than automated tasks in that period. Overall, compared to 2020, employers have revised their forecasts for future automation down by 5% (from 47% automation by 2025 in 2020 to 42% automation by 2025 in 2020 to 42% in 2027). Task automation in 2027 is expected to range from 35% of reasoning and decision-making to 65% of information and data processing.

An analysis of the situation in Ukraine shows that the digital market is one of the few that retains some tendencies for development under martial law [6]. It is worth noting that in Ukraine, if employment is realized in two main forms: e-freelancing (e-lancer) and e-outsourcing. An e-freelancer carries out work remotely using ICT. E-freelancing covers a wide range of economic activities: programming, content creation and translation, market research, sales, consulting, financial accounting, and administration. An e-freelancer does not have face-to-face contact with customers: job search, contracting, receiving tasks, discussing current work issues, submitting work results and paying for them are all done online. An analysis of the situation in Ukraine's business environment shows that during the year of full-scale war, the number of IT professionals registered as individual entrepreneurs increased by 31,793, or 13%. In terms of the growth rate of the number of IT workers, 2022 did not differ from the previous year - in 2021, the number of individual entrepreneurs in IT also increased by 13%. According to [7], in 2022, 87% of Ukrainian IT professionals worked under the sole proprietorship model. About 6% were registered under the Labor Code, another 1% were gig contractors, and in 2023, the number of IT professionals registered in this way may increase. The Ministry of Digital Transformation said in a comment to DOU that the number of gig contractors is growing, but there is no exact data. Some IT companies also declare a shift away from working with individual entrepreneurs and towards other forms of cooperation with IT specialists.

Conclusions. Thus, we can identify the main vectors of changes in the labor market due to the development of the digital market. First, the boundaries of the traditional division of labor are changing, the boundaries of professions are blurring, the rate of "extinction" of traditional professions is accelerating, and new, previously unpredictable professions are emerging. Second, forms of employment are changing. Along with traditional contractual forms of labor relations, employment in the form of freelancing, outsourcing, flexible forms of involving professionals in labor activities, remote employment, project-based employment, etc. are actively developing. Third, there is a growing need for human mobility throughout the entire labor activity. This is due both to the intensification of migration processes (military operations, macroeconomic processes, etc.) and to interprofessional, interindustry, and intra-company mobility.

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A NEW LOOK AT PPP IN HEALTH PROTECTION: PERSPECTIVES OF INTERACTION BETWEEN THE STATE AND HOSPITALS OF UKRAINE

Victoria Khmurova,
Doctor of Economics, Associate Professor,
State University of Trade and Economics, Ukraine,
v.khmurova@knute.edu.ua; ORCID: 0000-0002-6398-6351
Nataliya Deeva,
Doctor of Economics, Pprofessor,
State University of Trade and Economics, Ukraine,
n.dyeyeva@knute.edu.ua; ORCID: 0000-0002-2278-549X
Yana Volkova,
postgraduate student,
State University of Trade and Economics, Ukraine,
y.volkova@knute.edu.ua; ORCID: 0000-0001-6531-7728

Annotation. *In the context of modern challenges facing the healthcare system of Ukraine, in particular the limitation of financial resources, and the need to modernize the infrastructure and improve the quality of medical services, public-private partnership (PPP) emerges as a strategic tool that offers new opportunities for solving these problems. The relevance of this study lies in the in-depth analysis of the potential of PPPs in the field of health care in Ukraine, with an emphasis on the identification of key success factors, challenges, and barriers that accompany the implementation of such projects. Given the growing need for investment to improve health infrastructure and services, as well as the need to introduce innovative approaches to healthcare delivery, PPP research is becoming increasingly important. It makes it possible to identify mechanisms through which effective interaction between public authorities and the private sector is possible, which, in turn, contributes to the achievement of strategic goals in the field of health care. This study is aimed at revealing the possibilities of PPPs to improve the availability and quality of medical services, analyzes international experience, and outlines recommendations for the adaptation of best practices in the context of the Ukrainian healthcare system. The results of the study are intended to contribute to the development of effective policies and strategies for the implementation of PPPs, which will become the basis for the sustainable development of health care in Ukraine, improving the quality of medical care and providing the population with affordable and high-quality medical services.*

Keywords: *health care, PPP, Ukraine, medical institutions, investments, modernization of infrastructure, quality of medical services, innovative approaches, strategic planning.*

Introduction. In the modern conditions of the development of society, especially in the context of global challenges facing the healthcare system, the search for effective ways of providing the population with quality medical services is becoming particularly relevant. Ukraine, like many other countries, faced the need to adapt its healthcare system to the changing needs of society and the challenges of the times. This requires not only

significant financial investments in the development of medical infrastructure but also an innovative approach to the management of medical institutions and the provision of medical services.

The relevance of public-private partnership (PPP) research in the field of health care in Ukraine stems from the potential of this tool to solve several existing problems. PPP can contribute to increasing the efficiency of medical care, modernization of medical infrastructure, introduction of the latest technologies and treatment methods, and attraction of private investments and innovations in the field of health care. Such cooperation between the state and the private sector opens up new opportunities for the development of the medical industry, ensuring a higher level of medical care and the availability of medical services for wider segments of the population.

However, despite the significant potential, the implementation of PPP in Ukraine is accompanied by several challenges. This concerns both legal and regulatory aspects of cooperation between the state and private investors, as well as risk distribution, control over the quality of medical services, and protection of patients' rights. Therefore, research aimed at analyzing existing experience, studying international practices, and developing recommendations for optimizing PPP models in health care becomes important. It aims not only to determine effective mechanisms of interaction between the state and the private sector but also to ensure a high level of accessibility and quality of medical services for the population, thus contributing to the sustainable development of healthcare in Ukraine.

This study aims not only to highlight the potential advantages and challenges of DPP in health care but also to propose specific directions for improving existing practices and developing effective strategies for implementing DPP in the medical field of Ukraine. Considering the growing interest in PPP models in the world, the analysis of the Ukrainian experience and the adaptation of best international practices can contribute to the solution of current healthcare problems, opening new perspectives for its development.

Literature review. In the introduction and abstract, we emphasized the importance of public-private partnership (PPP) in the field of health care in Ukraine, emphasizing the potential and challenges that arise during the implementation of such projects. The literature review expands this topic, based on the analysis of the works of scientists who investigate various aspects of PPP in the context of health care.

S. Kachula, L. Lysiak, Liliya Barannyk, I. I. Masyuk, T. Tereshchenko, and Tetyana Salnikova (2023) in their study emphasize the role of PPP in providing the population with high-quality medical services and maintaining financial stability. Their work emphasizes the importance of integrating the efforts of the state and the private sector to achieve sustainable development in the field of health care.

V. Borshch, Yevhen I. Maslennikov, V. Truba, and Lyudmila M. Tokarchuk (2019) examine the scientific debate on PPP issues, providing an overview of the current state and prospects for partnership development in the healthcare sector. Their analysis reveals key success factors and major challenges faced by PPP participants.

Yu. Gumenna, Ihor Martsovenko, P. Srovnalikova (2021) investigate in detail the peculiarities of PPP implementation as a key form of investment of financial resources

in the field of medical services in Ukraine. Their work makes an important contribution to understanding the mechanisms of effective cooperation between the state and private investors.

O. Shevchuk, V. Zuy, Ihor Kompaniets, V. Martynovskyi, and Yuriy Matat (2021) discuss aspects of legal regulation of PPPs in the field of health care, highlighting the importance of creating a clear and effective legal framework to ensure the successful implementation of PPP projects.

N. Ovcharova, M. Grabovska (2022), T. Popova, N. Gavkalova (2021), A.A. Nurkaeva, I. Vaslavska (2022), K. Pavlyuk, O. Kaminska (2018), Yevdokia Sergeyivna Kuznetsova, Azizakhon Zhalalidinovna Abdalieva (2023), and A. Ivanyuk (2020) complement this analysis, studying both global experience and specifics of the Ukrainian context in PPP implementation. Their research covers a wide range of issues, from the development of PPP elements and the formation of an effective environment for its implementation to the analysis of specific cases of successful interaction between the state and private organizations.

These authors made a significant contribution to the understanding of the role and potential of PPPs in health care, pointing to the need for an integrated approach to the planning and implementation of such projects. Their research emphasizes the importance of adapting the international experience to Ukrainian conditions, as well as the need to take into account the specific challenges and opportunities that arise in the process of PPP development in the Ukrainian healthcare sector.

The main goal of the study is a comprehensive analysis of public-private partnerships (PPPs) in the field of health care in Ukraine to identify the potential, challenges, and opportunities for improving the health care system through effective interaction between state structures and the private sector. The study is designed to determine the strategic directions and mechanisms of PPP optimization, which will contribute to improving the quality and availability of medical services in Ukraine.

Analysis of existing theoretical approaches to the definition of PPP in the field of health care: Review of scientific literature to synthesize the main theoretical concepts of PPP, which were developed by Ukrainian and foreign researchers, to establish the conceptual basis of the study.

Study of international experience of PPP implementation in the field of health care: Analysis of successful international PPP practices and models, to identify key success factors that can be adapted and implemented in Ukraine.

Assessment of the current state and specifics of PPP implementation in the field of health care in Ukraine: A detailed analysis of existing PPP projects in Ukraine, including an assessment of their effectiveness, challenges, and barriers to implementation.

Identification of the main challenges and barriers to the implementation of PPPs in the field of health care: Identification of legal, economic, organizational, and other obstacles that slow down or limit the effective implementation of PPPs in health care.

Development of recommendations for optimizing the interaction between the state and the private sector within the framework of PPPs: Formulation of proposals and

strategic steps to overcome identified barriers and challenges, as well as to increase the effectiveness of PPPs in the healthcare sector.

Forecasting the development potential of PPP in the health care of Ukraine: Determination of opportunities and prospects for the development of PPP as a tool for the modernization of healthcare, increasing the availability and quality of medical services for the Ukrainian population.

These tasks form the basis of the research and are aimed at achieving a defined goal, which will allow a deeper understanding of the potential of PPPs in health care in Ukraine and the development of effective recommendations for their implementation.

Methodology. The methodology includes methods of economics and managerial science as well as scientific publications of the world and Ukrainian scientists in economics and management. There are specific tools in economics today to conduct research in the institutional providing of entrepreneurship. However, there is a need to identify of the main directions to improve institutional conditions to provide activation of entrepreneurship in terms of after-war renovation. In this research, the authors used the dialectical method, method of analysis and synthesis, historical method, statistical method, formal-logical method, and scientific abstraction method.

The method of logical conclusions made it possible to work out recommendations for using international experience to improve the institutional environment to activate entrepreneurship in the economy of Ukraine.

To achieve the defined goal and solve the set tasks, within the framework of the study "A new look at PPPs in health care: prospects for the interaction of the state and hospitals of Ukraine" a comprehensive methodology will be used, which covers the following aspects:

1. Theoretical analysis.

Literature review: In-depth analysis of scientific works, monographs, articles in professional journals, and official reports of governmental and international organizations, which allows for the formulation of the theoretical basis of the research. Particular attention is paid to the works of scientists indicated in the list of authors, to integrate current approaches and conclusions into the research.

2. Comparative analysis.

International experience: Study and comparison of international PPP cases in the field of health care, to identify effective models and practices that can be adapted to Ukrainian conditions.

3. Empirical research.

Case studies: Detailed analysis of specific cases of PPP implementation in Ukraine, to identify success factors, key challenges, and opportunities for further development.

This methodology will enable a comprehensive approach to the study of PPPs in health care in Ukraine, providing a deep understanding of the topic, identifying the main challenges, and developing effective recommendations for improving policy and practice in this area.

Results and discussion. Taking into account the established goals and objectives,

the study is revealed through the analysis of existing practices, challenges, obstacles, and opportunities of PPPs, as well as through the development of recommendations for their optimization.

A review of scientific literature demonstrates that PPPs in health care are considered a tool for attracting private investment and management practices to improve the efficiency and quality of medical services. In Ukraine, PPP is starting to gain popularity, but there are still significant barriers to its implementation, in particular, imperfect legislation, bureaucracy, and the lack of clear control and monitoring mechanisms.

International experience shows that successful PPP projects in the field of health care are based on a clear division of risks, responsibilities, and duties between the state and private partners. Countries with developed PPP practices, such as the UK and Canada, demonstrate the importance of creating a favorable investment climate and transparent conditions for private investors.

Project "Royal Liverpool University Hospital" in Great Britain. This project involved the construction of a new university hospital complex in Liverpool through a PPP. The goal of the project was to provide the population with high-quality medical services with the help of modern infrastructure. Cooperation between the state and the private sector made it possible to use innovative technologies and approaches in treatment, as well as to increase the efficiency of hospital management.

"Alzira Model" project in Spain. The "Alzira Model" is a pioneering PPP model in the field of health care, which was introduced in the Valencia region. Under this model, the management of the hospital was transferred to a private company, which was given responsibility for providing medical services in a certain area. The peculiarity of the "Alzira Model" is that financing is carried out according to the capitation system, where the fee for services depends on the number of patients served, which contributes to increasing the efficiency and quality of medical care.

Project "Queen Elizabeth Hospital" in Belgium. The "Queen Elizabeth Hospital" project in Belgium is an example of a successful PPP in the field of health care, where the state cooperated with private partners to reconstruct and modernize the hospital. The project involved not only the physical renewal of the infrastructure but also the introduction of advanced technologies in diagnostics and treatment, which allowed to raise the level of medical care. An important condition for success was a clear interaction between all project participants, including the involvement of medical personnel in the process of project planning and implementation.

These projects demonstrate that PPPs can be an effective tool for the development of the healthcare sector, ensuring the modernization of infrastructure, improving the quality of medical services, and introducing innovations. An important aspect of success is the clear definition of goals, the allocation of risks and responsibilities, as well as the involvement of all stakeholders in the process of planning and project management.

Assessing the current state of public-private partnerships (PPPs) in healthcare in Ukraine, several successful initiatives can be highlighted that highlight the significant potential of PPPs to modernize medical infrastructure and improve the quality of medical services. These initiatives cover various aspects of health care, from the construction and

reconstruction of hospitals to the introduction of advanced technologies and approaches to health care.

1. Modernization of the Kyiv City Clinical Hospital.

City: Kyiv, Ukraine

Project: Cooperation between Kyiv city authorities and private investors for the modernization of the Kyiv City Clinical Hospital. The project included the renewal of medical equipment, the reconstruction of hospital departments, and the introduction of the latest technologies in the field of diagnostics and treatment. Special attention was paid to improving the conditions of providing medical services for patients and the working conditions of medical personnel.

2. Creation of a diagnostic center in Odessa.

City: Odesa, Ukraine

Project: Launch of a diagnostic center in Odesa with the participation of local authorities and private investors. This PPP project focused on providing access to high-quality diagnostic services using advanced technologies, particularly MRI and CT. The center has become a key element in improving diagnosis and treatment planning for residents of Odesa and the region.

3. Update of the emergency medical care system in Lviv.

City: Lviv, Ukraine

Project: The PPP project, implemented between the Lviv City Council and private partners, was aimed at updating the emergency medical care system. It included the acquisition of new ambulances equipped with the latest technology and the implementation of information systems to optimize emergency response. The project significantly increased the efficiency of emergency medical care in Lviv, shortened the response time to calls, and improved the quality of first aid.

The main challenges facing the implementation of PPPs in Ukraine include legal uncertainty, high risks for private investors, lack of trust between public and private structures, and bureaucratic obstacles. Specific barriers were also identified, in particular, the difficulty in defining KPIs (key performance indicators) for evaluating the effectiveness of projects.

Based on the analysis, several recommendations aimed at overcoming existing challenges and barriers were developed. This includes improving the regulatory framework, developing clear risk-sharing mechanisms, creating specialized agencies to support PPPs in health care, as well as measures to increase project transparency and accountability. It is also recommended to introduce programs to support and stimulate private investments in the field of health care.

The final section is devoted to the assessment of the prospects for PPP development in health care in Ukraine. Given the international experience and existing initiatives in Ukraine, we can expect a growing interest in PPPs as a tool for attracting investments and improving the quality of medical services. An important success factor will be the creation of a favorable investment climate and effective interaction between the state and the private sector.

Conclusions. PPP has significant potential in the field of health care in Ukraine,

offering ways to modernize the infrastructure and improve the quality of medical services. However, several legal, economic, and managerial challenges must be addressed to achieve success. It is recommended to further improve the regulatory framework, develop clear criteria for the selection of PPP projects, and ensure mechanisms for monitoring their implementation.

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THE ESG CONCEPT IN THE BUSINESS ACCOUNTING AND INFORMATIONAL SUPPORT SYSTEM: IMPORTANCE AND THEORETICAL BASIS

Lesya Leshchii,
Ph.D. in Economics, Associate Professor,
Ukrainian-American Concordia University,
lesya.leshchiy@uacu.edu.ua; ORCID: 0000-0003-2520-0589
Natalia Bielous,
Ph.D. in Economics, Associate Professor,
Academy of Labor, Social Relations and Tourism, Ukraine,
ordnadi@ukr.net; ORCID: 0009-0002-5596-4889
Serhii Nikolaienko,
postgraduate student,
Academy of Labor, Social Relations and Tourism, Ukraine,
serhiinikolaienko98@gmail.com; ORCID: 0009-0008-7190-4011

Annotation. *Considered the possibility of including aspects of ESG - the external environment, social and management components in the accounting and information provision of business. The article examines the origins of the problem - modern challenges facing the globalized economic space and the need to adhere to the concept of sustainable development. The results of a public survey regarding environmental issues and their solution are given, which indicate interest in this problem. On the basis of all the mentioned provisions, as well as a study of the works of scientists, practitioners, public organizations and consulting firms, the importance of reflecting ESG aspects in corporate reporting is substantiated.*

This will contribute to increasing the level of informativeness of reporting, which is important for investors and other users, and will also generally contribute to achieving the goals of sustainable development.

Keywords: *ESG, sustainable development, business accounting and information support, corporate reporting.*

Introduction. For a long time, the importance of a comprehensive assessment of business activity has been discussed in the economic space. Previously, this approach was based to a greater extent on the fact that effective management of non-financial components - for example, training and growth of personnel, research on the level of consumer satisfaction - leads to an increase in the efficiency of activities in the long term and profitability in general. Now more and more attention is paid to the importance of taking into account non-financial indicators within the framework of the concept of sustainable development.

Considering this, it is appropriate to pay attention to the main trends in global economic discussions, in particular, to the results of the conference in Davos, which took place on January 15, 2024. So, the list of topics included [1]:

1. Security and cooperation in today fragmented world.

2. Ensuring growth and jobs in the new era.
3. Artificial intelligence as a driving force of the economy and society.
4. Long-term strategy for climate, nature, and energy.

As you can see, the challenges of the modern world are emphasized, in particular, the ecological component and threats associated with global warming. Therefore, it is logical that global socio-economic trends should be reflected in the indirect information provision of business, because it performs two main functions. First, it is the basis for managing the enterprise - it is reflected in the company's financial statements, as well as in management reports intended for internal use, as the basis of management accounting. Secondly, this reporting is the basis for the formation of statistical data on a national and global scale, on the basis of which it is possible to evaluate the world trends of sustainable development and take into account the consequences of global warming. And thirdly, this information is necessary for integrated reporting. In order to understand to what extent the goals of sustainable development are being achieved by region and whether positive changes are taking place to prevent global warming, we must first of all assess the contribution of each business to this task.

In this context, the importance of the concept of ESG is increasing. ESG is an abbreviation for environmental, social, governance. With this approach, the company tries to take into account all the mentioned components as much as possible when building corporate governance. And it is the information obtained as a result of more objectively and fully compiled financial statements that can contribute to this.

Literature review. World practice shows sufficient interest and a certain level of research on this topic. Thus, in a study by Pedro Matos [2], conducted on the basis of the CFA Institute Research Foundation, it is noted that "ESG," "responsible investing," and "sustainable investing" are broad umbrella terms that refer to the incorporation **of environmental, social, and governance (ESG) considerations** into investors' portfolio decisions. Investors typically assess ESG factors using nonfinancial data on environmental impact (e.g., carbon emissions), social impact (e.g., employee satisfaction), and governance attributes (e.g., board structure).

Agnes Sipiczki in a study conducted on the basis of CEPS [3] says that environmental, social and governance (ESG) investing has been practiced in Europe for more than two decades, during which it has moved from niche to the mainstream market. Consulting companies also draw a lot of attention to this topic. Thus, in the study by Knachel Eric and Porter Brad [4] conducted on the basis of the company Deloitte & Touche LLP, it is stated that companies know that ESG matters not only have become a fixture in mainstream and social media but also have become top-of-mind for investors, credit rating agencies, lenders, regulators, policy makers, and other interested parties. Also interesting is the study by Rim El Khoury, Viviane Naimy, Sahar Iskandar [5] in which they compare the ESG concept with traditional financial performance evaluation.

Among domestic specialists, we note Korobkov O., Suskachevych A., Golov S., Shchur D., Chaly I., Kononenko O. and others. They note that as the environmental, social and governance ESG landscape rapidly evolves, the involvement of financial professionals is likely to play a key role in the next phase of the ESG reporting

process. They emphasize the importance of reporting in this area, the development and improvement of indicators of such reporting, as well as overcoming difficulties, since the task requires a complex innovative approach [6; 7; 8]. Also, many practitioners and scientists emphasize that business compliance with ESG principles and disclosure of information about ESG indicators becomes a significant factor in the investment attractiveness of a business, the future value of investments in it, that is, it directly affects the financial decision-making by investors [6].

Research methods. A generalization of a number of legislative acts, scientific and applied studies regarding the inclusion of ESG indicators in reporting was carried out, including studies conducted by consulting companies, in particular Deloitte. Surveys conducted in Ukraine regarding the importance of the ecological component and its relationship with economic goals are analyzed. The experience of Ukrainian and international companies in preparing a management report is summarized. The work uses the methods of induction and deduction, comparison and generalization.

Results and discussion. The study of the ESG concept in the system of business accounting and information support is best started from the origins of this approach - namely, from the concept of sustainable development, which has been widely recognized for many years, but has not yet been sufficiently researched and implemented in practice, especially in Ukraine.

Thus, the goals of sustainable development to be achieved by Ukraine by 2030 are specified in Document 722/2019 of 2019 - Goals of sustainable development of Ukraine for the period until 2030 [9]. This document was adopted for the purpose of harmonizing with the legislation of the EU countries, as well as for the purpose of Ukraine considering global trends. It should be noted that the document is dated before the full-scale retreat of Russia into Ukraine, it does not consider all the problems that arose in connection with the war, and in our opinion, it should be supplemented after the victory.

Let's consider some provisions (which will be relevant at any time) and their interconnection with the direct management of the company (table 1).

As we can see from the table, the goals of sustainable development, at first sight of a non-financial nature, can have a logical and consistent reflection in quite specific measures, the result of the implementation of which can be measured quantitatively and reflected in reporting. And it is the concept of ESG can be used for this. Let's pay attention on its components in more detail.

Environment – assessment of energy consumption, pollution, emissions, efficiency of use of natural resources and animal welfare. It's about environmental risks and how companies manage those risks over the longer term. In this context, it is also important to cooperate with state environmental regulators.

Social – Social factors - how the Company interacts with and cares for people, as well as how it affects the local community and culture in general. The factors consist of inclusiveness, gender policy, the privacy, protection of personal data and customer satisfaction. It is also important to understand how much the Company cares about the health and safety of its employees.

Table 1

Interconnection between the goals of sustainable development, the sphere of management and measures to ensure the achievement of the goals

Goals of sustainable development	the sphere of management	Measures taken by the company to ensure the goal
ensuring a healthy lifestyle and promoting well-being	HR; production management	timely and full provision of vacations, preventing of overtime work; compliance safety equipment
ensuring quality education and lifelong learning opportunities	HR; knowledge management; innovative development	conducting trainings and education for employees, matching the level of education to the position held; stimulation of innovativeness and motivation of employees for self-development
ensuring gender equality, expanding the rights and opportunities of all women	HR; legal management	preventing of gender discrimination in terms of salary or obtaining a managerial position; provision of maternity leave for men as well
ensuring availability and sustainable management of water resources and sanitation	production management; management of production resources	analysis of the use of water resources in the production process and development of measures to save them
ensuring access to affordable, reliable, sustainable, and modern energy sources for all	energy efficient management; Production management	analysis of available modern alternative energy sources, development of a business plan for their implementation
taking urgent measures to combat climate change and its consequences	production management; logistics management; management of waste disposal	reduction of logistics chains in order to save climate pollution in the process of transportation; sorting and recycling of waste

Source: compiled by the author based on [9]

Governance – this is to ensure the rights of shareholders and prevent potential violations of specific regulatory standards. This element includes internal control, access to industry best practices and dialogue with regulators (mainly tax authorities, national banks, and other government bodies) (depending on the industry). It is important to understand whether the company has developed measures to fight corruption and bribery, whether there are effective mechanisms for protecting the company's interest in court, if necessary, etc.

As you can see, the concept of ESG considers a rather wide range of elements, and it is gradually starting to be considered more and more as an element of corporative reporting. Additional evidence of the importance of considering environmental indicators in financial reporting can be considered the growing interest in environmental aspects among the public.

Thus, according to the results of a research conducted by the public organization

Friedrich Ebert Stiftung in 2021 [10], the majority of respondents (60.5%) of the mass poll supported the idea of increasing tariffs for the sake of Ukraine's transition to environmentally friendly energy sources. Also, citizens of Ukraine consider problems with processing and storage of garbage to be one of the most important environmental problems in Ukraine. Table 2 shows the attitude of citizens to environmental problems - as we can see, in most regions environmental protection is a prerogative over economic growth, and the younger and geographically closer to Europe the respondents are, the higher this indicator is.

Table 2

Distribution of respondents' answers to the question "What do you think is more important: economic growth or preservation environment?" depending on the region and age

	REGION					**AGE, years**			
	North	Center	East	West	South	18-29	30-44	45-59	60 and more
Economic growth	29,3%	25,4%	46,4%	30,6%	44,9%	30,5%	35,6%	38,8%	35,5%
Preservation of the environment	50,4%	57,2%	34,2%	54,7%	33,3%	53,2%	48,2%	43,3%	43,2%
Difficult to answer	20,3%	17,4%	19,5%	14,7%	21,8%	16,2%	16,2%	17.8%	21,8%

Sourse: Poll report, 2021 // https://library.fes.de/pdf-files/bueros/ukraine/17805.pdf

Also, according to the results of the same poll, we can see the opinion of citizens regarding the measures should be done by the state for promotion responsibility of business to environmental problems (respondents could choose several answer options).

Table 3

Opinion of citizens regarding environmental measures

Activities	**Number of responses**
Strengthen environmental requirements for enterprises and increase fines for their non-fulfilment	60,6%
Close all environmentally dangerous enterprises, if they are not will introduce measures to improve environmental safety	39,4%
Introduce tax benefits for enterprises engaged in increasing environmental safety	36,6%
Other and difficult to answer	5,6%

Sourse: Poll report, 2021// https://library.fes.de/pdf-files/bueros/ukraine/17805.pdf

Sociological research shows that citizens consider it is reasonable to strengthen environmental requirements and to shut down the enterprises if they do not meet environmental requirements. Currently, compliance with these requirements is almost not reflected in the financial statements of enterprises. That is, based on corporate reporting, investors will not be able to assess the environmental risks of the enterprise (as well as social or other risks related to sustainable development). In our opinion, this does not quite correctly reflect accounting information.

Research of the activities of Ukrainian companies conducted by the Professional Association of Corporate Governance (PACU) and the Center for the Development of Corporate Social Responsibility with the support of the Center for International Private Entrepreneurship (CIPE) show a certain level of disclosure of non-financial information by large Ukrainian companies. The average level of disclosure of information companies of Ukraine according to ESG indicators is 32%, and companies from the TOP-10 - more than 60%. Some participants in the ESG Transparency Index 2020 disclose general information about the company, information about environmental protection and community relations. The issues of human rights and management and company leadership are the worst illuminated items [11].

In addition, according to Ukrainian legislation, medium-sized and large enterprises that prepare reports based on the taxonomy of financial statements and according to international financial reporting standards must submit the report "Management Report" along with other reports. This document, containing financial and non-financial information, characterizes the state and prospects of the enterprise's development and discloses its main risks and uncertainties. The management report is submitted together with the financial statements and the consolidated financial statements. If the company submits consolidated financial statements, a consolidated management report is submitted.

It should be noted that in December 2023, Commission Delegated Regulation (EU) 2023/2772 of July 31, 2023 was published - supplementing Directive 2013/34/EU of the European Parliament and of the Council on reporting standards in the field of sustainable development, which should be applied from January 1, 2024. This Regulation approved the European Sustainability Reporting Standards (ESRS). They cover both the requirements for disclosure of information about the business entity, and the main provisions regarding the impact of the business entity's activities on the environment, the social sphere, as well as management issues within the business entity [12].

Therefore, the issue of considering ESG aspects is not fully regulated, it is at the stage of development, so the business entities need to start preparation work on the study and analysis of information that will be needed in the near future to make appropriate changes to accounting. We should also note that Ukraine has suffered greatly from armed aggression and the consequences of the war should also be considered in the ESG concept.

In general, this does not change the method, however, some emphases should be shifted – for example, the assessment of the environment should include not only the ecological state, but also, for example, the level of demining of the territory, the level

of demolition of rubble (destroyed buildings) and the level of infrastructure restoration and opportunities for employment of persons with special needs (disabled from war). However, this will not so much differentiate the domestic model from the internationally accepted standard, but to a greater extent complement and adapt it to real social-economic conditions.

Conclusions. Summarizing, we note that the concept of ESG is popular in scientific societies, as well as in actual activity of companies, due to more and more business participants are aware of the importance of a global method, taking into account long-term risks, switching to energy-saving technologies and protecting the environment. This dictates regulatory requirements regarding this issue.

The article provides grounding to change the accounting and information model of business support in accordance with the goals of sustainable development, taking into account challenges: environmental and safety risks, ensuring decent working conditions, etc. It is explained that the concept of ESG, considering such components as Environmental, social, and corporate governance, meets the best to these information requests and can serve as a basis for supplementing of corporate accounting

The results of sociological polls were analyzed. They show that most Ukrainian citizens consider environmental aspects more important than economic growth and consider it necessary to introduce certain measures against violations of environmental rules. Therefore, we consider it is reasonable to reflect environmental indicators in accounting and oblige enterprises that have a significant impact on the environment to submit ESG indicators in their corporate accounting report. Similarly, ESG accounting should also consider other aspects - social and corporate governance, which are proposed to be supplemented by certain management measures, and which are an integral component of sustainable development.

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MONITORING OF LOCAL REQUIREMENTS, NEEDS AND EXPECTATIONS OF YOUNG PEOPLE IN CREATING AN INTERNATIONAL NETWORK OF VIRTUAL YOUTH BUSINESS HUBS

Tetiana Tsalko,
Ph.D. in Economics, Assistant Professor,
Kyiv National University of Technologies and Design, Ukraine,
lozzeika@gmail.com; ORCID: 0000-0002-4609-8846
Olexandra Olshanska,
Doctor of Economic Sciences, Professor,
Kyiv National University of Technologies and Design, Ukraine,
olshanska.ov@knutd.edu.ua; ORCID: 0000-0003-1535-7742
Svitlana Nevmerzhytska,
Ph.D. in Technical Sciences, Assistant Professor,
Kyiv National University of Technologies and Design, Ukraine,
vsminfoSN@gmail.com; ORCID: 0000-0001-5392-9030

Annotation. *The article highlights the problems of education during the period of war in Ukraine. The idea of the grant project ERASMUS+ Call [ERASMUS-EDU-2022-VIRT-EXCH] - Virtual Exchanges in Higher Education and Youth - "International Network of Virtual Youth Business Hubs" (VEHUB4YOU) is presented. The VEHUB4YOU project focuses on the transfer of business knowledge from the EU to young people in Eastern partner countries through virtual exchange technologies as a means of improving and strengthening the educational process for Ukrainian children who are internally or externally displaced as a result of Russia's military aggression in Ukraine. The article presents the results of a survey of young people, namely: students and teachers of schools, universities and colleges from Ukraine and Azerbaijan. The survey is dedicated to the determination of the need and interest of students in the creation of an international network of virtual youth business hubs with the aim of improving the quality of education by providing access to modern European education, transfer of business knowledge from the EU to the youth of Eastern partner countries using virtual exchange technologies, etc. The authors of the article summarized the most popular international virtual mobility courses for young people as a result of a survey.*

Keywords: *education, training, European cooperation, virtual mobility, non-formal education, distance learning, business innovation, educational hub, internally displaced persons.*

Introduction and problem statement. Ukraine's internationalization, accession to European communities, etc. provides unique opportunities for multilateral cooperation in education and science. On the other hand, the outbreak of hostilities in Ukraine and the imposition of martial law throughout the country have significantly affected the organization of the educational process in educational institutions of various types of accreditation, from secondary schools to universities and academies. Many educational institutions have been destroyed, with libraries, equipment, and educational materials

being destroyed as a result of massive shelling [2, 3, 4]. In Ukraine, 180 schools have been completely destroyed and more than 1,300 educational institutions have been damaged as a result of Russia's military aggression. A significant number of participants in the educational process (administrators of educational institutions, academic and teaching staff, students, parents) were forced to change their place of residence, leave the war zone and move to other regions and outside of Ukraine. A number of towns and villages are under occupation, subject to harassment by the Russian regime. A significant number of educational institutions were forced to move to the territory controlled by Ukraine. Out of 13,000 schools, only 9,000 can now return to full-time education [3, 5].

As Human Rights Watch notes, according to the Ministry of Education and Science of Ukraine, as of January 2023, more than 95 percent of students, who were ready to continue their education, were enrolled in schools. That was a significant achievement for Ukraine in wartime. Despite these measures, the interruption of education due to the war, as well as the global impact of the coronavirus pandemic, show that the shift from face-to-face to distance learning often leads to losses in the quality of education. Significant efforts are needed to help Ukrainian children resume learning [14].

For two years before this, Ukraine's education system had also been operating under restrictions caused by the COVID-19 pandemic, which was not in line with the standards adopted by the European Education Community. The primary task was to organize a safe environment and switch to distance learning [10, 12].

The Laws of Ukraine "On Complete General Secondary Education" and "On Higher Education" emphasize the possibility of active use of mixed learning and distance learning technologies in the period of martial law and post-war recovery. Mixed learning makes it possible to effectively combine traditional methods with new technologies, which helps to improve learning and actively engage students in the learning process.

Today in Ukraine, children who live far from the combat zone and did not move to other regions of Ukraine or abroad during the war are studying on part-time, distance, or mixed form of learning. According to the Ministry of Education and Science, as of November 14, 2022, 4 million 31 thousand 537 students are enrolled in general secondary education institutions. Of these, 1,013,951 students are studying full-time, 1,892,891 are studying remotely, and 1,124,695 are studying in a mixed mode of learning. Please note that this includes the total number of students enrolled in Ukrainian schools, not just those who live far from the combat zone and did not change their place of residence during the war. Of the 1,892,891 students studying remotely, more than 1 million are from Donetsk, Zaporizhzhia, Luhansk, Dnipro, Sumy, Mykolaiv, Kharkiv and Kherson regions. However, due to prolonged air raids and power outages lasting several hours, the educational process in the safe areas is also interrupted. After all, when teachers and students are in a shelter during an air raid or without electricity and, accordingly, high-quality Internet, participants in the educational process cannot continue neither full-time nor distance learning at this time. Therefore, children spend a significant portion of their school time studying on their own. All of this only exacerbates educational losses [4].

In 2022, the project team of teachers from the Faculty of Management and Business

Design of the Kyiv National University of Technologies and Design, together with foreign partners, received a grant project ERASMUS+ Call [ERASMUS-EDU-2022-VIRT-EXCH] – Virtual Exchanges in Higher Education and Youth – "International Network of Virtual Youth Business Hubs" (VEHUB4YOU). The VEHUB4YOU project aims to transfer business knowledge from the EU to young people in the Eastern partner countries (aged 13 to 30) through virtual exchange technologies as a means of improving and strengthening the educational process for Ukrainian children who are internally or externally displaced as a result of Russia's military aggression in Ukraine [16]. Already in 2024, the first international virtual business hub will be organized on the basis of the Kyiv National University of Technologies and Design and business training will be launched for high school, college and university students of both economic and non-economic specialties. This step will be the beginning of the creation of an international network of virtual youth business hubs, which includes 60 virtual international business hubs in schools, universities and rural libraries in Ukraine and Azerbaijan. European universities, with the help of universities and youth organizations in Ukraine and Azerbaijan, will share their business courses and experience of lecturers with young people from the Eastern Partnership countries.

As a result, 1800 representatives from 60 hubs and 250 facilitators from Eastern partner countries will participate in the project, as well as 220 participants from other identified regions (Southern Neighborhood and Sub-Saharan Africa). The project participants will develop a pool of methodological materials for online business training. The VEHUB4YOU project is expected to improve the quality of education by providing access to modern European education; at the organizational level, it will promote entrepreneurial training, and at the level of individual project participants, it will provide them with skills of business planning, product marketing, and tools for starting their own business. It is expected to modernize school, college, and university curricula in line with new trends in virtual learning and to increase the effectiveness of virtual education [16].

The use of online technologies in the educational process allows for a wide coverage of different educational categories and age groups. The main difference is that the content and methods of teaching may differ depending on the age group and the characteristics of each level of education. For gymnasium students, it is advisable to develop special curricula according to their level of development and needs. University students may have more advanced courses, focused on specific majors. In addition, it is important to take into account the difference in approaches to learning, communication, and assessment between school and university levels. School learning may require more supervision and support from teachers, while university learning is a priori more independent and research-oriented. Given these features, the parallel provision of online services to high school and university students can be an effective way to provide education at different levels and develop skills in using modern technologies in the learning process [11, 13, 15].

As a result, children are in completely different conditions, and each group requires analysis of specific conditions and specific support from the state, especially children who are in the temporarily occupied territories or in the combat zone and fight for their

lives every day. The full-scale war has only significantly expanded the size of each group of children and the impact on their lives and education.

Review of the literature. The organization of the educational process in secondary schools and institutions of higher education of Ukraine in the context of full-scale hostilities has been the subject of research by both domestic and foreign scholars. O. Glushko, S. Kravchenko, L. Kalmykova [7], O. Lokshyna [8], N. Nikolska, E. Nikolaiev [9] and others studied the role of the EU countries in the integration process of Ukrainian pupils and students into the educational systems of foreign countries, as well as analyzed and systematized the problems of the Ukrainian education system and the quality of the educational process in the context of the Russian invasion of Ukraine. But despite numerous studies, the problem of improving the methods of organizing online learning, as well as introducing innovative ways to effectively conduct classes in a distance format, requires further research and development. Recent studies on online learning for students and pupils offer many interesting insights and practical recommendations [1, 6].

Goals and tasks. The purpose of the article is to analyze the needs of participants in the educational process in the context of a full-scale war and to provide recommendations for effective motivation of pupils and students to acquire knowledge through the effective use of modern online services, educational platforms, and joint virtual exchange projects for pupils and students of Ukraine for the purpose of multilateral cooperation in the field of education with the EU countries.

The objectives of this article are to determine the interest of the target audience by analyzing the data from a survey of young people and teachers about the need and interest of students in creating an international network of virtual youth business hubs: school students, university and college students from Ukraine and Azerbaijan.

Main research methods. The methodological basis of the study includes traditional methods, namely: observation, description (empirical); generalization, survey, analysis, classification (theoretical) and systematic. All of these helped to research, describe, analyze and summarize the needs of the target audience and the peculiarities of the educational process under martial law.

Summary of the main material. 2,294 respondents took part in the survey of students' need and interest in the creation of an international network of virtual youth business hubs: school students, university and college students from Ukraine and Azerbaijan. The geographical distribution of respondents is: 1406 respondents (61,3%) from Azerbaijan and, accordingly, 888 (38,7%) respondents from Ukraine (Fig. 1). The age structure of the respondents is shown in fig. 2.

The majority of survey participants (49,7%) are aged 18-24; 18,8% – 13-15 years old, 24,6% – 16-17 years old; 6,9% – 25-30 years old.

The vast majority of students (89,9%) want to become business owners in the future (Fig. 3).

During the survey, it was found that the majority of students (57,7%) intend to improve the level of foreign language proficiency through participation in international mobility programs (Fig. 4).

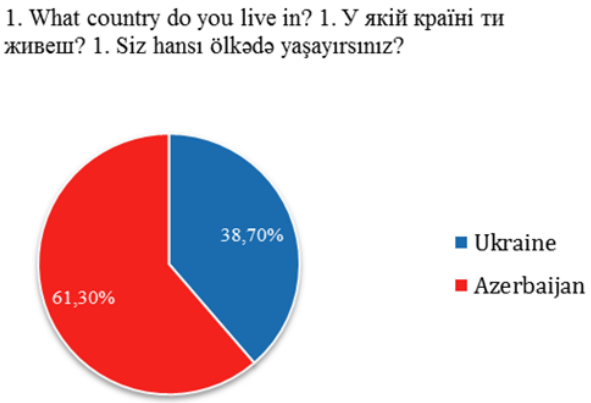

Fig. 1. The geographical distribution of respondents

Fig. 2. Age structure of respondents

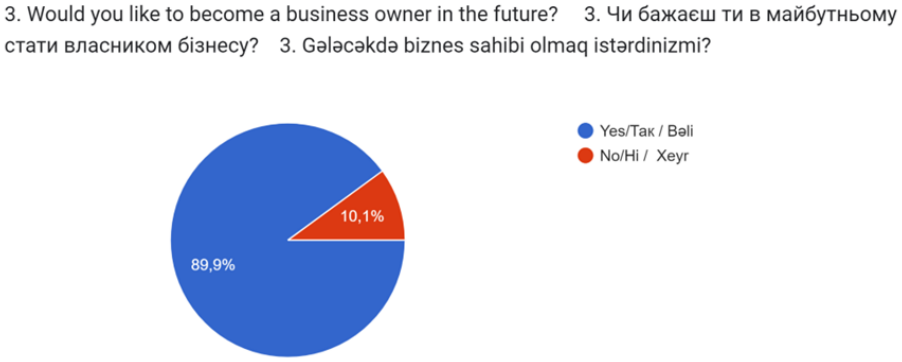

Fig. 3. Aspiration of students to create their own business

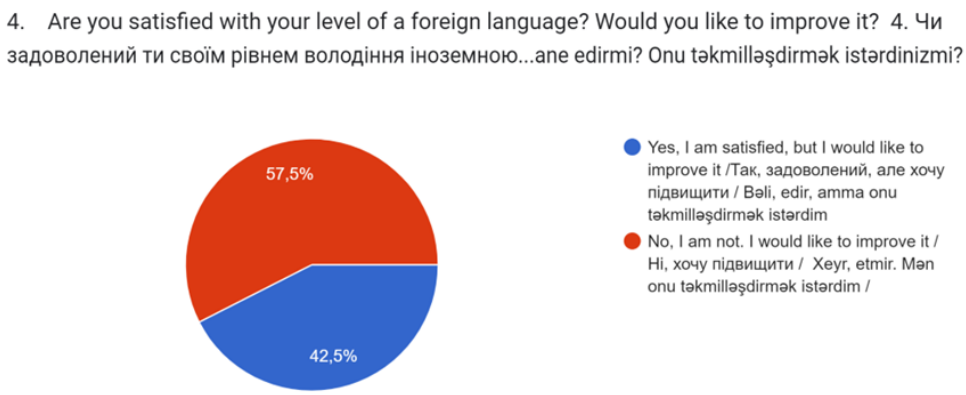

Fig. 4. Students' desire to improve their foreign language skills through participation in international mobility programs

According to the survey, most students want to participate in international virtual mobility programs in a hybrid format: 39,7% – in a mixed format, 28,4% – online, 32% – offline (Fig. 5).

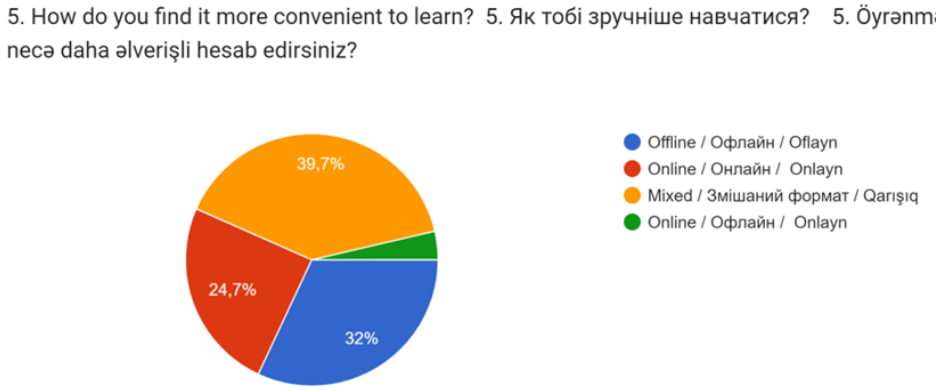

Fig. 5. Preferred format of student participation in international virtual mobility programs

Thanks to participation in international virtual mobility programs, students want to develop and improve various communication skills: 70,3% of respondents want to improve their knowledge of a foreign language; 30,9% of respondents want to communicate with foreign peers; 21,6% – to communicate through international virtual hubs (Fig. 6).

Among the business competencies that survey participants would like to develop, 5,4% wish to develop business competencies; 55,2% – skills of creating own business; 23,2% – skills in creating startups (Fig. 7).

According to respondents, the formats of conducting virtual mobility events should be

diverse. 50,1% want to participate in international summer schools, 43,5% – in international training; 40,9% – in practical classes; 25,5% – lectures; other participants also chose to participate in Olympiads, case competitions, international round tables (Fig. 8).

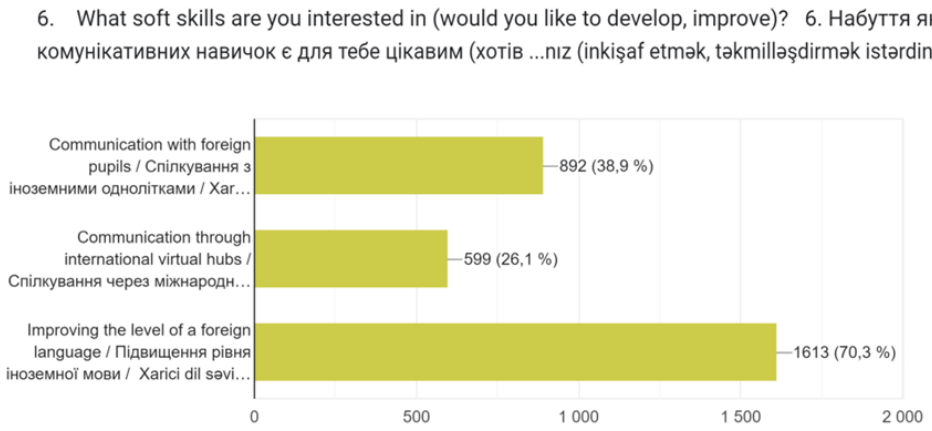

Fig. 6. Directions of development of communication skills of students in international virtual mobility programs

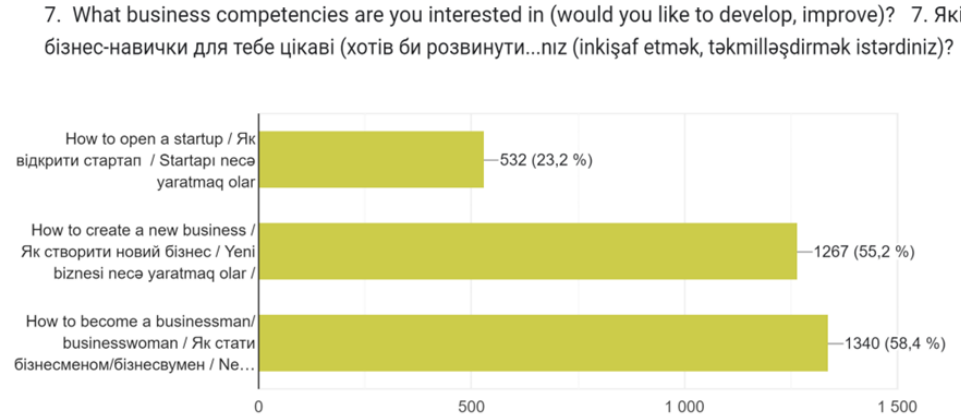

Fig. 7. Directions of development of students' business competencies in international virtual mobility programs

The results of a survey of students regarding the courses they wanted to take in international virtual mobility programs are interesting (Fig. 9). According to the results of the research, the most popular courses for students are:

- organization of own business 42,9%; economy for business – 37,0%; basic financial literacy – 33,7%, online marketing – 32%; social networks for business – 27,9%; management – 27,7%; creation of an online business (marketplace) – 25,2%; project management – 23,2%; business communications – 21,7%; business design and

startup management – 25,2%; offline marketing – 19,2%;

- courses aimed at developing students' digital skills: digital platforms for business – 22,5%, digital communication tools – 14,9%; digitalization – 19,6%; 3D visualization for virtual marketing – 18,0%;

- courses related to social networks and the possibility of using their functions for business: social networks for business – 27,9%; Instagram for business – 28,5%; TikTok for business – 23,1%; YouTube for business – 23,5%; Facebook for business – 15,5%; LinkedIn for business – 7,6%; Telegram for business – 17,8%; Chat bots for business – 16,6%; Animation for business – 10,9%.

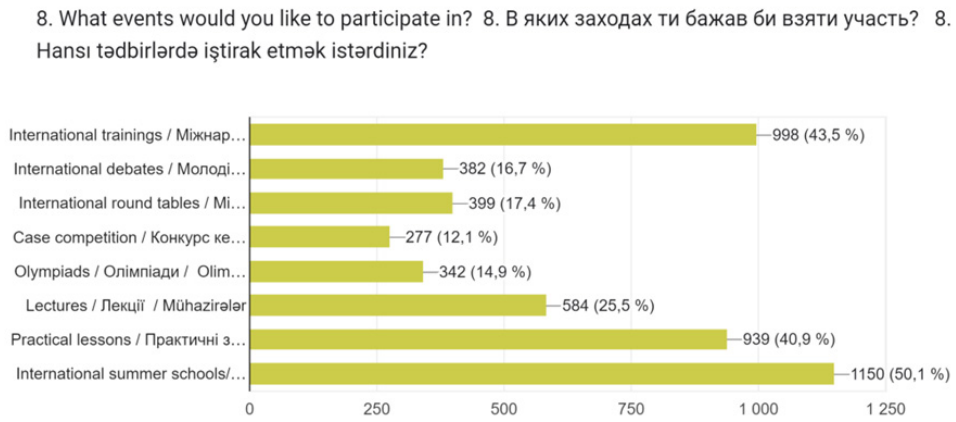

Fig. 8. Measures of international virtual mobility programs

Digital applications used by students for virtual exchange and learning are presented in Fig. 10.

The most popular digital applications used by students for virtual exchange and learning are: Instagram – 71,8%, Telegram – 69,7%; E-mail – 61,2%; Zoom – 58,1%; WhatsApp – 61,8%; Google Meet – 37,6%; Viber – 28,4%. Messenger – 18,0%.

According to the survey, students use the MOODLE and Google Meet platforms reluctantly: 7,2% and 37,6%, respectively, and hardly use Mural, A teacher's professional blog.

The majority of surveyed students (79,1%) have a desire to participate in joint lessons with their peers from other countries online and wish to receive a Certificate (90%) about international studies within the framework of a European project (Fig. 11, 12).

Students who have expressed interest in participating in international virtual exchange programs should submit their proposals for the name of their own youth business hubs: Center for young businessmen, Youth business center, Educated youth center, Business education, The road to success, The result of endurance and will, Vision of the future, Towards development with young people, Helpful, Light to the future, Business development center, Forward together, Bright road to the future, Career Center,

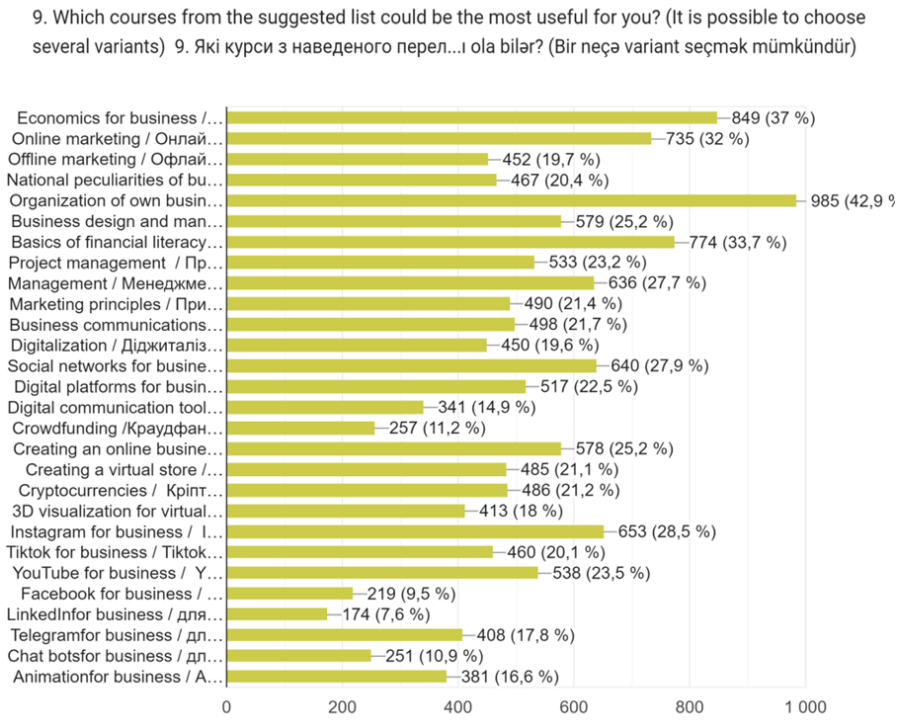

Fig. 9. Demand for international virtual mobility courses among students

Young businessmen, Business center, Business among young people, Grand, Good luck, Successful Business, Youth business center, Sacrifice, Youth hostel, A confident future, Young will come, Teenagers, Youth hub, Youth & creativity, Business and design, Economy and creativity, Eagles, Quest, Insect, Youngbae, Unification of people, Modern economy.

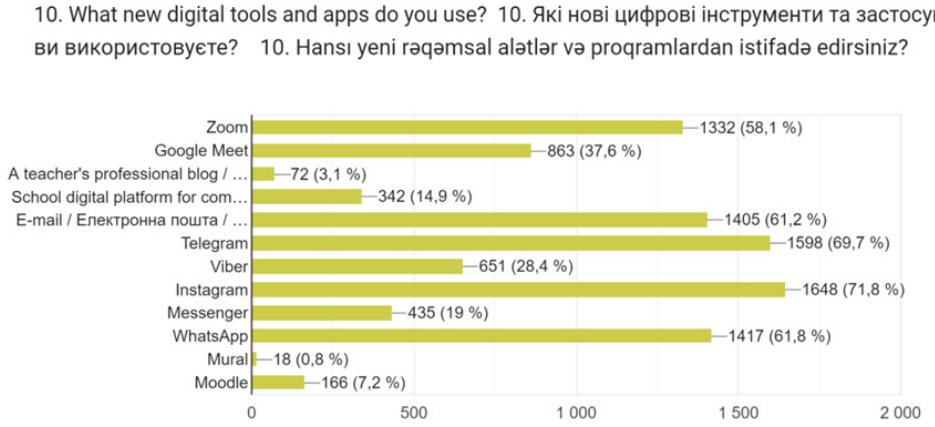

Fig. 10. Digital applications used by students for virtual exchange and learning

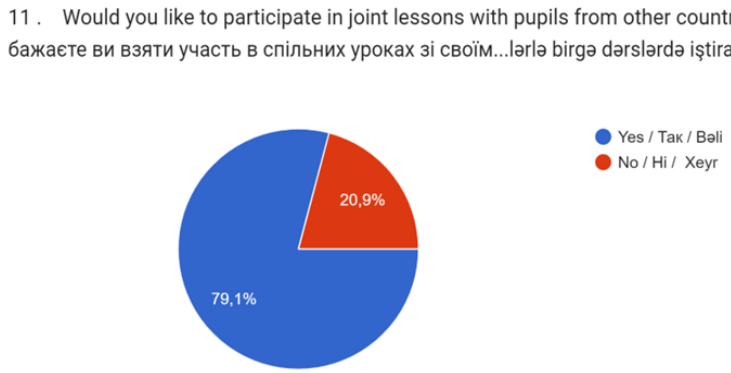

Fig. 11. The desire of students to participate in joint lessons with their peers from other countries online

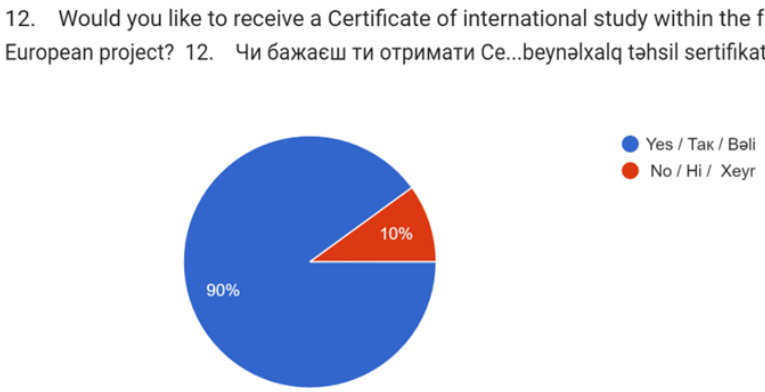

Fig. 12. Intentions of students to participate in joint lessons with their peers from other countries online

Conclusions. According to the results of the survey, it can be concluded that the majority of surveyed students (89,9%) want to become owners of their own business in the future, and therefore are interested in participating in the international youth virtual mobility program. Students are interested in all formats of international mobility: synchronous and asynchronous.

By participating in the international youth virtual mobility program, students wish to develop and improve their communication skills: level of foreign language proficiency; communication with foreign peers; communication through international virtual hubs. Students also wish to develop business competencies; skills of creating your own business; skills in creating and implementing startups.

The most popular international virtual mobility courses for students are:

- organization of one's own business, economics for business, basic financial literacy, online marketing, social networks for business, management, creation of an

online business (marketplace), project management, business communications, business design and startup management, offline marketing;

- courses aimed at developing students' digital skills: digital platforms for business, digital communication tools, digitalization, 3D visualization for virtual marketing.

The results of the conducted survey of facilitators and students regarding their wishes and expectations from the international virtual mobility program make it possible to draw the following conclusions:

- most of the respondents are interested in participating in the international virtual mobility program;
- survey participants are ready to participate in the international virtual mobility program in synchronous and asynchronous formats;
- facilitators and students need to develop communication skills and business competencies based on participation in the international youth virtual mobility program;
- the courses most in demand among facilitators are: basic financial literacy, organization of one's own business; digitalization, business communications; business design and startup management; economics for business, project management, management, digital platforms for business, digital communication tools; social networks for business;
- the most popular courses of the international youth virtual mobility program among students are: organization of one's own business, economics for business, basic financial literacy, business communications; online marketing, offline marketing, social networks for business, management, project management, business design and startup management.

The next step of the authors' research and the grant project will be to develop a Program to train teachers in European modern digital methods of virtual exchanges. Ukrainian and Azerbaijani teachers, lecturers and researchers will improve the quality of the educational process and the adaptability of their work in the most severe conditions of martial law in the country with these modern technologies of virtual exchanges.

The VEHUB4YOU project is expected to improve the quality of business education by providing access to modern European education; at the organizational level, it will promote entrepreneurial training, and at the level of individual project participants, it will help them to acquire skills in business planning, product marketing and tools for creating their own business. The project is expected to modernize school, college and university curricula in line with new trends in virtual learning and increase the effectiveness of virtual education.

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FORMATION OF THE ENTERPRISE STRATEGY IN CONDITIONS OF TURBULENCE

Viktoriia Soroka,
Master's degree student,
National University of Kyiv-Mohyla Academy, Ukraine,
vika.soroka@ukma.edu.ua; ORCID: 0009-0007-7317-6401
Iryna Ignatieva,
Doctor of Economics, Professor,
National University of Kyiv-Mohyla Academy, Ukraine,
iignatyva@ukr.net; ORCID: 0000-0002-9404-2556

Annotation. *This article examines the development of business strategies for enterprises in turbulent environments, focusing on the Ukrainian business context. The author analyzes the economic conditions and challenges faced by Ukrainian enterprises during turbulence, providing practical advice and potential business strategies. Using an analytical approach, the study identifies strategies to mitigate risks and capitalize on opportunities. Emphasizing effective decision-making and resource allocation, the paper highlights the importance of long-term success in turbulent business environments. Despite various strategies available, the article recommends a thorough analysis of organizational strengths and weaknesses, considering the specificities of the business environment for an effective and tailored strategy that balances economic benefits with potential risks.*

Keywords: *business strategy, enterprise strategy, turbulent external environment, anti-crisis strategies, strategic planning, re-location.*

Problem statement. The topic of business strategy in turbulent conditions is extremely relevant for the whole world and especially for Ukraine in 2023, as the country faces significant challenges and uncertainties after the outbreak of war. Among the key challenges that Ukrainian businesses are likely to face in 2023 are political instability and economic uncertainty caused by the consequences of the war, and the ongoing COVID-19 pandemic.

In this context, Ukrainian businesses will need to adopt a strategic approach to overcome these challenges and ensure their long-term survival and growth. This may involve developing contingency plans for different scenarios, remaining flexible and adaptable in response to changing market conditions, and investing in innovation and new technologies to remain competitive.

In addition, Ukrainian businesses may need to focus on building strong partnerships and networks both domestically and internationally to expand their customer base and reduce risks associated with the domestic market.

Overall, the ability of Ukrainian businesses to develop and implement effective strategies in response to the challenges of a turbulent environment will be critical to their success in 2023 and beyond.

Some of the unresolved parts of the overall problem are the lack of effective risk

management practices in many Ukrainian enterprises, limited funding and resources for research and development, and the need for empirical research on effective strategies in the Ukrainian context.

Analysis of recent research and publications. Among the prominent foreign scholars who have studied business strategies in turbulent times are Donald Hambrick, Robert Burgelman, and Michael Tushman [1-3]. Their research focuses on such topics as strategic management, organizational change, and innovation. Rita McGrath, Clayton Christensen, and Henry Chesbro have also made significant contributions to our understanding of the challenges and opportunities of businesses in a turbulent environment [4-7].

Although the study of enterprise strategy formation in turbulent environments is a relatively new field in Ukraine, there are several prominent domestic scholars who have also contributed to this area. Among them are Oleksandr Kubatko, who studied the impact of economic turbulence on business strategies, and Natalia Bondarenko, who investigated the role of innovation in developing effective strategies in a turbulent environment [8-11]. Other well-known Ukrainian scholars in the field of strategic management include Ihor Malyshko and Mykola Kozlov, who studied the challenges and opportunities of strategic change in turbulent conditions [12-14]. However, the topic of forming and applying business strategies in a turbulent period seems to be insufficiently covered and requires special attention.

The purpose of this research article is to investigate how enterprises can develop a strategy to operate successfully in a turbulent business environment. To achieve this goal, the author analyzes the economic situation in Ukraine and, in particular, the business sector during the period of turbulence. The author also examined the challenges faced by Ukrainian enterprises and provided practical advice and possible business strategies for further development of enterprises.

Summary of the main material. First of all, in order to thoroughly analyze the topic, it is necessary to understand the essence of such a concept as "turbulent environment for business".

According to F. Kotler and J.A. Cascione, "market turbulence" means unpredictable and rapid changes in the internal and external environment of an organization that affect its activities [15]. This phenomenon is similar to turbulence in nature, which is characterized by aggressive, unpredictable and chaotic behavior.

Physicists have long been interested in modeling and predicting turbulence, but it remains a challenging task despite advances in data processing and supercomputing [16]. The behavior of dynamic systems whose state evolves in time looks chaotic, although chaos is not a negative component of it, and a small initial effect can lead to a dynamic increase in deviations in the future. Chaos theory was developed by physicists to study how events can unfold based on initial conditions and deterministic assumptions [17].

In the context of the modern economy, business environment turbulence is defined as rapid, unpredictable, and contrasting changes that are difficult to influence through government regulation [15]. Traditional economic characteristics described in

empirical textbooks on economic theory do not apply to the "new normal" economy, which is turbulent. The differences lie not in the characteristics themselves, but in their manifestations for the traditional (normal) economy and the turbulent (new normal) economy (Table 1).

Table 1

Differences between a normal economy and a new normal economy

Feature	**Normal economy**	**The economy of the new normal**
Economic cycles	Predictive	None
Growth / sharp increases	Determined (on average 5-7 years)	Unpredictable, volatile
Recessions/crises	Determined (average 10 months)	Unpredictable, volatile
Possible influence of factors	Low	High
General structure of investments	Expanding, wide	Cautious, focused
Attitude to market development	Acceptance	Avoidance
Consumer status	Confidence	Uncertainty
Customer preferences	Resilient, evolving	Fears, desire for security

Source: [15, c. 31].

Therefore, it can be concluded that in the current economic environment, significant shocks and painful downturns can be expected, leading to an increase in overall risks and uncertainty for companies. The increased turbulence of the economy is a constant reality to which companies must adapt by studying in detail the catalysts of turbulent processes. These catalysts include technological progress, the information revolution, innovation, continued economic growth, hypercompetition, as well as the development of financial markets, the emergence of new financial instruments and the involvement of financial markets in globalization.

Turbulence creates challenges, but also opens up new opportunities as new resources emerge and consumer needs change. Effective strategies require a timely response to positive foreign experience, untapped potential, and cost optimization, not just innovation.

According to D. Sall, "If you run a company, turbulence should become a way of life for you. The world around us is changing, but some companies, instead of changing with it, start doing more of what they are used to. This usually doesn't lead to anything good. This is active inertia, meaning that the company tries to do something, spends much more time and effort, but remains completely inert in terms of change" [18].

Therefore, to succeed in a turbulent environment, companies must adopt a dynamic approach. They need to become more agile, responsive and flexible to adapt to changing circumstances instead of maintaining a fixed, unchanging approach.

First of all, when developing a strategy, enterprises should assess turbulence by analyzing a number of internal and external factors that may affect their operations. These factors may include changes in economic conditions, political instability, technological disruptions, increased competition, regulatory changes, as well as social and environmental issues [19].

Assessing the turbulence of the business environment is an ongoing process that businesses must undertake regularly to stay ahead of the curve. A turbulent business environment can be a challenge for any enterprise, but with the right strategy, success and even prosperity can be achieved.

If we delve deeper into the study of business strategies during the pandemic, which has created unprecedented turbulence around the world and affected the economic and business environment, we can see different strategies for businesses to adapt to harsh conditions. Zhanna Aksyonova very accurately noted that the pandemic has created a new turbulent business environment due to its suddenness, intensity, globalization, inclusiveness and uncertainty. It has slowed down globalization and led to structural shifts, and the greatest potential for effective implementation by companies in turbulent conditions is an ambivalent strategy that allows companies to use certain elements of the cost reduction strategy and investment strategy at different stages of adaptation [20].

According to the results of the 11th monthly survey of Ukrainian enterprises "Ukrainian Business in Times of War" by the Institute for Economic Research and Policy Consulting (IER), as well as the analysis of the survey of business managers conducted by the National Bank, Ukrainian business continues to face numerous challenges in the context of the economic crisis and war in the country. The political instability caused by the conflict in eastern Ukraine and the annexation of Crimea creates uncertainty for businesses and complicates long-term strategic planning. In addition, the devaluation of the national currency, high inflation and decreased purchasing power of the population create difficult conditions for business, leading to a reduction in consumption and sales [21].

These challenges have been exacerbated by reduced foreign investment, market closures, supply chain disruptions, and increased costs due to the conflict. The sanctions have also resulted in significant losses for Ukraine, as the lack of access to the Russian market has led to reduced exports and losses for exporters. Some businesses have suffered physical damage due to the conflict and have been forced to reduce or completely cease operations, which has caused serious difficulties in the context of the economic crisis and war, as these businesses have not only lost potential profits but also suffered significant material damage.

In Figure 1, we can see the dynamic indicators of the functioning of business entities in Ukraine during the first year of the war, and based on this data, we can conclude that there is a positive trend in the work of enterprises. 12% of enterprises reported an increase in the volume of work compared to the period before the full-scale invasion, and another 9.3% of enterprises reached the indicators of 2021.

The overall indicators of business climate and conditions have remained positive over the past three months, as evidenced by the index of the current

financial and economic situation at the enterprise, which, although it remained without significant changes, continued to gradually increase and amounts to -0.10 compared to February 2023 (-0.11). It is also worth noting that the expectations of enterprises regarding changes in the financial and economic situation in the six-month perspective have been increasing for four months in a row, in March the value of the corresponding index increased from 0.34 to 0.48. However, the value of the index of Expectations of Changes in Business Activity over the next two years decreased from 0.27 to 0.23, due to the transition of a small percentage of firms that planned to expand their activities to those that do not plan any changes. If we talk about the production sector, we can also see positive dynamics, the index of changes in production for the first time since the full-scale invasion changed its sign to positive from -0.06 to 0.18, which indicates a predominant share of those who increased production over those who decreased it [21].

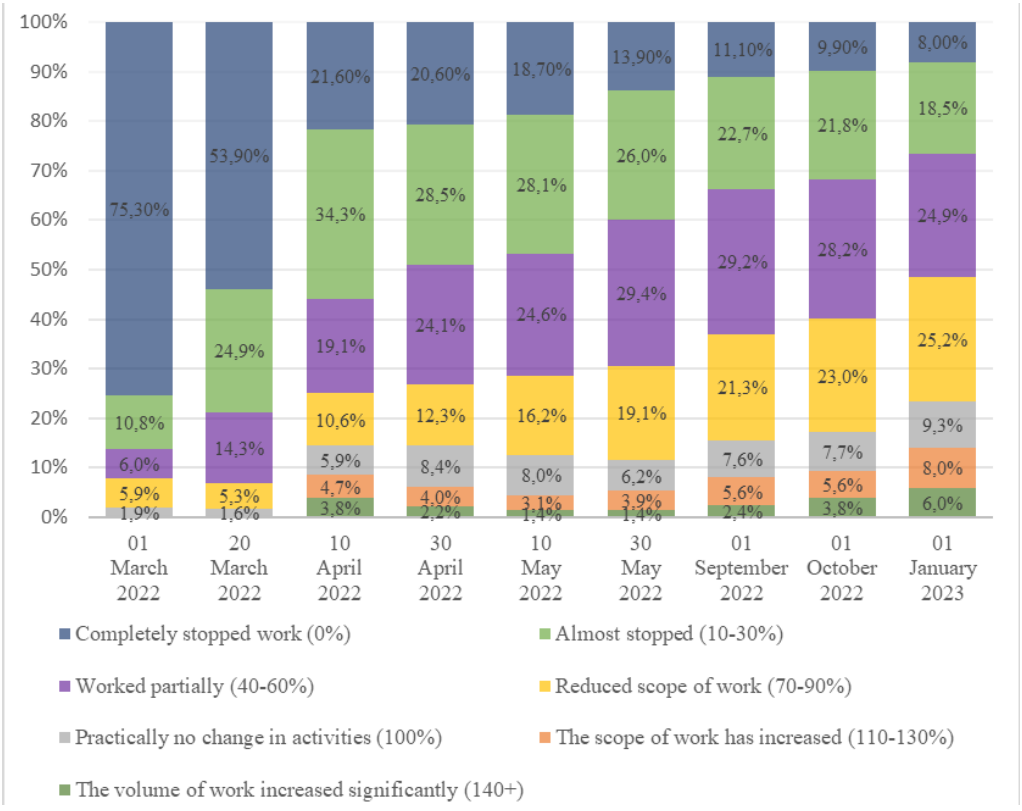

Fig. 1. Performance indicators of Ukrainian business entities in 2022
Developed by the author based on the source [22]

Based on the analysis of the economic situation presented above, the development and implementation of crisis management tools is now a prerequisite for the effective functioning of enterprises. Crisis management can be defined as management that provides for possible crisis phenomena in the company's activities, analysis of its symptoms, development of measures to reduce the negative effects of the crisis and use of its factors for further development [23].

However, the turbulence and unpredictability of the business environment require a change in the approach to the concept of strategy creation and formation. A protracted and inflexible strategic planning process can be not only ineffective but also harmful in a highly turbulent environment. Therefore, it is necessary to change the strategic management procedure. This change must meet two conditions: first, the new procedure must ensure the flexibility of the process, which will allow for constant adaptation to new challenges and development. Second, it must ensure continuity of operations. The procedure cannot be seen as a process that is repeated only from time to time. Moreover, the simultaneous creation and implementation of the strategy is a difficult task, since in conditions of high uncertainty these stages occur simultaneously and are difficult to separate from each other [24]. Therefore, the process of forming an enterprise strategy in turbulent conditions should be divided into four main stages (Table 2).

The essence of the differences between the logic of strategic management in turbulent times and the classical concept is primarily in the departure from strict adherence to the stages of strategy creation and implementation, as well as in changing expectations from this procedure. Strategic planning is no longer considered a sufficient condition for a company's success, as it was in the classical approach, but plays a supporting role and is a useful tool.

In the current economic environment, strategic planning should be used to develop an anti-crisis strategy for an enterprise as a long-term program document containing a set of consistent actions and management decisions aimed at ensuring the company's overcoming crisis situations, competitiveness, solvency and financial stability [25].

Analyzing the possible anti-crisis strategies that can be chosen in a turbulent period, they are classified at the enterprise level according to various criteria.

According to the nature of their behavior, these strategies can be divided into survival strategies and breakthrough strategies. Survival strategies are aimed at maintaining the company's status and prioritizing short-term goals to help the business weather the storm during a crisis. In contrast, breakthrough strategies focus on long-term success and growth by investing in innovation and market leadership. These strategies require significant investment and may not be feasible during a crisis.

Anti-crisis strategies can be classified as defensive or offensive, based on the nature of market behavior. Defensive strategies are aimed at protecting the business from the negative impact of the crisis, while offensive strategies are intended to take advantage of opportunities that may arise during the crisis. Defensive strategies prioritize stability and security, while offensive strategies require a willingness to take risks and make strategic investments. Defensive strategies can help businesses minimize losses and maintain a stable position, while offensive strategies can be effective for businesses that have the resources and flexibility to respond quickly to changing market conditions.

Table 2

The main stages of forming an enterprise strategy in turbulent conditions

The stage of strategy development	Main features and tasks
Stage 1	It involves formulating the company's vision and mission and defining the main goals of its activities based on them. It is the most general component of strategy development, relying more on intuition and imagination than on specific procedures. It serves as a guide for finding strategic goals that can be realized independently of other elements of strategy development or can be the result of previous analyses, decisions, and actions. The vision and mission serve as the basis for formulating specific strategic goals for the company.
Stage 2	It involves a comprehensive analysis of both the internal and external environment of the company. The strategic analysis process should be continuous and cover three areas: macro analysis, competitive environment analysis, and internal environment analysis. The analysis of weak signals is crucial for generating development ideas, but it is impossible to process all impulses continuously due to the limitations of information processing capabilities within the company.
Stage 3	It involves creating a strategy by generating options and selecting one of them, which is influenced by the strategic analysis. The choice of strategy initiates the analysis of new areas, and there is a close connection between strategy creation and the first stage, where ambitious visions and goals inspire the search for new development concepts, but also provide stabilization for new strategic concepts.
Stage 4	It involves implementing the strategy and monitoring its results. The process of implementation and monitoring complements the previously made strategy choice. On the other hand, difficulties in implementing previously developed concepts may lead to their revision. Thus, there is a feedback loop between the third and fourth stages. Similarly, the other stages of the strategic management process interact with each other, despite their different goals and objectives.

Developed by the author based on the source [24].

Based on the main direction of the company's management, the types of anti-crisis strategies are: stabilization strategy, reduction strategy and restructuring strategy.

The stabilization strategy is aimed at stabilizing the company's operations during a crisis. Depending on the pace of production, investment, and project implementation, it can be divided into pause, cautious progress, no change, and profit extraction.

The downsizing strategy is aimed at reducing costs and improving the company's financial position. It can be implemented through various approaches, such as cost cutting, harvesting strategy, reduction of the organizational structure, and liquidation.

A cost-cutting strategy focuses on identifying opportunities and taking steps to reduce costs. The "harvesting" strategy involves maximizing revenue in the short term by abandoning the long-term perspective of a particular business. The organizational structure reduction strategy involves closing or selling one of the company's divisions to change the boundaries of its operations in the long term. The liquidation strategy is an extreme case of the downsizing strategy and is implemented when the company cannot continue its operations.

A restructuring strategy involves significant changes in the structure and operations of the company in order to improve its efficiency and adapt to changing market conditions. It may include such measures as mergers and acquisitions, asset sales, and changes in the company's culture and management practices [26].

There are also seven types of functional anti-crisis strategies:

- The financial strategy involves achieving revenue growth, cost control, financial performance and investment management goals.
- The investment strategy involves allocating resources to maximize profits and achieve long-term growth while managing risks.
- The organizational strategy focuses on optimizing efficiency, communication and employee engagement through effective management of the company's structure and decision-making process.
- The technical development strategy is aimed at improving customer experience and operational efficiency through the introduction of new technologies.
- The logistics strategy deals with managing the flow of goods and services through the supply chain, with goals related to inventory management, transportation and cost reduction.
- The human resources strategy focuses on managing the workforce through recruitment, retention, training, development, and engagement.
- The social development strategy is aimed at increasing sustainability, corporate social responsibility and ethical behavior, taking into account the company's impact on society and the environment.

Therefore, the choice of an anti-crisis management strategy will depend on the specific circumstances in which the business operates, including its resources, goals and market conditions, but in the current conditions of the Ukrainian business environment, there are also some enterprises that will not be ineffective in using the above business strategies because they are on the verge of survival in the combat zone or under temporary occupation, the Ukrainian Government, together with the Ministry of Economy of Ukraine,

is implementing a program to **relocate** Ukrainian enterprises located in the zone of active hostilities. The main objectives of business relocation are to preserve assets and capacity, resume work for the benefit of the economy and save jobs.

Relocation is possible within the country and abroad, but state support is available only within the country. Business owners had high expectations and underestimated external factors when re-locating their companies abroad. When located abroad, domestic companies face differences in business styles, difficulties in finding qualified personnel, and problems with crossing the state border for some citizens.

While relocating a business has many benefits, such as preserving assets and jobs, it also carries risks, such as high costs, inability to predict costs, and limited access to resources. Therefore, when developing a business strategy in a turbulent environment, relocation will only be appropriate if all possible risks have been taken into account and the economic and financial benefits outweigh the risks.

I would like to share a successful case of re-location in Ukraine by EPAM. In response to the outbreak of a full-scale war, the company implemented a Business Continuity Plan (BCP) that focused on ensuring the safety of employees. A dedicated Human Resource Management (HRM) team, comprised of top managers, was responsible for coordinating all aspects of the BCP. During the first two weeks of the war, the company was actively involved in facilitating the evacuation and sheltering of its employees and their families from the regions under attack.

Different groups of employees have been assigned to address different aspects of BCP's work, including the creation of a 24-hour support hotline to provide advice on a wide range of issues. To date, the hotline has processed more than 12,000 requests. In addition, the company organized the relocation of 14,000 employees from central, eastern and southern Ukraine, which was accomplished with the help of staff from various departments.

ERAM has long had a special department for internal and global relocations, as well as a unit responsible for organizing business trips. Thanks to these departments, the company was able to relocate 4,000 employees within Ukraine and send 2,500 people abroad. In addition, the company has set up temporary shelters in its offices and coworking spaces in several cities across Ukraine, including Lviv, Chernivtsi, Ivano-Frankivsk, Vinnytsia, Dnipro, Nadvirna, and Uzhhorod, where more than 5,000 people have found temporary shelter.

The company also provided financial support to its employees, in particular, by transferring USD 1,000 to each specialist during the first weeks of the war. Additional financial assistance was provided to employees who moved abroad and to those whose families were evacuated. The company also offered separate financial assistance to mobilized employees [28].

Conclusions. There are many strategies that can be implemented in a turbulent environment, such as crisis management, which in turn is divided into different types depending on the needs and problems of the enterprise, strategic planning and re-location. However, not all types of strategies can bring the desired financial stability and profit maximization for enterprises based on the economic and political conditions of Ukraine during the period of full-scale invasion.

Therefore, when formulating a business strategy in a turbulent external environment, it is recommended to analyze the strengths and weaknesses of the organization, take into account the specifics of the relevant business, production and provision of goods and services, so that the business strategy is truly appropriate and effective, and the economic and financial benefits cover all possible risks.

Thus, given the government's business support policy, the right choice and successful implementation of a competitive strategy will allow companies to achieve competitive advantages and stabilize their operations during the crisis, laying the groundwork for future growth under more favorable economic conditions.

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PEDAGOGY AND PSYCHOLOGY

BASIC APPROACHES TO BUILDING HEALTHY RELATIONSHIPS IN COUPLES AND MANAGING CONFLICTS

Oksana Deeptan,
Psychologist, Gestalt therapist,
National Pedagogical University named after M.P. Dragomanov, Ukraine,
od@deeptan.com.ua; ORCID: 0009-0008-1510-5063

Annotation. *This article explores key aspects of maintaining healthy relationships in a couple and effectively managing conflicts from a practical standpoint of psychology. The author discusses fundamental principles of building healthy relationships, such as open communication, shared interests, emotional intimacy, collaboration, mutual support, readiness for change, and compromise. Additionally, the importance of establishing rules in relationships and defining roles, as well as the role of gratitude, mutual understanding, and empathy in relationship maintenance, are considered. The article provides practical advice on resolving conflicts effectively, as well as information on the positive impact of constructive interactions on emotional well-being and health. Furthermore, the author addresses aspects of ending relationships with dignity and respect for the partner. Lastly, the article emphasizes the importance of recognizing and highly valuing various forms of expressing love within a couple, which may include both romantic gestures and practical support and understanding.*

Keywords: *healthy relationships, couple, conflict management, open communication, emotional intimacy, empathy, resolving conflicts, ending relationships.*

Introduction. We all want peace now - in Ukraine, which has been exhausted by the enemy's attacks, in society, which is split by strife, in every family and every couple. Because war - whether at the front or in the family - always destroys and devastates. Therefore, today the question of how to maintain healthy relationships in a couple is extremely relevant from the perspective of practical psychology. After all, harmonious relationships are the reliable front line that each of us desperately needs. It is something that needs to be worked on, fought for, and strengthened like powerful walls and high ramparts. Yes, relationships that can effectively withstand any external and internal threats are a real fortress.

When a man and a woman go through life together, side by side, hand in hand, it is a very strong union on all levels: physical, emotional, and social. The very first sign of its strength is the ability to communicate, speak and understand each other from half a word. Another sign is the habit of making joint decisions quickly, without much debate, performing important tasks or solving problems together. Such a couple does not blame anyone, does not blame each other, but looks in the same direction and does a common thing. Such a man and woman go together towards their goal, bringing their common

dream closer step by step.

Main material. Therefore, as a practicing psychologist, I am convinced that it is very important to establish open, constructive and continuous communication in the couple's relationship, it is the foundation of healthy relationships. This is the main psychological challenge.

Steps to a healthy relationship. From the point of view of practical psychology, the path to healthy relationships can include the following steps:

1. Open communication: talk to your partner regularly about your feelings, wishes, and expectations.
2. Shared interests: find common activities or interests that will keep you close.
3. Developing emotional intimacy: openness and shared feelings can strengthen your bonds.
4. Collaboration: It is important to learn to work together to resolve conflicts and complete tasks.
5. Mutual support: Be prepared to support each other in difficult situations.
6. Openness to change: develop together and don't be afraid to adapt to new circumstances.
7. Compromise: Learn to find compromises in situations where opinions differ.

Tell me honestly, do you have rules in your family or couple? This question may surprise many people. They might think, why would you want to establish rules in a relationship based on the free choice of individuals? They only limit and regulate. But is it possible to drive love into a certain framework of rules? It turns out that this does not harm love at all. There are rules on the roads so that traffic is not chaotic. There are rules in business structures so that business is transparent, efficient, and successful. And a family is also a structural unit in a way.

It is convinced **that to maintain relationships and a strong family, we need rules.** After all, where they exist, there is respect - for the partner, his or her personal space, his or her principles, views and desires. The rules developed by both, by mutual agreement, help to maintain this respect, values, and understand the point of view of a loved one.

In her book "I Want This to Work," Elizabeth Earnshaw, a well-known American psychotherapist and member of the American Association of Marriage and Family Therapy (AAMFT), talks about the importance of respecting your partner and not forgetting to respect yourself. She stated: "For me, love in the modern sense is a respectful attitude of each partner to the other. You cannot say that you love someone if you do not value yourself in such a couple, and you should not call a relationship in which you do not value your partner love. Nowadays, people want feelings and emotions to play a very important role in a couple's life, and for each partner to find both support and the opportunity for personal growth in such relationships."

If there are no rules and no respect, there is a crisis in the relationship, and the family has no chance of survival. Also, when there are rules and partners do not break them, it is an important sign that you can trust your loved one because they will never betray you or your relationship. Trust is another brick in the foundation of a family.

Family rules. What are some effective rules? Where to start creating this kind of family charter? I suggest starting with the simplest thing. For example, he or she can't live a minute without modern gadgets, where you can see and hear so many interesting and funny things. People get stuck, diving headlong into the bright worlds of social media. It's especially unfortunate when a couple wastes valuable time that could be spent communicating with each other, exchanging energy and emotions. For example, at breakfast or dinner and when a woman or a man is on the phone, the other partner feels unnecessary, unimportant, secondary, because the smartphone comes first. In other words, I'm sitting across from you, but I'm less interesting than a video on tik-tok. Hey, I'm here, I need your attention, your warmth!

Therefore, **rule No. 1** is to put down the gadgets and talk. After all, personal communication is a real gift to each other. This is what our partner needs and what we can give, generously share, and receive the same from our loved one. Only in communication can you get that important verbal and non-verbal feedback that either "says" that everything is "OK" with the relationship, or, on the contrary, signals that there is a crisis in the relationship or is just about to happen.

It happens that at a certain stage, a couple has nothing to talk about, no common theme. He's into soccer, paintball, or fishing, which doesn't interest her much. And she has fashion, handcrafts, and home life hacks that he doesn't like at all. So, what can you do to avoid breaking the thin thread of communication, and thus intimacy? I suggest watching a movie together once a week or a month, reading the same book in turn, going to the theatre, and then discussing it all. And you will see how different your views and your perception are, because a man sees one thing and a woman sees another. And it's incredibly interesting to see something from the other side thanks to your partner. So, I sincerely advise couples: find a common language, look for a uniting theme, an activity.

Communication in partnership can be built using modern psychological practices, some of which resemble games with specific tasks. Psychological practice "rose". Let's imagine this beautiful flower in all its details: here is a beautiful stem with leaves, but they are covered with unpleasant thorns, and here is a beautiful delicate bud. We start with the good things and tell each other about the positive things that happened during the day, week, or month. The second step is to share something bad, painful, something that hurt, wounded, offended, or outraged. And finally, we reach the "rosebud" and tell our partner about our plans for the next period, for the future. I invite my loved one to imagine the "pictures" that I draw and consider how my partner sees the future life of the couple. So, there are so many topics and reasons for joint conversations. There are also many good opportunities to express yourself and allow your partner to express themselves. And then you will literally bloom in the eyes of your loved one like a rose! And mutual communication will become another powerful source of pleasure and mental enrichment.

Another easy and very **pleasant rule is to thank each other** for the smallest things and at the slightest opportunity, to give small compliments, and to men as well. Even if the implementation of something is set in your family rules, no one has cancelled

sincere and warm words of appreciation and encouragement. Numerous international studies by foreign scientists have proven that such communication directly stimulates the production of such a socially important hormone of trust and affection as oxytocin. This neuropeptide causes a sense of pleasure and significantly increases the feeling of calmness next to a partner, and it reduces anxiety. Scientists say that this neurohormone activates the part of the brain that is responsible for communication, encourages us to strengthen relationships, be closer, empathize, help and support. In some American companies, there is even an experimental practice of inhaling oxytocin to make employees feel cared for and empathized with.

Peace in relationships and our health. And now for the most interesting part: our pituitary gland synthesizes oxytocin as part of the body's response to stress. Yes, everyone knows that in response to stress, adrenaline is produced, which provokes a rapid heartbeat. So when oxytocin is activated during stress, we start looking for support. This pushes us to share the emotions we are experiencing with someone, encourages us not to keep them inside. That is why in difficult times we try to be with a close family member.

Oxytocin is also responsible for protecting the cardiovascular system from the effects of stress: it allows blood vessels to relax. Scientists have shown that the heart has special receptors sensitive to this neurohormone, which helps to restore heart cells.

Thus, we can observe a sequence: hugs, gratitude, communication stimulate the production of oxytocin, and then it helps to strengthen the relationship in a couple and heals the spouses mentally and physically. In support of this, I want to give a recent example: in November, the British Daily Mail published a study by scientists from the University of Colorado, where they analysed data from 6,800 American adults aged 45 and older. They found that married men are twice as likely to die of heart failure within five years of diagnosis.

Oxytocin is also called the maternal hormone. In general, the birth of a child is a very important stage in the formation and development of a family. But it is also a test of the family and the relationship of young parents. Therefore, **a few more rules may apply to many aspects of child-rearing.**

Moreover, I recommend writing down these rules even before the baby is born. Distribute responsibilities among yourselves in advance: who will do what, how to help, and what to be responsible for. This will be especially necessary in the first three months, when mom and dad will have a lot of work to do. When the child grows up, goes to kindergarten and then to school, it is very important that parents clearly distribute their roles and responsibilities for the child. For example, mom checks homework, and dad oversees sports sections, thinking of different options for outdoor activities. It is important that the young family member knows these areas of responsibility and, for example, does not ask dad to help with math and mom to organize a picnic in nature. There are different situations in the family, so it is very important, for instance, to develop a rule of safe tone.

Domestic relations in the family. Domestic relationships in the family play a

crucial role in creating a healthy and cohesive environment for all family members. Balanced family relationships are an important factor in creating a positive atmosphere conducive to the growth, development, and support of all family members. From the perspective of practical psychology, they cover a wide range of aspects:

1. Communication: open and effective communication between family members helps to reach an understanding, express their thoughts and feelings.

2. Support: it is very important to feel that you can always get assistance within the family, regardless of life circumstances.

3. Mutual trust: its development helps to strengthen the basic sense of security and stability in the family.

4. The importance of understanding personal spaces: support for the individual needs of the partner and awareness of personal boundaries.

5. Shared values: The importance of similar life values and beliefs to ensure harmony and cohesion.

6. Sharing responsibilities: Sharing responsibility for various household and family tasks promotes balance and mutual understanding.

7. Respect: Mutual respect in the family can help create a harmonious atmosphere and always supports healthy relationships.

8. Time spent together in leisure or family activities: It helps to strengthen bonds, develop common interests and create shared memories.

9. Openness and readiness for change: the ability to adapt to transforming relationships, courage and determination in difficult life circumstances and difficult family situations.

10. Conflict resolution: the ability to resolve disagreements and communication bottlenecks in a constructive way that helps to maintain harmony in the family.

A relationship in a couple is like a business - it needs to be developed and worked on. They are not static, but are constantly changing, transforming, moving to a new stage. Therefore, by talking, move your relationship forward. I advise couples to do three things: do not devalue your partner in any way, take an active but very considerate and unobtrusive interest in your partner's life, and always support your spouse. And when this happens, a man with such a woman will flourish and become successful. And if you forget about it, the man will be a failure and stagnate.

Love = passion + interest

Love, and therefore relationships, is based on two basic things: passion and a sense of interest. If a couple has these two aspects, then a woman will be delighted to accept every initiative of her beloved: "What a great project you've come up with, well done. I believe in you; I will support you." And when that's not enough, the other woman will ask: "Why do you need it?" And this will clip a man's wings. Doing things together, taking risks together, being stressed together, being happy together - this is the important daily work on healthy relationships, on strengthening relationships in the family.

In her bestselling book Too Good to Leave, Too Bad to Stay, the famous American Mira Kirshenbaum, a world-renowned family therapist, co-founder and clinical director

of the Chestnut Hill Institute, and author of a dozen books on relationships, marriage, and family, talks about the importance of constant work on relationships. She writes: "Love's highest purpose is to serve us well, not to control us. Love is an important part of life, but we are not its slaves... It is time to tell the whole truth about love. It is not blind or stupid. It can see and learn. If you allow your love to see the truth of your relationship, if you allow it to take care of you, it will definitely respond."

How to overcome resentment? If there is silence in the family, literally and figuratively, if communication is too short and uninteresting, the "rose of relationships" withers, and resentment accumulates inside. They lead to the formation of an internal conflict - a hidden aggression that will come out in the form of a conflict in a couple. We begin to unconsciously use punishment for our partner: we either refuse intimacy or withhold money. And all this horror happens because there is no communication in the couple, and therefore no trust and respect.

Conflict and how to get out of it? How do you talk about offenses in a couple's relationship? Tactfully, with a sense of dignity and respect for your partner, voicing only your views, but in no case in the form of claims, labelling, and other things that kill relationships. Always say: “I am upset with this phrase of yours, with the fact that you did not do this, that you did not fulfil this promise”. It is wrong to say: your action offended me. When we say something to our partner, it is very important to start with the word "I": I am sad, I am worried, I am angry. And in no case should we use you: you offended me, your action offended me. There is no need to shift responsibility, no need to "move the needle." The essence seems to be the same, but the message is completely different.

If we talk about external conflicts between partners, they are, according to practicing psychologists, an integral part of any relationship. Building communication in a couple cannot avoid all conflicts but understanding and supporting each other can reduce their impact and help maintain stable relationships.

Some important aspects of research on relationship conflict include:

1. Different types of conflicts: over assets, role conflicts ("I am the mother", etc.), and conflicts caused by different norms and values.

2. Perception of conflicts: some relationships may intensify conflicts, while the microclimate in another family may help to resolve them.

3. Conflict resolution: Psychological research examines effective conflict resolution methods, such as compromise or cooperation, or avoidance.

4. Impact of conflicts: conflicts can have both positive and negative effects on relationships. Some conflicts can contribute to problem solving and relationship development.

5. Factors that influence conflicts: Communication, role structure, personality traits, and cultural differences can influence the emergence and development of conflicts.

The negative impact of conflict is that it can cause stress. Conflicts can trigger negative emotions such as hurt, irritation, anger, sadness, or even feelings of helplessness. Conflict can have a significant impact on your mood and well-being, leading to negative

feelings and physical or psychosomatic reactions. A conflict situation can cause stress, which affects the physiological state of the body and can lead to high blood pressure, rapid heart rate, etc. Conflict can affect the quality of your sleep by disrupting your ability to rest and relax. Negative emotions associated with conflict can lead to a general deterioration in health, fatigue, and malaise. Conflicts can affect the psycho-emotional state, leading to anxiety, depression and other psychological problems.

It is important to learn how to effectively resolve conflicts, seek compromise, and strive for mutual understanding to reduce the negative impact of conflicts on your emotional state and health. In general, psychological research on relationship conflicts helps to better understand how they arise, how they can be resolved, and how to maintain a positive balance and equilibrium between partners, which is the basis of a healthy relationship in a couple.

Often, conflicts and other problems make it impossible to maintain a relationship in a couple, and partners see no point in doing so. So how do you get out of a relationship without hurting yourself or your partner?

Leaving the relationship. Leaving a relationship is a sensitive process, and it is very important to consider the feelings and emotions of both parties. Here are a few steps that can help you leave a relationship with dignity and respect:

1. Be honest: An open and honest conversation with your partner is essential. Discuss your feelings and the reasons why you think a breakup is necessary.

2. Be respectful: It is important to maintain respect for your partner during this conversation. Avoid accusations, expressions of anger or irritation.

3. Carefully choose your words: choose the right words and expressions that will help you convey your feelings without causing unnecessary pain.

4. Listen: Give your partner the opportunity to speak and share their thoughts and feelings.

5. Set boundaries: If possible, discuss what will happen after the breakup, such as how you will share things or communicate in the future.

6. Maintain privacy: It's important to keep things confidential and not discuss personal details of your breakup with other people.

7. Give time: If your partner needs time to think and reflect, make sure you give them that opportunity.

8. Seek support: If the breakup is very difficult or you are experiencing strong emotions, consider seeing a counsellor or asking for support from friends or family.

It's important to approach this process with sensitivity and empathy, contributing to a healthy end to the relationship. A healthy, fulfilling relationship is not only about following the rules and sharing responsibilities as a couple, not only about overcoming problems together and resolving conflicts constructively, but also about romance. However, each of us has our own "love language," not necessarily with romantic implications. Therefore, when you lack some surprises, flowers, serenades under the balcony, take a closer look, watch your partner: how does he or she show his or her love? Maybe he does it in a different way, for example, by taking care of your moral or

financial security? Or maybe he does everything he can to provide you with maximum comfort in your life? Respect his expressions of love, do not devalue his steps toward you. Also, don't wait months or years for a romantic date. After all, you most likely saw at the beginning of the relationship that your path together would not be paved with rose petals. Ask yourself the question: Do I love my partner for what I expect from him or just for being in my life? Give yourself an honest answer to these questions. And once you have it, appreciate your partner even more here and now, appreciate and kiss them!

Main conclusions of the article. Maintaining healthy relationships in a couple and effectively managing conflicts involve several key principles, such as open communication, shared interests, emotional intimacy, collaboration, mutual support, readiness for change, and compromise.

Establishing rules in relationships, defining roles, as well as expressing gratitude, mutual understanding, and empathy are important elements of maintaining healthy relationships.

Practical advice on resolving conflicts effectively, such as acknowledging one's own emotions, using "I-messages," and seeking compromise, can help maintain stability and harmony in a couple. Understanding the importance of ending relationships with dignity and respect for the partner is crucial when dealing with relationship breakup. Recognizing and highly valuing various forms of expressing love within a couple contribute to maintaining emotional connection and intimacy.

Conclusions. Summarizing the main conclusions of the article emphasizes the importance of establishing and maintaining healthy relationships in a couple by considering key aspects such as communication, mutual understanding, and emotional support.

Many psychologists have devoted their work to the study of family relationships and relationships between men and women. In my practice, I rely on works:

1. John Gottman: Renowned American psychologist who spent many years researching relationships in couples and the development of healthy relationships. His work includes studying factors leading to relationship dissolution, as well as methods of supporting and restoring couple relationships.

2. Susan Johnson: Canadian psychologist and founder of Emotionally Focused Therapy for couples. She specializes in researching emotional attachment in couples and methods for working with emotional conflicts.

3. Esther Perel: Belgian psychotherapist and author of the book "Mating in Captivity," which explores questions of sexual attraction, intimacy, and relationships between partners.

4. Gary Chapman: Author of the book "The 5 Love Languages," which explores different ways of expressing love and how it is perceived in couple relationships.

These psychologists and many others have made significant contributions to understanding relationships in families and couples, providing practical advice and insights for supporting healthy and happy relationships.

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LEADERSHIP IN THE CONTEXT OF SOCIAL ACTIVITY AND ACTIVISM: PERSPECTIVES FROM HIGHER EDUCATION STUDENTS

Anastasiia Kotelevets,
lecturer,
Borys Grinchenko Kyiv Metropolitan University, Ukraine,
a.kotelevets@kubg.edu.ua; ORCID: 0000-0002- 0177-0440
Mariia Vyzhva,
postgraduate student,
Mykhailo Drahomanov Ukrainian State University, Ukraine,
mariacherpack@gmail.com; ORCID: 0000-0003-4596-4164

Annotation. *The article provides an overview of leadership within higher education and highlights the significance of understanding students' perceptions of leadership within educational contexts. It studies different views on leadership and social activity, emphasizing the diversity of interpretations and the influence of factors such as cultural backgrounds and personal experiences on students' perception of the concept. In the article it is explored similarities and differences in defining leadership and social activity with the use of a comparative analysis. The relationship between these concepts is described, highlighting the role of social activism as a sign of leadership skills. It is important that the results of a survey conducted among higher education institution students are provided. The analysis suggests that students believe that helping others is both a sign for social activity and activism as well as one of the main outcomes of leadership activity. Moreover, organizing different events and engaging others is believed to be a component of leadership. Future research directions are presented in the article, including the development of training programs to enhance social activity and leadership among young people.*

Keywords: *social activity, youth, leadership, leader, initiative, Russian-Ukrainian war.*

Introduction. Leadership can be defined and interpreted in different ways. However, despite the diverse approaches' universities tend to underline a key role of leadership development as the ultimate outcome of higher education (Melissa R. Shehane, Kathryn A. Sturtevant, Lori L. Moore, Kim E. Dooley, 2012). Understanding how students perceive leadership within the contexts of education, peer engagement and other forms of social interactions is essential for fostering an efficient environment for personal development, collaboration, and community development.

As there is not a unique theoretical framework to define leadership, there is not a single factor influencing students' understanding of this concept. Among them are cultural backgrounds, personal experiences, and institutional contexts (Wielkiewicz, Richard M, 2000). According to the study by John E. Shertzer & John H. Schuh (2004) student leaders view leadership as an individual-centered concept associated with holding positions of authority and influence. They believe that it demands special traits.

Further research by Paige Haber (2012) showed that students leaned towards seeing leadership more as hierarchical and centered around individual leaders rather than as collaborative and team-oriented. Another trend noticed in this research is the participants'

emphasis on leadership being associated with achieving a goal or completing a task, as reflected in the prevalence of themes related to shared goals and tasks.

Latest study by Jestine Philip and Mariya Gavrilova Aguilar (2021) studied the skills which students define as important for leaders. Their conclusion is that younger people choose digital literacy as a key skill for corporate leaders alongside the skills traditionally described as acquired by a leader.

Among other scholars who paid attention to students' perception of leadership are Senka Borovac Zekan, Ivan Peronja, Andrea Russo, John Garger, Paul H. Jacques and others. However, we can see the lack of studies on students' views on leadership and social activism and social activity.

The purpose of the article is to explore how students perceive leadership in the context of social activity and activism. Understanding students' vision can provide insights into how higher education institutions can foster an efficient environment for students to help them develop their leadership skills and encourage their activism.

The research methodology is based on theoretical data analysis. Methods of generalization, synthesis and systematization are applied.

Results of research. As educational systems are complex and adaptive they require appropriate leadership approaches, hence Scott Eacott (2011) emphasizes the importance of viewing leadership as a complex social activity that is not directly observable. It is necessary to define two concepts - leadership and social activity (social activism).

In the textbook «Social work in Ukraine» (Zvereva, I.D., Bezpalko, O.V., Kharchenko, S.Ya, 2004), we see the following explanation of the concept of social activity: it is a conscious, purposeful activity of a person, focused both on the transformation of objective social conditions and on the formation of social qualities of one's own personality (active life position).

Social activity is a necessary condition for an individual's versatile development, an element which accelerates social development. It can be implemented in various forms, not only as an individual, but also as a group, collective, organizational, aimed at realizing the opportunities and interests of certain social groups.

Currently there is a great variety of models, theories, and philosophies of leadership which cover different aspects of the concept. Earlier approaches defined leadership through the set of unique traits which a certain number of people held, however the contemporary trend in the field is that leadership can be demonstrated by individuals irrespective of their official titles or positions (Brooks et al., 2019; Komives et al., 2006; Kouzes & Posner, 2012) and it's a skill that can be developed if the individual has access to relevant opportunities (e.g., Avolio, 2010; Bok, 2020; Elmuti et al., 2005; Komives et al., 2006; Mumford et al., 2000; Shek et al., 2021).

Peter Northouse (2021) believes that leadership «is a process whereby an individual influences a group of individuals in order to achieve a common goal». Likewise, other researchers have defined leadership and leadership skills as the ability to employ social influence and perceptions to unite a group towards achieving a shared objective, and includes a set of other skills like communication, conflict resolution, self-management (e.g., Chemers, 2014; McCormick, 2001; Oyinlade, 2006; Pellegrino & Hilton, 2013; Ruben & Gigliotti, 2016). Additionally, it involves an individual's capacity for critical thinking and problem-solving, the ability to make decisions during challenging situations (e.g., Mumford et al., 2000; Reed et al., 2019).

L. Kyzymenko and L. Bidna in the «Social Worker's Dictionary» (2000, p.3) define social activity as a conscious, purposeful activity of a person, which is oriented both on the transformation of objective social conditions and on the formation of social qualities of one's own personality (active life position).

Viewing leadership as a skill underlines the importance of the abilities, capabilities, and knowledge necessary for effective leadership (Northouse, 2021). Dugan (2017) has provided clarification by suggesting that skills, and set of skills (attributes), transition into competencies when they are essential for performing a particular task (Bass, 2008). Similarly, Kragt and Day (2020) regard «leadership competency» as extending beyond general leadership skills that are not tailored to a specific context; instead, it relies on the specific tasks and goals of a particular role.

S. Kharchenko (2006, p.251) notes that social activity is precisely a personal quality through which a person's views on values are manifested and is a desire to show social interest in the life of society.

A. Bazilenko (2018, p.33) notes that currently several approaches to the concept of «personal activity» are distinguished: activity as a social position, as a process of social activity, as internal self-determination and a means of self-education, as a property of the subject of life activity, as a path to self-realization and self-creation of an individual, etc.

According to J. Scouller (2011), who developed an integrated model of leadership, argues that current theories explain only some aspects of leadership. They can be either incomplete, emphasizing the significance of vision and inspiration while overlooking the practical aspects of implementing it. Alternatively, they can be subjective, inflexible, and narrow-minded, dictating a specific model of leadership in action, which does not fit for every situation. He defines leadership as: «the process of addressing four dimensions simultaneously: setting a motivating purpose that inspires people to combine and work towards willingly; paying attention to the means, pace and quality of progress towards the aim; and upholding group unity and individual effectiveness».

In the psychological aspect, social activity can be defined through the motives of behavior, semantic systems, value orientations, its influence on the solution of social tasks, the ability of an individual to be represented in others, the continuation of oneself in others. This side of social activity aligns with the definition of leadership by J.Scouller and others who view leadership not only as a set of skills or a mere group process but combination of those two as well as a set of behaviours needed to unite the group and motivate them to achieve a common goal.

Having analyzed the concept of social activity, we consider it as a necessary condition for the versatile development of the individual, a characteristic of the individual’s way of life, which is oriented both on the transformation of objective social conditions and on the formation of social qualities of one's own personality (active life position). Leadership, in turn, is a set of qualities and skills that allow an individual to be socially active.

To study the students’ perception of both of these concepts we have conducted a survey among eighteen students of higher education institution. The students voluntarily agreed to participate in the survey as a member of a focus group in studying leadership and social activism.

To conduct research study, we used a specially developed questionnaire which contained ten questions and the statement of participant’s consent for using their answers in the research.

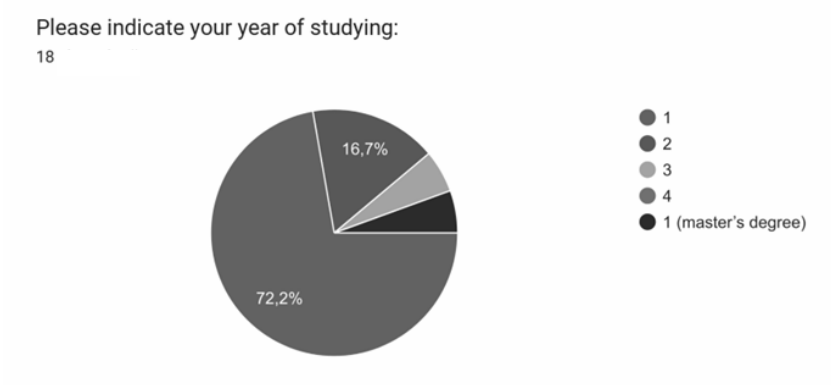

Fig. 1. Year of studying

The most participants of the survey are first-year students – 72.2%, 16.7% –second-year of studying, students of the third year of studying and master-degree students together make 5.6%. All the participants defined themselves as females.

Next, we offer to consider the answers to the questions directly related to the topic of our article and determine the extent to which the understanding of the concepts of leadership and social activity by scientists and students coincides (see Figure 1).

When asked what social activity is for you, 88.9% of respondents said that it is to participate in community social initiatives (cities, countries). The second place was taken by answering «help others» – 77.8%. The third most popular answer was «volunteering» – 72.2% (see Figure 2).

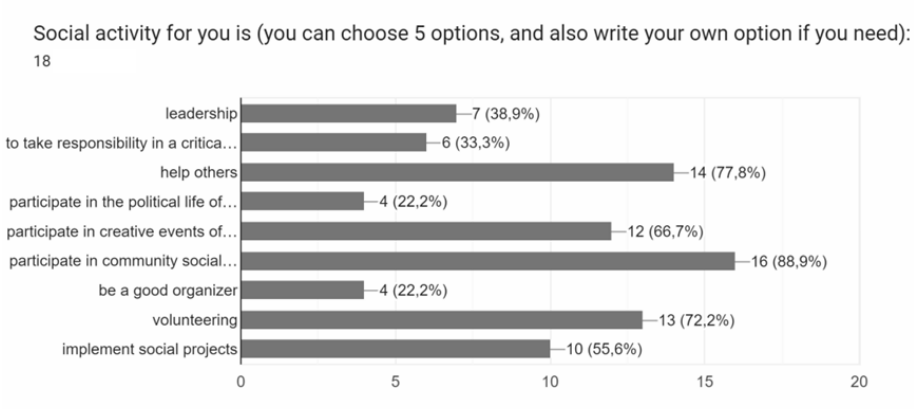

Fig. 2. Social activity for you

The next question was «What is leadership for you? » The main response was «taking responsibility in a critical situation» – 83.3%. The second place was again taken by the answer «to help others» – 72.2%. The third most popular answer was «be good at organizing» – 61.1% (see Figure 3).

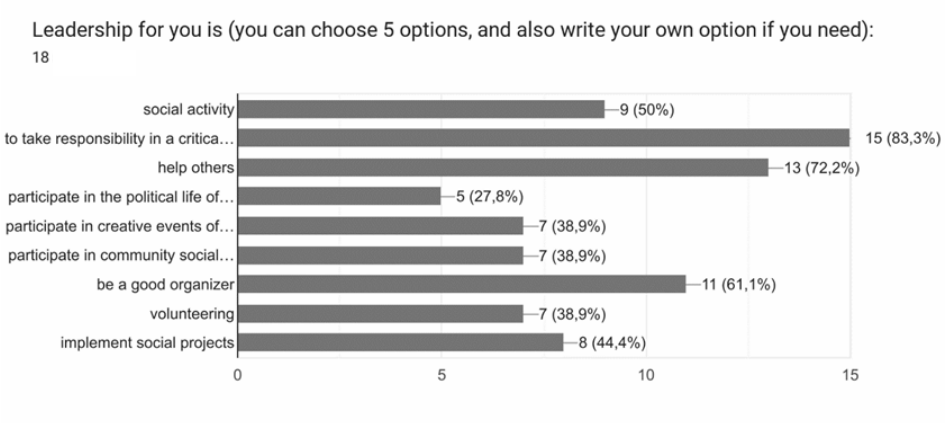

Fig. 3. Leadership for you

Therefore, for students helping others is the basic common value of the two concepts. However, the first place in the answers is very different as students believe that leadership is first of all manifested when one takes responsibility in a critical situation, while social activity is taking part in events organized by one's community.

It is also interesting to note the opinion regarding the third place. Social activity is associated with volunteering while leadership with the fact that a person should be good at organizing others.

At the same time, as shown by the answer to the following question, 88.9% of respondents consider social activity a sign of leadership, and only 11.1% doubt it, but none denies this opinion (see Figure 4).

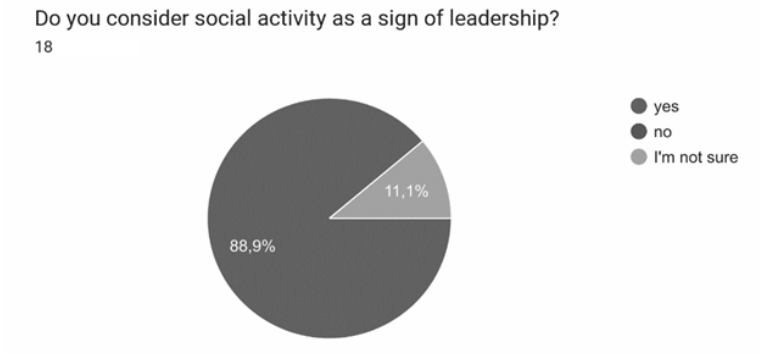

Fig. 4. Social activity as a part of leadership

However, to the question of whether you consider volunteering to be a form of leadership (see Figure 5), the answers were distributed as follows: 61.1 answered «yes», 27.8% were not sure, and 5.6% answered «no». Some of the participants introduced their own answers as: «part of leadership - yes. Form of leadership – don't think so»

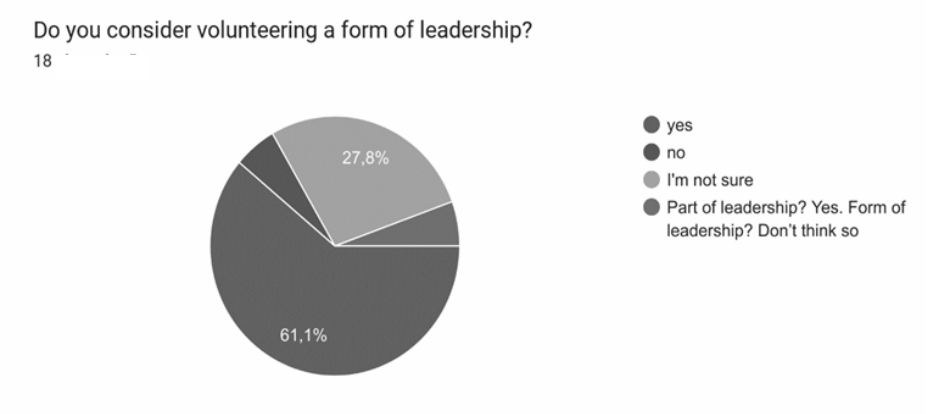

Fig. 5. Volunteering as a part of leadership

Interesting result shows the answers to the question «Have you become more socially active after February 24, 2022? » (see Figure 6) as half of the respondents said an affirmative «yes», almost 30% – answered that they started doing more, 5.6% – were active even before the full-scale invasion, but 16.7% noted that their social activity has not changed in any way.

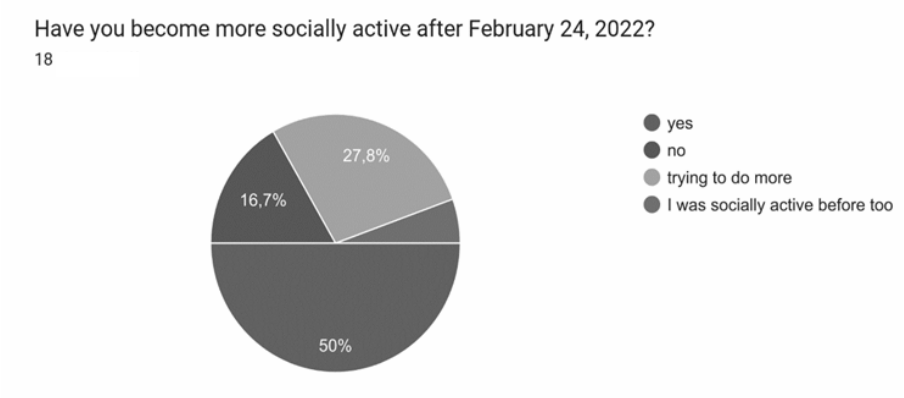

Fig. 6. Social activity after February 24, 2022

The last question «Do you have experience demonstrating your leadership skills? Please, describe the situation in two to three sentences» was an open one. The following are some of the answers we got:

– I organized a literary social project and held literary events. This Tuesday I will conduct a training for children to encourage them to learn the Ukrainian language and be interested in Ukrainian culture :)

– At school I organized «book crossing week», so everyone could bring his/her book and choose another one from available in the box. It was a great experience,

and maybe I would like to try something like that again but this time at university. At school organization of it was not very difficult, I just had a conversation with head teacher. Then I and my friend made some posters (which we sent to each class) and found a box. I still have someone's book which I took from that box.

– On my first day at the university, I became a group leader, and I was one at school as well. I always try to be active in different situations, in discussions and participate in different events. I'm always happy to join all kinds of projects. Once, when I was studying at an online English school, my teacher asked me to teach a lesson instead of him because he had some urgent business. I was well prepared with the material, learned everything I needed to know, and taught it with pleasure

– I have not had such experience yet, but I am ready to try to succeed in my studies and acquire new skills. It is important to me.

– I am not sure that this can be leadership, but I created a Telegram channel with my friends to popularize the Ukrainian language and culture

– I was the leader of my school, where we organized various activities, including volunteer activities. I also attended a leadership school.

– I was the deputy president of my school and organized all events

– I have launched an educational project about human rights activists, also I have participated in youth exchanges in a role of a team leader

– For instance, in school and university projects, simply life, in difficult psychology situations

– Yes, I have experience demonstrating my leadership qualities. As president of debate club, I organized weekly meetings, helped train new members on public speaking and argumentation techniques, and delegated tasks to ensure our events ran smoothly. This role allowed me to develop skills in team management, communication, and event planning.

– Not at all. in short, I don't see myself as a leader, so I just do what I'm asked to do.

– I took the lead in organizing my prom at school, when I saw that my classmates were frustrated because our teacher didn't let them do what they want. So I united them all with a speech and took on the hatred of the teacher and tried to achieve the right to choose at least a song. They all were grateful.

– I didn't have opportunity to demonstrate my leadership skills throughout my life. But I'm looking forward to demonstrate myself in future.

Though the answers vary, some common characteristics can be noticed. A number of the participants see the opportunity to demonstrate their leadership skills through organizing different events or engage people in participating in events. A few participants shared about acquiring a position of a leader which led them to opportunities to demonstrate their leadership skills. There are also participants who haven't had leadership experience but are expecting to demonstrate their skills.

Conclusions. Students' answers analysis as well as the scholars' findings lead to the conclusion that leadership as a set of skills and practices can increase and be

demonstrated in the form of social activism, which, in turn, can include helping others, participating in community events as well as organizing them.

As a perspective for further research, we see the development of a training program to increase the level of social activity of young people and give them the opportunity to demonstrate their leadership qualities.

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SCIENTIFIC PRINCIPLES OF LEARNING SPHERICAL GEOMETRY IN INSTITUTIONS OF HIGHER EDUCATION

Natalia Shapovalova,
Ph.D. in Physico-mathematical Sciences, Associate Professor,
Mykhailo Dragomanov State University of Ukraine,
n.v.shapovalova@udu.edu.ua; ORCID: 0009-0000-7084-1460
Larisa Panchenko,
Ph.D. in Pedagogy, Associate Professor,
Mykhailo Dragomanov State University of Ukraine,
larpan97@gmail.com; ORCID: 0009-0001-8156-286X
Olga Mihulova,
Master of Mathematics,
Mykhailo Dragomanov State University of Ukraine,
rukovoditel10b@gmail.com; ORCID: 0009-0008-9916-0560

Annotation. *The article provides historical information about the emergence and development of spherical geometry, considers the basic concepts of spherical geometry, reveals and improves the scientific principles of teaching spherical geometry in institutions of higher education. The interdisciplinary connections of spherical geometry with geography, astronomy, navigation, cosmology, and others are described. The determined potential of spherical geometry in the field of astronomy, where determining the coordinates of objects on the celestial sphere is important for understanding cosmic phenomena. Since spherical geometry is an important tool for the analysis and modeling of real phenomena in three-dimensional space, its application in modern GPS technologies and geospatial information systems emphasizes the relevance of this area of research.*

The peculiarities of teaching spherical geometry in institutions of higher education are analyzed and the main methodical aspects of this process are revealed. The purpose, content, basic provisions of spherical geometry are considered, and modern approaches and methods of its teaching are proposed. The proposed use in the educational process of practical and applied applications of facts of spherical geometry, tools of dynamic geometry, interdisciplinary connections of spherical geometry with physics, biology, astronomy, cosmology.

Keywords: *spherical geometry, basics of geometry, sphere, competence, interdisciplinary connections, educational process, learning, scientific approach, physics, astronomy.*

Problem statement. In the educational process, both in secondary education institutions and in institutions of higher education, mathematics acts as one of the key subjects that contributes to the mastery of other disciplines and finds wide practical application. Particular importance is attached to the study of geometry, which plays a specific role in learning and practical activities.

Knowledge of geometry is of great importance, because in modern society, the development of spatial concepts and logical thinking become decisive for the professional competence of specialists in many fields. The geometry course determines the level of

development of these skills, which is a key criterion for professional success.

The study of the properties of geometric bodies and the study of their connections not only form the scientific worldview of students and pupils, but also contribute to the development of logic, systematicity and the ability to express one's thoughts in a reasoned way. Knowledge of geometry opens up wide opportunities for the development of the culture of thinking, spatial ideas, creativity and independence in learning.

The development of spatial thinking, in particular in the study of spherical geometry, is an important component of education. Logical thinking acquired through geometric studies is necessary not only for mathematicians, but also for representatives of other sciences, contributing to the correct analysis, formulation of hypotheses and solving problems in various fields of knowledge.

Like the geometry of Euclid, spherical geometry is used for practical purposes, in ancient times it was required by the science of astronomy. This knowledge was important, for example, to travelers and sailors who charted their routes by the stars. Since during astronomical observations, it was believed that the Sun, Moon and stars move on an imaginary "heavenly sphere", therefore, knowledge of the geometry of the sphere was necessary to study their movement.

Currently, spherical geometry is widely used in the following areas:

1. *Geodesy and navigation.* Spherical geometry is the foundation for solving problems of location, geodesy and navigation.

a) To calculate the path, distances and angles in navigation and aviation;

b) To describe the method of finding the shortest distance between two points along the Earth's surface, if their geographic coordinates are known;

c) To determine the initial course of the ship when moving from one point to another, if the geographical coordinates of these points are known.

2. *Cartography.* Spherical geometry is used in cartography: in particular, in the construction of map projections.

3. *Geoinformation systems (GIS). Nowadays,* GIS have become an integral part of many industries, including geology, urban planning, transport logistics, and others. The use of spherical geometry in GIS helps to correctly display and analyze information for the further correct implementation of the tasks.

4. *In space research.* Calculation of distances, angles and coordinates of objects in outer space is important.

5. *Globalization.* In the modern world, mobility and globalization are increasing, information about the modern world and its processes are becoming increasingly important. Understanding spherical geometry helps to effectively interact with global aspects of life, including international travel, communication, trade.

Therefore, research and application of the facts of spherical geometry remain relevant due to their applied importance in various fields of science, technology and everyday life. Therefore, the development of the scientific foundations of teaching spherical geometry in institutions of higher education is an urgent need.

Analysis of recent research and publications. Hipparchus of Nice (180-185 BC)

and Leonard Euler (1707-1783) are considered to be the founders of spherical geometry. Spherical geometry arose in the 1st-2nd centuries AD, when, after the Roman conquests, close contact was established between Greek and Alexandrian geometers and Babylonian astronomers. In the 1st century the "spherical" of Menelaus appeared, which was used for astronomy by the famous Claudius Ptolemy. Later, with the development of navigation and geography, spherical geometry began to be used for the surface of the globe.

Questions related to the study of spherical geometry are very closely intertwined with the features of psychology and the theory of cognition in general, with questions about how spatial imagination and intuition arise. Famous scientists Leonard Euler, Georg Friedrich Bernhard Riemann, Felix Klein, Henri Poincaré, A.D. Aleksandrov, I.P. Yegorov, O.S. Smogorzhevskyi, N.V. Yefimov, L.S. Atanasyan, O.V. Manturov, V.P. Yakovets and others.

The purpose of the article. The purpose of the article is to use available sources, scientific literature and own experience to reveal and describe the results of the study of the specifics and features of teaching spherical geometry to students of higher education institutions. To reveal the main methodological aspects of this process and to improve the scientific principles of teaching spherical geometry in institutions of higher education. To analyze the practical application of the facts of spherical geometry for solving real tasks and problems in various fields of science and practice.

Research methods in spherical geometry. Studies of spherical geometry include the use of various methods that allow studying the properties and relationships between objects on the sphere.

Here are some basic methods used in the study of spherical geometry.

1. The analytical method includes the use of analytical coordinates on the sphere to express geometric objects and their properties. Solving systems of equations that correspond to the equations of spherical geometry.
2. The synthetic method consists in constructing geometric figures and proving statements with the help of special spherical constructions and mutual positions of objects and using spherical lune or spherical digons or figure having two angles, spherical triangles and their properties to study geometric problems.
3. The methods of differential geometry include the use of concepts and statements, theorems and criteria of differential geometry to study the properties of curves and surfaces on a sphere, the determination of vectors and curves for objects of spherical geometry.
4. Methods of projective geometry - the use of projective transformations to study the properties of spherical shapes when transforming spherical objects in order to study their characteristics.
5. Geodetic methods consist in the use of geodetic measurements and triangulation to determine distances and angles between points on the sphere, solving navigational and cartographic tasks using spherical calculations.

These methods are often combined for a more effective and comprehensive study of the facts of spherical geometry and taking into account their specificity.

Presenting main material. There is much in common between the geometry of the Euclidean plane and spherical geometries; this is explained by the fact that the sphere has the same "mobility" as the plane: an arbitrary point of the plane and the directions emanating from it can be combined by the movement of the plane with any other point of the plane and the direction emanating from it, and also an arbitrary point of the sphere and the direction emanating from it can be combined by the rotation of this sphere with any other point of the sphere and the direction emanating from it.

If the main concepts of geometry on the Euclidean plane are a point, a straight line and the movement of a plane, then in spherical geometry the point of a sphere, a great circle and the movement of a sphere play the same role [8, p.49].

The cross-section of a sphere by an arbitrary plane is a circle, because if you drop a perpendicular from the center of the sphere onto this plane and rotate the space around this perpendicular by an arbitrary angle, then when you rotate, both the sphere and the plane and the line of their intersection will pass into itself; therefore, an arbitrary point of this line of intersection is at the same distance from the point of intersection of the plane with the perpendicular, and this line of intersection is a circle.

When the plane passes through the center of the sphere, i.e. represents a diametrical plane, the circle on the sphere is called a *great circle;* all other circles on the sphere are called *small circles.*

Since a single plane passes through arbitrary three points of space that do not lie on the same straight line, then a single diametrical plane passes through two arbitrary points of the sphere that are not diametrically opposite.

Therefore, *a single great circle passes through two points of the sphere that are not diametrically opposite.* This fact is analogous to the fact that a single straight line passes through two points on the Euclidean plane. An infinite number of large circles can be drawn through two diametrically opposite points. Since *any two diametrical planes of the sphere intersect along its diameter, then any two great circles intersect at two diametrically opposite points of the sphere.*

Since a plane divides space into two regions, *a great circle divides a sphere into two regions,* these regions are called hemispheres. Because two intersecting planes divide space into four regions, *two great circles divide the sphere into four regions.* As three planes intersecting at one point divide space into eight regions, so *three great circles not intersecting at one point divide the sphere into eight regions.*

If the first two of these properties are analogous to the properties of straight lines on the Euclidean plane, which is divided into two regions by a straight line and into four regions by two intersecting straight lines, then the third property is not analogous to the corresponding property of straight lines on the Euclidean plane, since three pairwise intersecting straight lines do not pass through one point, divide the plane into seven parts.

The great circle corresponds to two diametrically opposite points of the sphere cut out of it with a diameter that is perpendicular to the plane of the great circle. These two points are called the *poles* of the great circle.

Two diametrically opposite points A and B on the sphere correspond to a single great circle, for which points A and B are poles; this great circle is called the *pole* of a pair of

diametrically opposite points *A* and *B*. Each point of the pole is called *polar conjugate* to each of its poles, in other words, the points *P* and *Q* of the sphere are polar conjugate if the radii *OP* and *OQ* are perpendicular (*O* is the center of the sphere).

The concept of motion on the sphere can be introduced analogously to the corresponding concept on the Euclidean plane. The movement of the sphere is such a transformation of the sphere in which the distance between the points is preserved. In other words, the transformation φ of the sphere is a movement if, for arbitrary points *A, B* of the sphere, the distance between the points *A'=φ(A) and B'=φ(B)* is equal to the distance between the points *A* and *B: AB = A'B'*.

The basic properties of motions in the Euclidean plane carry over accordingly to motions on a sphere, but motions on a sphere have some distinctive properties that motions on the Euclidean plane do not. In particular, since two points A and B are diametrically opposite if and only if the distance between them is the largest possible value equal to 2r (where r is the radius of the sphere), then it follows from the definition of motion that *in arbitrary motion the spheres are diametrically opposite points of the sphere pass into diametrically opposite points.* This property has no analogue in the Euclidean geometry of the plane, since there are no such pairs of points on the Euclidean plane that the movement of one of these points determines the movement of the other. Therefore, if the movement of a plane is a transformation of a set of points of this plane, then the movement of a sphere is essentially a transformation of a set of pairs of diametrically opposite points of the sphere.

The simplest motions of the sphere are *the rotation of the sphere about any axis* passing through the center of the sphere, *the symmetry of the sphere with respect to any plane* passing through the center of the sphere, *the symmetry of the sphere with respect to its center.*

As in planimetry, *the composition of any two motions of a sphere is also a motion of a sphere. Spherical geometry studies those properties of figures on the sphere that are preserved during arbitrary movements of the sphere.*

Figures on the sphere that can be translated into each other by some movement of the sphere are called *equal* figures, the geometric properties of equal figures are the same.

Since the arbitrary motion of the sphere translates a pair of diametrically opposite points into a pair of diametrically opposite points, *the pair of diametrically opposite points in spherical geometry is an independent geometric object.*

It is appropriate to draw students' attention to one remarkable property of these pairs of points: *each theorem of spherical geometry corresponds to another theorem of this geometry, which is obtained with the first substitution of the words:* "pair of diametrically opposite points" and "great circle", "lies on" and "passes through" , "connect" and "cross".

Example:

Two pairs of diametrically opposite points of the sphere are connected by one big circle.	Two great circles on the sphere intersect at one pair of diametrically opposite points.

This property of the theorems of spherical geometry is a consequence of the fact that a pair of its poles mutually uniquely corresponds to each great circle on the sphere,

and to any pair of diametrically opposite points of the sphere, their polar corresponds mutually uniquely, and if a great circle passes through a pair of diametrically opposite points, then the poles of this circle lie on the polar of this pair of points. And this property is called *the principle of duality,* and the theorems obtained from each other by the specified substitution are called dual theorems. If one of the dual theorems is proved, then the proof of the second theorem can be obtained from the proof of the first theorem by going from each great circle to its poles, and from each pair of diametrically opposite points to its poles.

The angle between two intersecting lines in space is called the angle between the tangents to these lines at the point of their intersection. A partial case of the general concept of an angle between two lines is the angle between two great circles on a sphere. *The angle on the sphere is equal to the length of the arc of the great circle between the points of the sides of the angle, polar conjugate to the apex of the angle, divided by the radius of the sphere.*

Lines, angles, triangles, curves and other figures on the sphere have specific properties.

Two great circles define four angles between two semicircles, pairwise equal to each other. Those of these angles, both sides of which are continuations of the sides of the second angle, are equal and are called *vertical angles,* those of these angles that have one common side, and in the sum make up the expanded angle π are *called adjacent angles. The angle between the two great circles is equal to the length of the arc connecting the poles divided by the radius of the sphere. Great circles, one of which passes through the pole of the other, intersect at right angles.* Such large circles are called *perpendicular. Each of the two perpendicular great circles passes through the pole of the second great circle.* From this it follows that a great circle is the pole of the point of intersection of two great circles, perpendicular to the two great circles, that is, *two great circles always have a single great circle, which is perpendicular to both of them.*

For comparison, note that on the Euclidean plane, a common perpendicular can be drawn only to parallel straight lines, and not one, but many common perpendiculars can be drawn to two parallel straight lines.

Three great circles on the sphere, not intersecting at one point, divide the sphere into eight regions. Each of these areas, bounded by arcs of three great circles, is *called a spherical triangle.* That is, a *spherical triangle i*s a figure formed by three arcs of large circles that intersect at three points, for example, triangle *ABC.* Arcs of great circles bounding a spherical triangle are called its *sides, t*he ends of these arcs are called its *vertices,* and the angles formed by the sides of a spherical triangle at its vertices are called *angles* of a spherical triangle [1, p.111-112].

It is clear that each side of a spherical triangle is less than half of a great circle.

Considering the properties of triangles on a sphere, it should be noted that while the sides of a triangle on the Euclidean plane are straight line segments and are measured in linear units, the sides of a spherical triangle are arcs of great circles and are measured in arc units - *degrees or radians.*

Each side of a spherical triangle is less than the sum of the other two and greater than their difference. The semi-perimeter of a spherical triangle is always larger than each of its sides. The sum of the sides (perimeter) of a spherical triangle is always less than 360o and greater than zero.

In spherical geometry, there is such a figure as a *spherical lune or spherical digons* or *figure having two anglest,* which does not exist on the Euclidean plane. A dihedral is a part of a sphere bounded by two halves of large circles with common ends; these common ends, called vertices of the dihedral, are diametrically opposite points of the sphere.

Two spherical triangles are called equal if they can be aligned with each other by the movement of the sphere. It is obvious that a correspondence can be established between the vertices of two equal spherical triangles, in which both the corresponding sides and the corresponding angles of these spherical triangles are equal: for this, each vertex of the first spherical triangle must be matched with the vertex of the second spherical triangle into which it passes at combinations of these spherical triangles.

We have ***six signs of the equality of spherical triangles:***

two spherical triangles are congruent if:

1) two sides of one spherical triangle are equal to two sides of another spherical triangle and the angles between these sides are equal;

2) two angles of one spherical triangle are equal to two corresponding angles of another spherical triangle and equal sides between these angles;

3) all sides of one spherical triangle are equal to the corresponding sides of another spherical triangle;

4) two sides of one spherical triangle are equal to two corresponding sides of another spherical triangle, the angles opposite the other two sides are simultaneously acute or obtuse;

5) two angles of one spherical triangle are equal to two corresponding angles of another spherical triangle, the sides lying opposite two equal angles are equal, and the sides lying opposite two other equal angles are simultaneously smaller or larger than πr;

6) all three angles of one spherical triangle are equal to the corresponding angles of another spherical triangle.

The first four of these signs of equality are analogous to the signs of equality of triangles on the Euclidean plane. The fifth sign of the equality of spherical triangles also has an analogue in geometry on the Euclidean plane, but with the difference that the fifth criterion for the equality of plane triangles, that is, triangles on the Euclidean plane, does not have a condition similar to the condition formulated at the end of sign of equality of spherical triangles. The sixth sign of the equality of spherical triangles has no analogue at all in the geometry of the Euclidean plane, where the equality of the corresponding angles of two triangles is a sign not of equality, but of the similarity of triangles.

The concept of equality of figures on the sphere can be introduced in the same way as it is done for figures on the Euclidean plane. First, two spherical figures are said to be equal if they have equal corresponding elements. Secondly, two spherical figures are

called equal if, by some movement on the sphere, one of them is reflected on the other, while the vertices of one figure become the vertices of the other so that the order of the vertices is preserved. In the school course of geometry, it is proved that for a plane such two definitions of the equality of figures are equivalent.

Note that the equality of figures is also defined as follows: two spherical figures are called *equal* if one of them can be combined with the other by overlapping. It is clear that all the corresponding elements are equal in the shapes that overlap when superimposed.

But the reverse statement for spherical figures is not always correct. For example, let us have two triangles *ABC* and *A'B'C'* such that all the elements of the triangle *ABC* are equal to the corresponding elements of the triangle *A'B'C',* but they cannot be combined by overlapping, because they have the opposite orientation. For such triangles, instead of the term "equal", the term "symmetric" is used.

In an arbitrary spherical triangle, each side is less than the sum of the other two sides, and greater than their difference.

From this, as in the geometry of the Euclidean plane, the consequence follows that *in an arbitrary spherical triangle the larger side lies opposite the larger angle, and the larger side lies opposite the larger side.*

Due to the fact that the length of any continuous line on the sphere can be replaced with a very small error by the length of the line consisting of arcs of great circles connecting the points of the given lines, then the arc of a great circle, a smaller semicircle, is shorter than any continuous line on of the sphere connecting the same points of the sphere, that is, this arc of the great circle is the shortest line on the sphere. In this respect, a great circle is analogous to a straight line on a plane. We can see from here. That this line on the earth's (spherical) surface, which is obtained on it by hanging and which in small areas is taken for a straight line, when sufficiently extended is an arc of a great circle. Since these lines are drawn by surveyors, great circles are also called geodetic lines on the sphere.

In any spherical triangle, the difference of the sum of any two angles and the third is always less than two right angles. In any spherical triangle, the sum of the angles and the third is always less than 540 o and greater than 180 o, i.e.

$$180\ o < \angle A + \angle B + \angle C < 540\ o.$$

The sum of the angles in a spherical triangle is a variable value and is always greater than 180o, i.e. $\angle A + \angle B + \angle C = 180\ o + \varepsilon$ [1, p.114-115].

It should be noted that in spherical geometry there is even a geodesic triangle with three right angles.

Note that in a spherical triangle, the concepts of bisectors, medians and heights, as well as the ratio between sides and angles have the same meaning as in a triangle on a plane.

In particular, te following statements apply:

1. *Opposite equal sides of a spherical triangle lie equal angles and vice versa.*

2. *In an arbitrary spherical triangle, the larger side lies against the larger angle and vice versa.*

3. *In an isosceles spherical triangle, the angles lying opposite equal sides are equal.*

Therefore, the formulas of spherical geometry for figures with small linear dimensions compared to the radius of the sphere coincide with the corresponding formulas of Euclidean geometry.

The sum of the angles of a spherical triangle is greater than the extended angle. This is a significant difference between geometry on a sphere and geometry on the Euclid plane and geometry on the Lobachevsky plane.

In spherical geometry, there are no similar triangles because the angles of a triangle uniquely determine its sides.

Parallel "straight lines" cannot be drawn in spherical geometry, while there are parallel straight lines on the Euclid plane and the Lobachevsky plane.

Conclusions. In the process of teaching spherical geometry, which is one of the non-Euclidean geometries, it is advisable to use comparative analysis, namely to compare the statements of parabolic geometry or Euclid's geometry, hyperbolic geometry or Lobachevsky's geometry, projective geometry, spherical geometry, elliptic geometry or Riemann's geometry, activating facts known to students , and identify their common or distinctive features. The most effective methods of teaching non-Euclidean geometries are the explanatory and illustrative method and the heuristic conversation. It is during the heuristic conversation that students compare statements of non-Euclidean geometries with their counterparts from Euclidean geometry.

In order to increase the level of educational activity, it is necessary to continue to form general mental actions and methods of mental activity in students, to strengthen the motivation of learning and to use traditional and new technologies, modern information technologies that activate educational and cognitive activity.

In the process of learning spherical geometry, it is advisable to create and use reference notes as one of the teaching aids.

Reference abstract (RA) is a visual structural and logical diagram, with the help of which educational material is presented in a condensed form, taking into account essential connections and relationships.

One of the main advantages of using spherical geometry is that it enables the researcher to model and analyze phenomena in three-dimensional space, making it an important tool in fields related to geography, astronomy, navigation, cosmology and other fields.

Having analyzed a variety of applied problems, we determined that spherical geometry is successfully used in solving problems related to determining distances, directions, angles and other parameters on a sphere. Another important aspect is the possibility of taking into account the curvature of the Earth when modeling geographical phenomena. For example, in navigation systems, where determining the exact location and determining the optimal routes become critical tasks.

The research shows that spherical geometry allows to effectively solve problems related to global positioning and navigation on Earth, as evidenced by its use in modern GPS technologies and geospatial information systems.

Also useful for the educational process will be the use of tools of dynamic geometry, interdisciplinary connections of spherical geometry with physics, geography, biology, astronomy, seafaring, cosmology.

In further research, it is possible to expand the scientific principles of learning spherical geometry in institutions of higher education and the application of facts of spherical geometry in other fields of science and technology, developing new methods and approaches for solving real problems. Using interdisciplinary connections, it is important to consider the prospects of using spherical geometry in innovative technologies and new scientific research.

Thus, the study of the properties of geometric figures in non-Euclidean geometries expands students' understanding of the modern picture of the universe, increases the competence of future specialists and stimulates their own search for new mathematical, geometric and physical ideas and theories [8, p.52].

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LAW

JUSTICE OF THE PEACE: WORLD PRACTICE AND PROSPECTS FOR UKRAINE

Anna Pakhomova,
Ph. D. in Law, Associate Professor,
Bila Tserkva National Agrarian University, Ukraine
pakhomova_a@ukr.net; ORCID: 0000-0003-2292-9315
Inna Kovalchuk,
Ph. D. in Law, Associate Professor,
Bila Tserkva National Agrarian University, Ukraine
kovalchuk.inn@gmail.com; ORCID: 0000-0002-1804-4189
Victoria Melnyk,
Ph. D. in Law, Associate Professor,
Bila Tserkva National Agrarian University, Ukraine
viktoriia.melnyk@ukr.net; ORCID: 0000-0002-1287-8799

Annotation. *The article presents the international practice of justices of the peace and potential opportunities for Ukraine to introduce magistrate's courts into the national judicial system. This perspective arose as a reaction to the calls of the President of Ukraine to reform the court system in order to increase trust in the judicial branch of government and involve citizens in the administration of justice. Therefore, the study of network practice in matters of magistrates' courts is extremely necessary for our state to implement better opportunities.*

Keywords: *justices of the peace, magistrate's court, jurisdiction, court system.*

Formulation of the problem. From the moment Ukraine gained independence, from time to time, politicians in political circles turn to the idea of introducing the election of certain categories of judges. At the same time, this innovation concerns the judicial reform - because, usually, it involves the creation of the institute of justices of the peace, as well as the reform of people's power.

In the pre-election programs of the current President of Ukraine, Volodymyr Zelenskyi, and his political forces, there were promises to introduce in Ukraine the institute of elected magistrates' courts, which would consider simple disputes.

The idea was created as an element of increasing trust in the judicial branch of government and involving citizens in the administration of justice. After solving the more urgent issues of reforming the judicial system, ideas are gradually being implemented today to develop a legislative framework for the launch of the institute of justices of the peace. In 2022, the Ministry of Justice of Ukraine initiated a preliminary meeting involving people's deputies and judges of the Supreme Court of Ukraine to discuss the introduction of this institute. Currently, the Ministry of Justice of Ukraine is monitoring the operation of this tool in other countries. In general, there are several models

of the institute of magistrates. The first is its implementation in the judicial system. This is more difficult because it requires amendments to the Constitution of Ukraine. The second model provides for the launch of justices of the peace based on local self-government bodies. This is an easier way. But in any case, more than one discussion will take place regarding this topic. For example, should a magistrate be a lawyer? For several simple cases, provided the procedure is clearly prescribed, the judge may not be a lawyer, but a person who has certain experience and enjoys respect and authority within the community. Moreover, it is desirable that these positions be elective. There is also scepticism about this institute, and if everything is worked out correctly at the level of legislation, we believe that there will be no problems society [1].

Despite the novelty of such an institute for Ukraine at first glance, in fact, discussions about its introduction have been going on for more than 15 years. However, at the state level, there is still no concrete vision of how such a court should function and whether its introduction is justified at all.

When considering the concept of justice of the peace, let's turn to the legal encyclopaedia, which under this concept understands the lower link of the court system for consideration of small criminal and civil cases, which is entrusted with the function of reconciling the parties. According to another definition, a magistrate's court is a local (local) judicial or administrative judicial state body of limited jurisdiction that considers and resolves minor cases under a simplified procedure [2].

However, it is problematic to give a complete definition of this concept, since the models of peace justice in countries are so different that it is difficult to reduce them to common basic principles. There are conceptual differences in almost all constituent elements.

Due to distrust of the existing courts of general jurisdiction, the faith of Ukrainian citizens in the existence of justice is lost, and as a result, there is a need for the Ukrainian society to effectively protect its rights and legitimate interests. The catastrophically growing mass of mistrust forces the government to introduce certain changes in the judicial system, to carry out reforms. According to many jurists in Ukraine, there is a need to renew the institute of justices of the peace. Such a position is justified by the need for effective courts and access to justice, which only constitutional amendments can provide. The preferred perspective is that magistrates will be able to fulfill the state task, namely to provide Ukrainian citizens with a truly democratic court. In contrast to the current courts, which protect the law, which is imperfect relative to the needs of citizens, magistrates will defend the rule of law of the Ukrainian society [3].

So, having considered the goals of creating the institute of justices of the peace, namely: increasing access to justice for Ukrainian citizens, relieving the workload of local courts and improving personnel training, we ask ourselves some serious questions: is it really necessary to create a separate institute of justices of the peace to achieve the goals, or can it be enough to improve training , activity and increase the number of already existing local courts? How can such experiments turn out for a country where there is no effective judicial system?

As an example, let's turn to the experience of creating arbitration courts, which in their features and characteristics are very similar to the proposed magistrates' courts. Legislators, who created a system of arbitration dispute settlement, gave the parties of civil and economic relationships the opportunity to refer the arising dispute to an arbitration court. Unfortunately, the almost twenty-year-old result of the Law of Ukraine "On Arbitration Courts" is disappointing - abuse of powers by arbitration judges, causing significant material damage to the state. All this is partially connected with the lack of education, irresponsibility of arbitration judges, the commercial component of their activity. It was these factors that led to the fact that the country's parliament considered proposals to stop the development of the arbitration institute [4]. As a result, in 2009 Law of Ukraine No. 1076-VI "On Amendments to Some Legislative Acts of Ukraine Regarding the Activity of Arbitration Courts and Implementation of Arbitration Court Decisions" was adopted and on February 3, 2011 - Law of Ukraine No. 2983-VI "On Amendments to Article 6 The Law of Ukraine "On Arbitration Courts" regarding the jurisdiction of cases in the field of consumer rights protection to arbitration courts" which significantly narrows the range of cases subject to arbitration proceedings. Disputes regarding real estate, the establishment of facts of legal significance, labour disputes, disputes arising from corporate relations, disputes based on the results of consideration of which the implementation of the arbitration court decision requires the performance of appropriate actions by state authorities, disputes on the protection of consumer rights are no longer subject to arbitration courts. including consumers of bank (credit union) services [4].

According to the Law of Ukraine "On Arbitration Courts" dated 11.05.2004 No. 1701-IV, a person directly or indirectly not interested in the outcome of the dispute, as well as knowledge, experience, business and moral qualities recognized by the parties, may be appointed or elected as a judge of the arbitration court. , necessary to resolve the dispute [5].

If the reformation will be carried out in this way, then how will the new justices of the peace differ from the arbitrators, whose powers have been narrowed? The answer predicted here is nothing. Accordingly, the conclusion follows that it is not necessary to increase the quantity of introduced reforms, but the quality of their implementation. Therefore, it is possible to disagree with the opinions of the above-mentioned scientists, stating that magistrates are not the only panacea for social injustice, but it will be more effective to improve existing reforms than to introduce new ones. Ukraine needs to take into account its specifics, and not mindlessly adopt foreign experience. The power to create the concept "On Justices of the Peace" was prompted by the positive practice of functioning of justices of the peace in foreign countries.

In 2008, understanding the future prospects, an initiative group of people's deputies submitted to the Verkhovna Rada of Ukraine a registered project of the law "On Justices of the Peace of Territorial Communities" (registration number 3291) [6], but this project did not progress beyond the declaration, as it did not have a constitutional basis.

In the judicial system of each state, magistrates play a special role. An analysis of

the general and distinguishing features of the institute of justices of the peace in various states shows that each country has its own specific approach to the institute of justices of the peace and the judicial system. For example, a magistrate judge in Italy is not a professional lawyer and considers only civil cases with a small claim amount. The situation is the opposite in Israel, where the magistrate already has to be a professional lawyer, as he will be authorized to hear criminal cases, in addition to civil and family cases, and can impose a sentence of imprisonment for up to seven years. Justices of the peace in Brazil are elected by the population by direct, universal and secret ballot, but in New Zealand they are appointed by the Governor General.

In general, in scientific studies devoted to justices of the peace, it is customary to distinguish three types (models) of justices of the peace. Classical (English), when the magistrate performs administrative and judicial functions and the judicial composition is formed on a semi-professional basis. French, when the magistrate's court performs purely judicial functions, there is a semi-professional composition of magistrates. Mixed, when the court consists of a professional staff that performs not only judicial, but also administrative functions. The mixed type is most common in the United States of America.

This classification is based on two characteristics, in respect of which the legislation of different countries diverges. In the first case, the type of state activity carried out by peace institutions (administrative-judicial or only judicial functions). In the second, the staff of magistrates' courts (professional, when candidates are subject to strict qualification requirements for legal education, or semi-professional, when such conditions are not imposed, and ordinary citizens can become judges along with lawyers) [7].

England is considered to be the originator of the peace court. Its emergence was caused by the political situation that developed after the Norman conquest in 1066. The strong centralized royal power was forced to reckon with an equally strong feudal nobility, and the resistance of the local population posed a threat to state and public security. The first aspect of this confrontation was the desire of the central government to control the management of the periphery, which was concentrated in the hands of the sheriffs. The second is in the creation of an effective police apparatus. For these purposes, during the reign of King Henry II (1166–1189), the role of sheriffs was limited by the establishment of commissions "for the preservation of peace", in essence, for the preservation and maintenance of public peace and order. They included knights (medium and small feudal lords) and noble people. These commissions replace the sheriff in maintaining order in the district, they are considered by British researchers to be the immediate predecessors of justices of the peace.

The introduction of this position by the Statute of Westminster in 1361 (from this time the term "justice of the peace" still unofficially appears) is connected with the name of King Edward III (1327–1377), who reformed the local judicial and police apparatus in the context of the exacerbation of the class struggle in the countryside. The primary and main task of the English justice of the peace ("Justice of the Peace") was to preserve public order and peace (peace) in the region. It was in this sense that the world court

was understood by contemporaries, and it was precisely this sense of the English word the Peace that was included in the concept. The Statute of Westminster in 1361 indicated that "in each county of England, one lord and three or four most worthy residents who have some knowledge of law will be appointed to keep the peace. They have the right to detain criminals, rioters, and all other rioters, investigate and punish them according to their misdemeanours and crimes, imprison them or subject them to other due punishment according to the laws and customs of the kingdom, according to their prudence and good advice; they should also give information about those who were robbers across the sea, and now have returned and wander, not wanting to work as they did before; catch and arrest all those who are found guilty or suspicious, and put them in prison; catches those who do not have a good reputation, wherever they are found, and hand them over to a suitable surety as a bond for their obedient behavior towards the king and his people; they properly punish others so that neither the people suffer from rebels or rioters, nor the peace is exposed to danger, nor merchants or other people following the royal trade routes suffer a loss" [8].

Examining the English model of the peace court, scientists noted that with the growth of rent in England, the peasantry was gradually stratified. Numerous rural poor (cotters) had to be employed by landowners and wealthy peasants. The demand for labor in woodworking grew throughout the 14th century, especially in knightly estates. But in large, and especially monastic, estates, cork continued to dominate, and the strengthening of ties with the market led to the growth of feudal rents and the strengthening of the cork system. In connection with this, the resistance of the peasants to the demands of the feudal lords increased more and more. One of the measures of the struggle of the ruling class with the peasantry was the expansion of the judicial and police functions of the guardians of peace. The position of "guardian of the peace" was given the name "justice of the peace" to show that their main function is the trial and conviction of all violators of the peace [9].

During the first hundred years of its existence, justices of the peace gradually expanded their competence at the expense of the competence of sheriffs. In 1461, even the preliminary investigation of criminal cases was transferred to magistrates. The only thing left for the sheriff was to execute the sentence, i.e., a purely administrative function. Gradually, the order of preliminary proceedings with the magistrate was established, and he became a kind of link between the private prosecutor and the prosecuting jury. The magistrate has begun to prepare the indictment materials previously presented to him in writing, to be sent later together with the indictment to the jury. During the period of absolute monarchy in the 16th century. justices of the peace, at the request of the owners, were obliged to search for the slaves.

Consequently, the justices of the peace were originally called to a greater degree to maintain the law and order existing in society, demand from citizens the observance of the law, performing at the same time not only purely judicial, but also administrative powers [8].

In this institution, the functions of the local government, the police and the court

merged. This happened to the greatest extent in the 16th–17th centuries, due to the decline of the role of the parliament. It was during that period that the Magistrate's Court became, in fact, the main governing body in the counties, a pillar of royal power. The competence of justices of the peace was extensive. This should relate to the strengthening of royal power, when justices of the peace with a wide range of various powers become its conductor throughout the territory of the state and in broad layers of society. The justice of the peace of this era is significantly different in its state and political purpose from the justice of the peace of the 11th-20th centuries, in those years it had both a more local origin and more local functions.

After the English Revolution of 1640–1660 justices of the peace, which has already become an integral part of the system of state institutions, return to their original role - independent full-fledged courts (with a considerable amount of administrative functions) established in certain localities. In this capacity, they are from the end of the 15th to the 19th century. begin to spread throughout the territory of the British Empire. However, positions with the same name also appear outside of it.

In Great Britain, the activity of magistrates' courts is still considered as one of the forms of public participation in the administration of justice. They combine both the crown court and the jury trial, they decide both questions of fact and questions of law, determine both the presence of guilt and the measure of punishment.

Justices of the peace are appointed on behalf of the monarch by the lord chancellor from local residents aged 18 to 70 living within a radius of 15 miles from the location of the justice of the peace. They perform their duties on a free basis and often on a part-time basis, fulfilling the norm of attending meetings 26 times an hour. Candidates for justices of the peace are selected and submitted to the Lord Chancellor for approval by local advisory committees consisting of representatives of the local administration, the judiciary, and the public [9].

Separate legal training courses are provided for non-professionals (both initial and periodic, once every three years). Thus, the image of justices of the peace is gradually being transformed from that of an amateur to a status close to that of professionals. Such are the requirements of time. However, proposals to completely replace ordinary citizens with professional lawyers do not find support. The British value traditions and are rightly proud of the fact that their Magistrates' Court is the most unique and oldest of the surviving institutions of the state legal system. It was not shaken even by the establishment in the middle of the 20th century. positions of paid justices of the peace in London and some other largest counties. They have a legal education, experience in practical work and perform their duties permanently and for remuneration. One paid magistrate is equal in terms of authority to a board of non-professionals. But the number of paid justices of the peace is insignificant: approximately 100 people, while non-professional ones - about 30 thousand. According to the resolution of the Parliament of Great Britain in 1990, the purpose of paid magistrates is to "provide assistance and support to non-professional magistrates." Note that the decisions of English magistrates, except for paid ones, do not have the force of a precedent and do not become a model for

the decision of similar cases [8].

During the following centuries, justices of the peace appear in other European countries. The definition of the status and direction of the development of the peace court was influenced by numerous objective factors: peculiarities of the state system, political and legal traditions, social and economic situation. That is why peace courts in other countries acquired several different features when they were formed, organized, and operated.

In 1790, magistrates were established in France. The Great French Revolution destroyed the state and legal institutions of the absolutist monarchical system and built on their ruins a new order based on the ideas of the Enlightenment about freedom, equality, fraternity, separation of powers, and popular sovereignty. And the peace court, the idea of which was borrowed from the British, also corresponded to the main slogans of the revolution. However, we note that we are talking about borrowing only an idea and a term. Full copying of English-style world justice in France would be possible only if the entire English socio-economic and political model of society was transferred here [10].

The main similarity between the French justices of the peace and the English ones was that they were recruited from ordinary citizens without special education. It seems that this is exactly what attracted the republicans: the creation of a counterbalance to the old courts, where the royalist aristocracy ruled, the embodiment of the idea of justice in the name of the people and by the people themselves.

Justices of the peace were elected at primary meetings of active citizens from among persons no younger than thirty years of age who have the right to be elected to the department's administration. The term of office of the judge was changed several times, but did not exceed two years, with the right of re-election. The judge of the peace consisted of experts-assessors, elected by list at the same primary meeting (in the amount of up to four people). Cases were considered collegially, in the composition of a magistrate and two assessors. Since 1795, the magistrate has considered cases alone (Article 212 of the Constitution of August 22, 1795) [11].

A characteristic feature of the magistrate's court in France was its separation from executive power. In England, such a distinction occurred only in 1881, when the administrative functions of justices of the peace were mainly transferred to the created county councils. At the same time, some administrative powers remain with English justices of the peace to this day, for example, issuing licenses for the use of slot machines, the sale of alcoholic beverages, etc. [12].

In France in the middle of the 20th century. peace courts were transferred to a professional basis. Candidates for this position were appointed by the President of the Republic from persons with higher legal education. According to the Judicial Code of 1978, the place of peace courts was replaced by the so-called courts of small instance. Small civil cases remain within their competence, in addition, the courts of small instance act as police courts when considering minor criminal cases. These courts are single person, composed of professional judges of the "big instance" who are appointed to this position for three hours [12].

In the USA from 1793 to 1968, the so-called commissioners operated - a fairly exact copy of the English model. Their position, however, was paid depending on the number of considered cases. Since 1968, commissioners were replaced by magistrates. According to the federal law on justices of the peace, only a member of the professional organization of lawyers who has the right to conduct cases in the state supreme court can be among them. They are appointed for 8 years, have a stable salary, but can be part-time employees. In the latter case, the term of office of the magistrate is halved. Judicial power in the USA is organized mainly at the level of the legislation of individual states, and in some of them there are no justices of the peace, but there is an analogue - a municipal court. State peace institutions differ in their legal status [13].

Conclusions. Therefore, the positive experience of the functioning of the Institute of Magistrates' Courts testifies in favour of the idea of creating this institute in our country as well. The Institute of Magistrates' Courts can introduce a fresh stream into the Ukrainian judicial system, acting under certain conditions as a counterweight to the old post-Soviet court, and its introduction would become a progressive phenomenon in the field of justice and contribute to its democratization.

The study of the theory of peace justice, the reproduction of a complete picture of its historical evolution, the study and generalization of foreign experience can be useful in the process of choosing the optimal model of the peace court, which should be implemented in Ukraine, and the development and further improvement of the legislative framework aimed at regulating the organization and functioning of peace courts.

Undoubtedly, the creation of a separate institution of magistrates' courts will contribute to the development of civil society, the implementation of the principle of competitiveness, and will also most likely reduce the burden on courts of general jurisdiction. The introduction of the institution of magistrates' courts will be a continuation of the Ukrainian judicial reform and will raise the practice of justice to a qualitatively new level.

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TECHNICAL SCIENCES

ANALYTICAL AND PSYCHOLOGICAL ASPECTS OF WORK SAFETY IN URBAN TRANSPORT INFRASTRUCTURE PROJECTS

Ivan Bohdanov,
postgraduate student,
National Transportation University, Ukraine,
gmiller180890@gmail.com; ORCID: 0000-0001-6346-4388

Annotation. *The work investigated and analyzed the relationship between the psychology of occupational safety and industrial injuries, and the reasons that cause injuries at workplaces in the structural subdivisions of the metro were given. Proposed measures to improve the occupational health and safety management system at metro companies.*

Keywords: *modeling of labor safety, industrial injuries, social protection, ISO state standard, metro, project, infrastructure, production process, measurement tools.*

Introduction. Occupational safety psychology is a branch of psychological science that studies the psychological causes of accidents occurring in the course of work and other activities, and develops psychological methods of improving safety.

Properties and features of psyche and consciousness play an important role in work. Factors on which the character of a person's work depends are physical loads, the amount of nervous and emotional tension, rhythm, pace of work, its monotony, the volume of perception and processing of information, etc. A person's mental state has a special impact on occupational safety, namely the presence of conflicts, fatigue, and overwork, and illness, addiction to narcotic drugs, alcohol, nicotine, and features of the human psyche.

Analysis of industrial injuries shows that the main cause of injuries and deaths at workplaces is the poor mental state of employees during the performance of work duties.

Ensuring the reliability and continuity of the production process is important in the prevention of industrial injuries. Stoppages of production for various reasons, which now often happen, lead not only to a sharp decline in labor productivity, production losses, but also to a sharp deterioration in the physical and psychological well-being of the staff, lead to the occurrence of various types of errors in work, a stressful state, and an increase in the risk of accidents and traumatism. Such production is accompanied by significant nervous and mental stress, disruption of the normal rhythm of work, disputes between workers and colleagues and company management [1].

Objective of the study. The purpose of this study is mental processes (perception, attention, memory, etc.) that are generated by human activity and affect a person's mental state, personality traits, and safe behavior during work.

The main part. Based on this, in the conditions of production instability, along with guaranteeing the safe state of equipment, production environment and measuring means, significant attention from the management of structural subdivision enterprises should be paid to increasing the reliability of the human factor in the "man - machine - environment" system [2, 3]. It is necessary not only to improve the quality of training and instruction of personnel on labor protection issues, but first of all to carry out appropriate psychological work so that workers are educated in the psychology of safe work, where they evaluate every step and every action from the point of view of its safe execution in compliance with state standards.

Before the occurrence of an accident, as a rule, some dangerous situation is created, when a person can realize the approach of such an event and can take the necessary measures to prevent it. A person's inability to recognize a dangerous situation in time and take adequate measures leads to accidents and accidents. A person must anticipate the development of the production process and his behavior, be aware of a dangerous situation in time and prevent accidents. Sometimes such cases are considered as a consequence of inadequate behavior of the person himself in a dangerous situation.

The safety of human behavior at work depends on the following factors:

- states of unconditioned reflexes, with which a person unconsciously responds to various dangers that threaten his body (for example, automatic withdrawal of a hand from a hot object);
- psychophysiological qualities of a person, which are manifested in his sensitivity to danger signals, his speed of response to such signals, in emotional reactions to danger when identifying a dangerous situation and reacting to it. A person's behavior is influenced by his emotional, mental and physical state. Thus, a state of anxiety exacerbates the feeling of danger, a state of fatigue reduces a person's ability to identify and counteract danger;
- professional qualities and experience of a person, that is, knowledge of the profession and safety rules, life experience;
- motivation for safe work, compliance with technological processes.

Sometimes the motives of some benefit (saving time, increasing production) exceed the motives of safety of work performance. It is necessary to morally and materially encourage workers to comply with labor safety requirements and state standards, to increase their motivation. The costs of such promotion are justified by the prevention of accidents. This will make safe work financially more profitable. The worker will earn more not only due to labor productivity, but also due to the fact that he works safely, according to the instructions. And it is also important that every violation of occupational health and safety regulations should not go unnoticed, all employees should be aware that every violation of the instructions will be punished.

The motivation of workers to work safely increases when they notice that there is strict control over the implementation of safety rules at the enterprise, and for a high state of labor safety, workers are financially and morally encouraged. The condition of the bonus must be work without injuries and accidents. Remuneration to the heads of

the company's divisions from the material incentive fund can be paid only under the conditions that there were no injuries or violations of labor protection requirements in their areas and in the services they lead, there are means of individual and collective protection, stocked first-aid kits, etc.

Enterprise management should abandon the principle of "production and safety separately" and move to the principle of "production in safety conditions", where safety becomes a means of achieving production efficiency. The policy in the field of labor protection should be aimed at the collective search for ways to prevent accidents. Everyone in his place should make suggestions in this direction. It is necessary to create a psychological mood in the team aimed at occupational safety.

Psychological processes of human labor activity and occupational safety are characterized by a number of elementary types of mental activity (sensation, perception, attention, etc.). The worker receives information from several sources of irritation simultaneously by different sense organs. This is a process of perception. The time of sensation perception by various organs reaches a second or more. It is important for an employee to know which objects he needs to monitor especially carefully during the production process [4].

Concentration of attention can be caused by external factors (sound, light). This is an unconscious concentration of attention. Conscious concentration, which is carried out with the help of the second signaling system (words, thinking, etc.), is important. Unconscious concentration of attention can cause distraction from the main work and lead to an emergency situation. At the same time, a person is able to divide mental processes, for example, to perform work automatically and think about something else. However, the work will be safe if the worker can at any time connect the second alarm system to make an urgent decision. This is achieved by educating and mastering the relevant skills. Therefore, the development of skills and the ability to consciously manage mental activity is an important condition for occupational safety.

A person's ability to maintain attention on one subject determines the stability of attention, and the ability to transfer attention to other subjects is the phenomenon of attention switching. At the same time, a distracting factor can cause distraction, which leads to errors. If a person observes several objects at the same time, then this causes the distribution of attention. However, a person cannot simultaneously observe more than 4-5 objects. Studies show that a person can observe one object with the same degree of attention for no more than 10-20 minutes. Fatigue significantly affects attention. It reduces the volume of attention and shortens the time of its concentration. Therefore, it is necessary to provide rest breaks in such works (after 2 hours - a break of 15 minutes) [4].

Also, an important moment in the formation of the psychology of work safety is the labor team. Each team has formal and informal leaders, on whom the attitude of employees to the implementation of occupational safety instructions depends, therefore it is extremely necessary to form the correct attitude of the team to safety by involving leaders in the activities of occupational safety commissioners. Safety measures coincide with the tasks of the team and the production process. The manager should systematically

remind the employees about this. The leader's authority is created if his instructions are carried out not due to administrative subordination, but due to subordinates' awareness of their correctness.

Therefore, psychophysiological factors of danger directly affect a person - on physical and physiological processes, work capacity, mood, work productivity and his life activities in general.

The fight against fatigue, first of all, comes down to improving the sanitary and hygienic conditions of the production environment (elimination of air pollution, noise, vibration, normalization of the microclimate, rational lighting, etc.). Professional selection, workplace organization, correct working position, rhythm of work, rationalization of the labor process, use of emotional stimuli, implementation of rational modes of work and rest, etc., play a special role in preventing employee fatigue.

In addition, specific methods are used to prevent worker fatigue, which include means of restoring the functional state of the visual and locomotor apparatus, reducing hypodynamia, increasing cerebral blood circulation, and optimizing mental activity [5].

From the point of view of medicine, for the prevention, prevention and rehabilitation of the consequences of psycho-emotional stress, it is recommended to use exercises that include psychotherapy, physical, water-air procedures, physiotherapeutic procedures, massage, adequate nutrition, taking vitamins and minerals, relaxing music and exercises, meditation, autogenic training, etc.

In the prevention of worker fatigue and overwork, a significant role also belongs to the organization of a rational regime of work and rest. Physiologists substantiated five conditions for increasing work capacity, which contribute to the effective prevention of fatigue:

- any work should be entered gradually;
- a condition for successful working capacity is regularity and rhythmicity;
- familiarity, consistency and planning;
- carelessness and haste in work are not acceptable;
- a physiologically justified alternation of work and rest, as well as a change in the forms of activity (the most effective is rest associated with an active muzzle state;
- favorable attitude of society to work (work motivation and social conditions).

One of the common causes of industrial injuries at subway companies is the carelessness of the employee himself. An employee's actions may be considered careless if he is careless at work, does not use personal protective equipment, or carelessly complies with the requirements of the occupational health and safety instructions. Sometimes employees with long experience of more than 10-15 years ignore the implementation of labor safety rules and labor protection instructions.

The cause of most accidents (up to 75%) is the human factor, so the main focus of preventive work should be to increase the working capacity of employees and maintain it during working hours. An important direction of this work is the early diagnosis of professional pathologies and the painful state of the nervous system. An accident is the result of not taking into account a potential danger. An important role in this is played by

the employee's physical condition (good eyesight, hearing, etc.) [6].

Impeccable vision is an important condition for occupational safety. A significant number of accidents occur as a result of poor vision, poor lighting of tunnels, mines, machine rooms of escalators, transformer and traction-lowering substations, workplaces, etc. Uneven lighting requires frequent re-adaptation of vision, which takes up to 6 seconds, during which an accident can occur.

High noise background, hearing impairment lead to rapid fatigue and untimely reaction to sound signals. The more tired a person is, the more time is needed to perceive and react to a dangerous situation.

Reducing morbidity and preserving the health of workers is an important social and economic task. A radical measure in this direction is the improvement of working conditions, the implementation of medical and preventive measures (sanitary and educational work, promotion of a healthy lifestyle, industrial gymnastics, dispensation, etc.). This will reduce the level of industrial injuries and increase the economic efficiency of production.

Employees must know and follow occupational health and safety instructions during work. However, it is impossible to predict everything in the instructions. Life activities are much more complicated than the most detailed instructions. Therefore, it is very important to educate employees to observe, to be cautious and cautious.

The survey of employees showed that most of them consider the most frequent causes of injuries to be imperfect work organization, bad mood, fatigue, conflicts in the team with superiors, inattentive attitude of managers to subordinates, unsatisfactory psychological climate.

Violation of the rhythm of work and rest significantly affects work capacity. Therefore, when determining the working day regime, variable schedules must be set so that the duration of the employee's inter-shift rest, taking into account intra-shift breaks, is at least twice the duration of his working time of the previous shift. The length of working hours established by law cannot be changed by the administration even with the consent of the employee.

Taking into account that the mistakes of the employee during work can threaten the health and life of both the employee himself and other people, the requirements for his working capacity should be sufficiently high. Most workers feel tired at the end of the shift, which increases the likelihood of an injury-threatening situation, therefore, strict compliance with the established legislation and rules of the work and rest regime is very important.

Biorhythms greatly affect a person's well-being, work capacity, and reliability. It is known that more than 100 different rhythmic processes operate in the human body. Many publications have appeared in the literature about the effectiveness of taking into account three sinusoids with periods of 23, 28 and 33 days, which characterize the physical (ability to work, energy), emotional (mood, reaction) and intellectual (wit, memory) in regulating the work and rest regime of employees y) conditions [7].

In order to prevent accidents and diseases, safe work methods are promoted.

The following methods of campaigning and mass work are used: briefings, lectures, conversations, films, radio broadcasts devoted to issues of labor safety. Posters, souvenirs, etc. are widely used. Posters contribute to establishing correct and safe work methods in the employee's mind. An effective form of labor protection advocacy is public reviews, which are conducted by the administration together with trade union activists. It is important to use such forms of propaganda as exhibitions, stands, safety corners, etc.

However, the more effective are not the listed methods, but the formation of motives that force the employee to comply with the rules of safety technology, not because the employer requires it, but because it is his own desire, his own psychological attitude to safe work. This attitude is achieved by improving the psychological climate, involving employees in monitoring occupational safety, educational work, and the personal example of managers.

So, socio-psychological methods of labor protection management are based on the use of a complex of interrelated factors, such as knowledge of labor safety requirements, skills, safe work skills, motives, professional performance, moral stimulation for compliance with safety rules, humanization of work, adherence to a scientifically based regime work and rest, promotion of labor protection, medical and preventive measures [8].

Based on this, an important factor among the socio-psychological methods of labor protection management is also professional selection and career guidance of employees in some responsible professions. At the same time, it is worth paying attention not only to physiological, but also psychological data, that is, a sense of responsibility, the degree of confidence in one's capabilities, willpower (self-control, perseverance, determination). The probability of accidents increases with the worker's tendency to risk, adventurism, indiscipline, frivolity, social instability, aggressiveness, impulsiveness.

The existing methods of economic motivation of labor protection work at enterprises in modern economic conditions are complicated by the lack of funds for the implementation of appropriate organizational and technical measures and staff stimulation. Therefore, solving the tasks of occupational health and safety at enterprises can be achieved by increasing the efficiency of economic activity. The existing order of centralized management of the enterprise's economic activity, when all the levers of management are in the hands of the first manager, is outdated. This procedure suppresses the initiative and productivity of labor teams. It is necessary to radically change the procedure for managing production activities.

The economic mechanism of labor protection management should provide for a system of incentives for those employees who conscientiously comply with labor protection requirements, do not allow violations of the rules and norms of personal and collective safety, take an active creative part in the implementation of measures to improve the level of labor protection at the enterprise. The collective agreement (agreement) must establish various kinds of moral and material incentives for such employees: wages, bonuses (including special incentive bonuses for achieving a high level of labor protection), rewards for inventions and innovative proposals on labor protection issues. Rewarding the workers of brigades, divisions, and workshops for long-term work

without violations of labor protection rules, without injuries and accidents is of great benefit. In the case of the presence of dangerous and harmful production factors that constantly threaten the health of the employee, he is recommended to pay an allowance for increased caution. In addition to material encouragement, moral stimulation, which was once used in our country and is successfully used by foreign companies, is also of great importance. The forms of moral stimulation can be very diverse: from the announcement of thanks to the organization of evenings of rest, picnics, cruises for teams that have achieved the best results in labor protection.

The unsatisfactory state of labor protection at the enterprise leads to the inhibition of the economic and social progress of the country as a whole. According to the calculations of the experts of the International Labor Organization, losses due to industrial accidents and occupational diseases amount to 4% of the world's gross domestic product (GDP). Thus, the improvement of the labor protection system is one of the urgent issues at the level of both the state and individual enterprises [9].

Management of occupational health and safety at the enterprise is a set of actions of officials, carried out on the basis of constant analysis of information about the state of occupational health and safety at all workplaces in order to improve and maintain it at a certain level in accordance with legislative and regulatory acts [10].

The attitude of employees to work duties depends not only on the level of wages, but also to a large extent on their confidence in permanent employment, respect, recognition, and interest in work. The manager's task is to combine firm leadership with giving subordinates the opportunity to show their own creative abilities, initiative and individuality. The manager must constantly inform subordinates about the state of affairs. This increases people's interest in work. Each employee must realize that his work is very important, that without his participation the enterprise can stop. Favorable and safe working conditions at workplaces are an important factor in increasing labor productivity. Additional costs for improving labor protection are purchased multiple times. This is evidenced by the experience of developed countries.

Conclusions. Measures to increase the efficiency of labor protection activities in structural units of the metro:

1. The key to reducing the level of industrial injuries and improving the state of labor protection is the rise of the economy, which in modern economic conditions can be achieved only through the decentralization of production.

2. Improvement of the state of labor protection in structural subdivisions of the metro can be achieved by transitioning from the implementation of individual scattered measures to a system of planned purposeful management of this activity with a clear definition for each structural subdivision of the enterprise of the list and content of management tasks and functions. The tasks of work on labor protection arise from all production activities of the company's divisions and are aimed at fulfilling the requirements of the state policy on labor protection.

3. In order to fulfill the planned and other tasks of work on labor protection at enterprises, it is necessary to create labor protection funds, deducting for this purpose

0.5% of the volume of sales of products (services).

4. In the structural subdivisions of the metro, it is necessary to carry out systematic engineering support of the occupational health and safety management system by bringing production equipment, technological processes, buildings and structures, timely verification of measuring devices, sanitary and hygienic conditions, sanitary and domestic provision, etc., in accordance with the requirements of regulatory acts on occupational health and safety using modern methods of engineering and reengineering in order to eliminate unacceptable risks and comply with state standards.

5. For the instruction and training of labor protection workers, use modern methods of active learning, education of psychology and safety culture in workers, when someone's dangerous actions would be impossible. Before each potentially dangerous operation, a plan for its implementation is drawn up, an admission order is issued, and a detailed briefing is conducted. In case of the first violation of safety rules, the offender is given a warning, in case of repeated action according to the Code of Labor Laws. The occupational health and safety management system is a daily functional management subsystem of an enterprise, institution, or organization [11].

According to current legislation in Ukraine, enterprises are certified for compliance with the requirements of state standards DSTU ISO 9001-2001 "Quality management systems. Requirements" and DSTU ISO 14001-97 "Environmental management systems". The labor protection management system is also subject to certification. In accordance with international standards, the following are checked: the presence of a safety certificate, the integration of this system with the quality management and environmental protection systems, the presence of the document "Occupational safety policy at the enterprise" signed by the first manager, the implementation of this policy. The presence of legal acts on labor protection, certification of workplaces and assessment of the risk of work in them, availability of personal protective equipment, training of personnel, safety of high-risk works, certification of sanitary and technical conditions and availability of labor protection equipment in workshops, audits are also checked state of labor protection in shops and the enterprise as a whole.

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14. DSTU ISO 14001-97 "Environmental management systems"

ANALYSIS OF RESEARCH DETERMINATION OF CHARACTERISTICS OF SOIL STRUCTURES REINFORCED WITH GEOSYNTHETIC MATERIALS

Oksana Kushnirova,
Senior Lecturer,
National Transportation University, Ukraine,
kushnirovao@gmail.com; ORCID: 0000-0001-6011-5609

Annotation. *Geosynthetic layers have a high flexibility index; therefore, the distribution of loads between geosynthetic layers will depend on the stress-strain response of the soil and geosynthetic layers. With this aim, the article investigates the development of deformations in geosynthetically reinforced structures and their performance considering the variation in reinforcement intervals. Various research methods for studying these issues are considered, such as laboratory tests in compact setups, large-scale constructions, and centrifuge-based investigations. It is expected that upon reaching a certain optimal reinforcement interval, the geosynthetically reinforced mass will act as a monolith. The findings of the review can be utilized for further research on the optimal geosynthetic reinforcement interval in structures and ensuring their quality performance in constructions.*

Keywords: *geosynthetic reinforcement, strength, stability, soil layer deformation, loading.*

Introduction. Geosynthetic-reinforced soil (GRS) structures find wide applications in various engineering projects. Enhancing the performance of reinforced structures is achieved through effective separation and filtration of geosynthetic layers. These layers also mitigate soil deformation under loading, thereby increasing their bearing capacity by bolstering tensile strength and stiffness. It's important to note the economically efficient utilization of such structures.

The most critical aspect of the structural behavior of GRS structures is how horizontal soil pressure is transmitted to the geosynthetic reinforcement. This necessitates ensuring the necessary strength of this reinforcement. There's an assumption that soil and geosynthetic reinforcement deformation is significant enough to provide conditions for active earth pressure. It's assumed that each layer of reinforcement resists the load applied by the horizontal pressure of the soil at each layer of reinforcement. However, this assumption overlooks the potential redistribution of the load among the layers of reinforcement. Load redistribution leads to increased bearing capacity of GRS structures, and understanding their mechanical behavior is crucial for assessing the potential limitations of the design method.

The nature of complex interactions that may develop between adjacent layers of geosynthetic reinforcement, potentially leading to "composite" behavior of the reinforced soil mass, requires further extensive study. It is expected that the degree of interaction between neighboring layers of reinforcement will influence the mechanical response of the reinforced soil mass. Additional benefits from the interaction between reinforcement

layers will be particularly relevant for critical structures.

The interaction between the soil backfill and the geosynthetic reinforcement may be influenced by phenomena associated with the vertical spacing of the reinforcement. Such phenomena, which develop in the reinforced soil mass, may be related to soil arching. The soil arch forms during soil deformation and can take various shapes [2, 3, 4, 5]. This phenomenon can also occur in reinforced soil, especially in cases involving closely spaced reinforcement. It is expected that this phenomenon will depend on the soil density, particle size distribution, confining pressure, and interface characteristics.

Objective of the study. The aim of this study is to review the main testing methods for geosynthetic-reinforced structures to determine the factors influencing the performance parameters of these structures.

The main part. The consolidation of GRS structures occurs from the lower layers to the upper ones. At the initial stage of construction, the site is prepared by leveling the ground, where the first layer of reinforcement is then laid. If the GRS structure is intended to replace a slope, the slope is formed before construction begins. Then, the first layer of reinforcement is placed on the soil or foundation, and a layer of filler is applied on top of it, which is compacted before laying the next layer of reinforcement. This process is repeated until the desired height of the structure is achieved. A schematic view of the GRS structure can be seen in Figure 1 below.

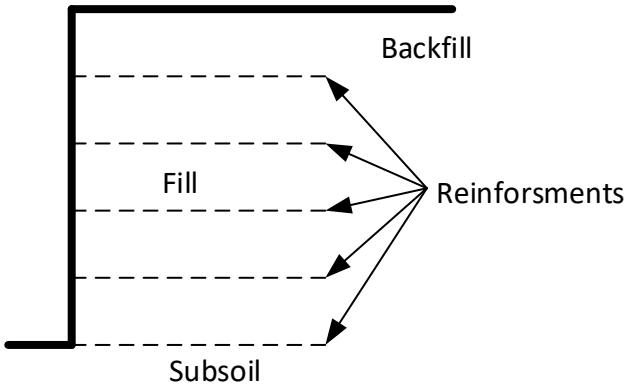

Fig. 1. Schematic overview of GRS-wall

Possible failure modes of GRS structures include: base sliding, overturning, loss of bearing capacity due to settlement, pullout of the reinforcement layer, overstraining during tension, internal shear, failure of connection with facing, facing failure during sliding, and facing overturning. Depending on the geometric configuration of the structure, the strength of the reinforcement, facing, connection with reinforcement, backfill material, and soil, different failure scenarios may occur. Therefore, it is important to have a comprehensive understanding of all aspects of the structure during the design process.

Failure modes are often classified into internal and external, or global failures. Internal failures occur within the reinforced zone, while external failures are those that occur outside the reinforced soil.

Geosynthetic reinforcement is made from linear polymer elements that can be combined in various ways. Different types can be roughly categorized into the following categories:

1. Geogrids: created by heating and stretching a polymer sheet or by combining strips or threads in two perpendicular directions with joints at intersections.
2. Woven fabrics: composed of two perpendicular sets of parallel linear elements interlaced to form a flat fabric.
3. Nonwovens: made from randomly arranged threads bonded together mechanically, thermally, or chemically.
4. Strips: made from parallel threads secured and protected by a polymer coating.

Geosynthetic reinforcement can be made from various types of polymers, such as polyester, polypropylene, and polyethylene. One of the most significant differences between these materials is their deformation behavior under loading. Figure 2 illustrates the deformation behavior under loading for different polymer materials and other reinforcement materials. Polymers, compared to other reinforcement materials like steel, demonstrate significantly greater deformation under the same force. This is highly significant as it affects their interaction with the soil.

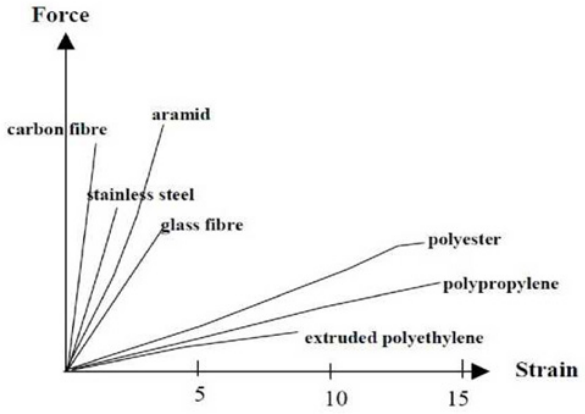

Fig. 2. Typical stress-strain relationship for different materials [6]

The purpose of using geosynthetics for soil reinforcement is to alter the force equilibrium of the soil by providing internal resistance to tension. This enhances the resistance to sliding of the structure. Resistance arises from the force mobilized when tensile deformation occurs in both the reinforcement and the soil. The greatest deformations in the soil occur in the sliding zone, hence the highest tensile forces in the reinforcement occur at the intersection of the sliding surface, as depicted in Figure 3. This implies that the structure has internal support, as the force in the reinforcement is

mobilized locally in the sliding zone.

The mobilization of tensile force in the reinforcement occurs through the stress transfer between the soil and the reinforcement. This stress transfer arises from the frictional contact between soil particles and the surface of the reinforcement, as well as from bearing stresses on the transverse elements of the reinforcement in the case of geogrid reinforcement [8].

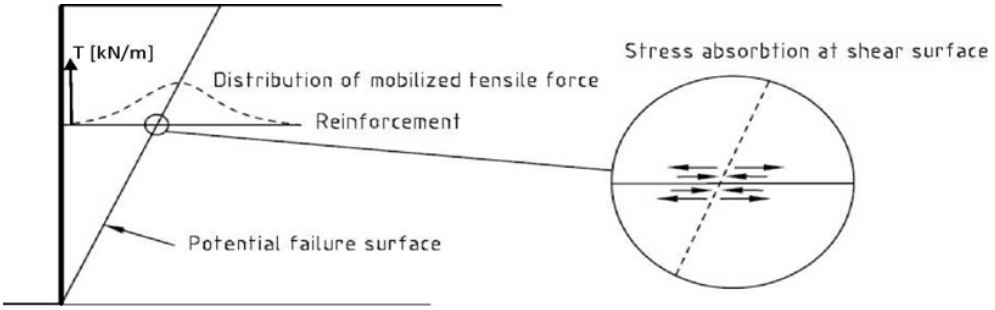

Fig. 3. Mobilized tensile force in the reinforcement and stress absorption on the sliding surface [8]

For a better understanding of the mobilization of tensile force in the reinforcement, let's consider a mass of soil subjected to vertical loading. This loading leads to compression deformation in the vertical direction and tensile deformation in the horizontal direction. When horizontally oriented reinforcement is introduced into the soil, horizontal deformation creates shear forces at the interface between the reinforcement and the soil. These shear forces represent the interfacial stress between the soil and the reinforcement [7]. In the case of walls or steep slopes, the directions of the primary deformations do not coincide in the horizontal and vertical directions. However, the reinforcement needs to be installed horizontally [9].

To prevent soil from falling out onto the face of the wall, facing elements are attached to the end of the reinforcement or the reinforcement is wrapped around the soil layer. There are several types of facings, but mechanically they can be divided into three categories based on their bending stiffness [10]:

1. Rigid - fully rigid facings without the possibility of accommodating differential lateral settlements, such as precast concrete facing covering the entire height.
2. Flexible/partially deformable facings - rigid blocks capable of accommodating differential settlements between the blocks making up the facing, such as modular walls made of concrete blocks.
3. Soft/deformable facing elements - facings without bending stiffness, where the soil is retained by geosynthetic reinforcement, i.e., gabions.

The stiffer the facing, the more load it carries, and the less load is applied to the reinforcement. This is because stiffer facing does not allow soil to freely move to the surface, so the facing bears more load. This general mechanical property means that

stiffer elements in the construction carry more load than less stiff ones.

In many studies, the long-term behavior of GRS structures has been investigated. In laboratory tests to assess the creep behavior of geosynthetic reinforcement due to interaction with soil, the geosynthetic reinforcement and the restraining soil were loaded for a long period and allowed to deform interactively. Two different tests used clean sand and kaolin clay as backfill. The results showed that reinforced soils have greater stiffness and strength than unreinforced ones. However, some vertical and horizontal deformations must be present to mobilize reinforcement effects. Additionally, it was concluded that the time-dependent deformation of the restraining soil plays an important role in the long-term creep potential of GRS structures. That is, the time-dependent deformation significantly affects the creep deformation of the reinforcement and depends on the time deformation characteristics of the confined soils. Sand and clay deformations differ significantly over time. Sands demonstrate less deformation rate than clays. Conversely, clays tend to deform more rapidly than sands. It was found that the assessment of creep potential of soil-geosynthetic composites can be misleading if it is based solely on the results of geosynthetic creep tests. Creep deformation decreases over time. In sands, vertical and lateral deformations are limited and similar. In clay, lateral deformation is insignificant, but significant vertical deformation is observed. Moreover, higher reinforcement strength further reduces deformation.

Research on the behavior of structures under constrained stress-strain conditions and various loadings has led to the following conclusions:

• Preloading increases the stiffness of the soil but does not affect the shear strength. The stiffness of reloading depends on the normal pressure and the level of unloading.

• Preloading enhances the geosynthetic stiffness and marginally reduces the tensile strength. Conversely, the stiffness of reloading decreases with an increase in the load level before loading.

• Preloading has no effect on the interface shear force. The stiffness of reloading increases with preloading and normal loading on the interface.

• Preloading does not impact the bearing capacity of GRS.

• Creep of geosynthetic reinforcement is negligible when using well-compacted granular backfill, and stress relaxation occurs immediately after construction.

• Unloading and reloading stress behavior almost coincide.

Large-scale general testing of the soil geosynthetic composite enabled the development of an analytical model to describe the relative contribution of reinforcement strength and spacing between reinforcements. Additionally, equations were derived based on the analytical model. These equations were formulated to calculate the apparent cohesion of the GRS composite (acquired cohesion due to the inclusion of reinforcement), ultimate load-bearing capacity of the GRS mass, and required strength of the reinforcement for a specified reinforcement interval. The adequacy of the developed equations was evaluated by comparing predictions with the results of tests, large-scale experiments conducted by other researchers, and finite element modeling [11,12, 13, 14].

The overall bearing capacity of the GRS structure was assessed using an analytical

formula [11], as depicted in Equation 1. This formula is applicable to GRS structures subjected to vertical loading.

$$q_{ult} = \left[\sigma_c + 0{,}7^{\left(\frac{S_v}{6d_{max}}\right)}\frac{T_f}{S_v}\right] K_{pr} + 2_c\sqrt{K_{pr}} \quad (1)$$

where: σ_c - lateral normal pressure;
S_v - vertical spacing between reinforcements;
d_{max}- maximum particle size of the backfill material;
T_f - ultimate strength of the reinforcement;
K_{pr} - coefficient of passive earth pressure.

The lateral pressure exerted on the facing from the soil is relatively insignificant compared to the lateral pressure predicted by soil pressure theory. It has also been reported that the pressure on the soil near the reinforcement layers is almost negligible. However, under certain conditions, some pressure may occur due to support stress. A method for estimating the lateral pressure on the soil acting on the facing of GRS structures has been proposed. It is noted that the primary function of the facing is to prevent soil spalling for GRS structures reinforced at small intervals (less than 0.3 m). A comparison was made between certain measured values of lateral pressure on the soil and two prediction methods. However, this comparison was not very reliable due to the inclusion of several measured values, most of which were negative. To enhance the assessment of prediction models, more reliable data were found and utilized. However, the effect of superstructure loading was ignored, meaning the predictions were based solely on the self-weight of the fill. It is worth noting that the investigated models mainly do not account for the effect of additional loading on the superstructure.

One of the methods for predicting the maximum lateral displacement in GRS supports assumes no volume change. This means that vertical deformation is compensated by an equivalent lateral deformation while maintaining the same volume of GRS mass. This method is considered conservative. Maximum lateral displacement and deformation can be estimated using appropriate equations [15].

$$D_L = 2 \cdot B \cdot \frac{D_v}{H} \quad (2)$$

$$\varepsilon_L = 2\varepsilon_v \quad (3)$$

where: D_l.- maximum lateral displacement;
B - width of the load along the top of the wall, including setbacks;
D_v - vertical load calculation;
H - height of the structure;
ε_l - maximum lateral deformation;
ε_v - vertical deformation.

This method is based on simplified deformation geometry, assuming that vertical

deformation under loading is uniform, while lateral deformation takes the form of a triangular prism. Regardless of the location of the maximum ordinate, the equation would still provide an approximate estimate of the maximum lateral displacement (the peak of the triangle). To properly assess the effectiveness of this method [15], a modification was made to account for the fact that supports allow deformation only on one side, whereas square supports deform on four sides, and supports with a fixed wall deform on two sides. This modification allows for the use of this method with structures of different geometric configurations.

Equations 4 and 5 modify the maximum lateral displacement and deformation, respectively.

$$D_L = 2 \cdot B \cdot \frac{D_v}{H} \cdot \frac{1}{n} \quad (4)$$

$$\varepsilon_L = \frac{2\varepsilon_v}{n} \quad (3)$$

Where n is the number of deforming sides of the structure (n = 4 for square abutments; n = 2 for abutments with fixed walls; and n = 1 for abutments).

Large parametric studies were conducted using finite difference software, which employs a finite difference approach. The results indicate that the effect of closely spaced reinforcement increases with the increasing shear strength of the fill material. This trend becomes more pronounced when the foundation soil is stiff. For distances between reinforcements of less than 200 mm, it was found that reinforced soil masses behave as integral masses and do not exhibit internal plastic zones. However, at large intervals (over 600 mm), connection failure is observed. The research has shown that the distance between reinforcement layers plays a key role in the behavior of the structures and significantly influences the predominant failure mode, which may not align with modern design approaches. Generalizing the numerical results, it was found that the interaction of all construction components (i.e., facing, foundation, retained soil, reinforced soil, and reinforcement properties) can significantly affect its performance. Additionally, it was established that for high-quality backfills, the "close interval" corresponds to values less than 400 mm, but this value is highly dependent on various factors. [16, 17].

Full-scale field investigations, while important, are often laborious and expensive, which limits their use in creating a comprehensive database. Therefore, many researchers turn to small-scale laboratory methods. For example, to study the behavior of GRS structures under vertical loading, small-scale models are used under normal gravity conditions (1 g) [18].

However, such scaled-down models are not always capable of reproducing the same stress levels that occur in real conditions. Therefore, a methodology for modeling engineering-geological centrifuges has been developed to analyze the performance of soil structures at representative stress levels. The use of these centrifuges allows for obtaining more realistic indicators and facilitates understanding of mechanical behavior by observing real conditions.

The engineering-geological centrifuge creates an environment with inertial

acceleration higher than free-fall acceleration, allowing for the reproduction of real conditions for test models. This enables conducting parametric studies on small-scale structures with the generation of highly realistic results reflecting the behavior of the structures.

The model testing was conducted under normal Earth gravity acceleration (1 g) using various reinforcement schemes, including hybrid vertical spacing and lengths of reinforcement bars. It was found that the reinforcement arrangement significantly influences the external and internal deformation of the reinforced soil mass. Specifically, it was concluded that short secondary layers of reinforcement with predominantly distributed primary reinforcement facilitate construction but provide limited benefit in restraining deformation. It was also reported that the maximum peak deformation of the reinforcement layers occurs at the mid-height of the GRS structures, contrary to the commonly accepted triangular stress distribution of the reinforcement, and occurs below the crest of the structure.

A significant amount of research has been conducted on scaling centrifuge models to real structures. Overall, practically increasing the gravitational force in centrifuge models can lead to a proportional increase in stresses. This can be achieved by rotating the structural model in the centrifuge to create a large centrifugal acceleration acting as an amplified virtual gravitational acceleration for the model. It is important for the model to be positioned in the centrifuge in such a way that its initial direction of gravitational force aligns with the centrifugal acceleration during its flight in the centrifuge. Elevated stresses in centrifuge models reflect the stresses observed in real structures. Such modeling provides analogous stress and deformation conditions as in real structures.

Geotechnical modeling using centrifuges has its limitations that may affect the accuracy of the results. These limitations can be classified into four main sources of errors:

1. *Acceleration field variability within the centrifuge model:* The acceleration field inside the model is proportional to the centrifuge arm radius. However, the variation in acceleration level within the model is proportional to the size of the model compared to the centrifuge arm.

2. *Mismatch between stress trajectories of the prototype and the model:* Stress paths in the model may differ from those actually observed in the prototype during construction.

3. *Model boundary effects:* Boundary effects can arise from the walls of the container in which the model is placed. These effects can be mitigated by using a material with a low friction coefficient to smooth the inner surfaces of the container to determine the state of plane deformation during testing.

4. *Model scale effects:* Scale effects arise due to the relative size of the fill particles between the model and the prototype. These effects can be reduced by using fill and reinforcing materials that can behave as a continuum. Additionally, the width of the contact zone should be greater than approximately 15 particle diameters to ensure adequate modeling of scale effects.

Conclusions. A review of GRS (Geosynthetic Reinforced Soil) construction testing methods has shown that the interaction between soil layers and geosynthetic reinforcement layers can be significant and can provide the construction with composite behavior. Testing of dual geosynthetic reinforcement systems has shown that the soil mass between geosynthetic reinforcements mobilizes as a monolithic system.

The results of experimental and field research components collectively indicate a favorable effect of closely spaced reinforcement on the characteristics of reinforced soil structures, particularly on the influence of closely spaced reinforcement on the stresses acting on wall components. Although the value of the vertical reinforcement interval below which composite behavior is expected has not been established, the following practical recommendations can be made: (1) composite behavior is not expected for vertical reinforcement intervals above 0.6 m, although this value is expected to correspond to the minimum stiffness value of the geosynthetic reinforcement; (2) the length of the geosynthetic reinforcement is expected to be governed by external stability considerations; and (3) the influence of closely spaced reinforcement on reducing stresses acting on wall components is significant.

The technology of geotechnical centrifuges is highly powerful in modeling GRS constructions, allowing for the modeling of real conditions in scaled-down models, enabling the investigation of deformation and stress states scaled to real structures. This provides important practical insights into the type of behavior expected from these structures and optimizes design accordingly.

The resulting conclusions can be summarized as follows:

- Reducing the vertical spacing of reinforcement increases the stability of wall constructions even at small L/H ratios.
- Reviewing the research results has shown that reducing the distance between reinforcements mitigates lateral pressure on the soil at the facing, resulting in reduced lateral deformation and, consequently, reduced vertical deformation.
- GRS constructions, built with the same total tensile capacity and total stiffness of reinforcement, behaved differently depending on the vertical spacing of the reinforcement.
- Using a large number of low strength-to-break and stiffness layers of reinforcement, but placed at a small vertical distance, may result in better overall structural characteristics than a comparable construction with high strength-to-break and stiffness reinforcement, but placed at a large vertical interval. This difference in operational characteristics is explained by the higher number of soil-reinforcement connections in constructions with closely spaced reinforcement.

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THE IMPACT OF DIGITALIZATION ON OPTIMIZATIONOF CUSTOMS' PROCEDURES AND INCREASING THEIR EFFICIENCY

Viktoriia Lebid,
Candidate of Technical Sciences, Associate Professor,
National Transport University, Ukraine,
viktoriia.lebid@ntu.edu.ua; ORCID: 0000-0002-1260-3760
Nelia Kopiak,
Senior Lecturer of the Department,
National Transport University, Ukraine,
nelia.kopiak@gmail.com; ORCID: 0000-0001-8539-9193
Yuiia Meish,
Doctor of Technical Science, Professor,
National University of Live and Environmental Sciences of Ukraine,
juliameish@gmail.com; ORCID: 000-0001-7492-700X

Annotation. *The processes of data exchange between foreign trade entities during customs procedures are currently the subject of many studies, especially in the context of the introduction of the new NCTS computerized transit system to improve and harmonize customs procedures. In light of the military operations in the customs territory of Ukraine, it is important to analyze the impact of these events on the efficiency of customs procedures and data exchange between foreign trade entities.*

The analysis of modern customs policy in the example of Ukraine, including the mechanisms for using customs instruments to regulate foreign trade in the context of a military conflict, is becoming an important element for ensuring the required level of security and efficiency of border crossing in the context of the introduction of new approaches.

One of the ways to improve the efficiency of customs procedures in the context of military operations is to minimize personal contact between customs officers and customers, use electronic services and mobile applications, and quickly resolve issues related to temporary restrictions on border crossing and transportation of goods necessary to meet the needs of the front line and civilians.

In general, the analysis of the impact of martial law on customs procedures and data exchange in the context of foreign economic activity requires a comprehensive approach and consideration of the specifics of the situation at customs and the border. As a result, the customs authorities of Ukraine are forced to exercise stricter customs control over goods during their customs clearance compared to the EU countries and other countries already operating in the NCTS transit system.

Keywords: *customs procedures, subject of the procedure, customs formalities, customs authorities, sender, recipient, computerized transit system NCTS.*

Introduction. The topic of implementation of the new computerized system (hereinafter referred to as NCTS) in Ukraine is relevant in the context of harmonization

of customs legislation with the rules of the European Union. The introduction of the common transit procedure and accession to the Convention is one of the prerequisites for Ukraine's accession to the EU. Therefore, implementing the stages of accession to the Convention, which European partners are helping Ukraine to fulfill, is a priority task on the way to European integration.

It is worth noting that Ukraine's customs system faces various challenges related to the development and implementation of legal, organizational, and economic solutions used within the European Customs Union. The EU pays great attention to issues related to customs services for participants in international supply chains. The problem is that the importance of the quality of customs services is underestimated in academic research on the optimal functioning of modern international supply chains and their efficiency. This can lead to insufficient attention to the quality of service during customs clearance of goods and disruption of logistics processes, which affects the efficiency and reliability of international trade operations [1].

Therefore, to improve and simplify customs procedures, one of the key initiatives in the field of digitalization in Ukraine is the introduction of the New Computerized Transit System. This system opens up new opportunities for automating and optimizing customs procedures, simplifying border crossing for goods, and reducing administrative barriers.

The implementation of the New Customs Transit System (NCTS) envisages the transition to electronic data exchange between customs authorities, authorized economic operators, and other stakeholders. This transition will help to reduce the time required for customs clearance and ensure greater transparency and reliability of the border crossing process. However, the implementation of the NCTS system also implies significant changes in internal customs procedures, as well as in data management and information and communication technologies. Therefore, it is important to study in detail all aspects of the implementation of this system, taking into account both the benefits and challenges that may arise during its implementation. It is also necessary to harmonize the new procedures with international standards and best practices to ensure their effectiveness and compatibility with the international trade environment.

The purpose of the study is to examine and analyze the use of modern digital technologies in the customs authorities of countries with developed economies, using the example of the European Union countries, and compare their experience with Ukrainian practice to identify opportunities and ways to introduce innovations in customs procedures to achieve optimization and improve the efficiency of Ukrainian customs. This approach will allow us to build a study based on the analysis of international experience and take it into account when developing recommendations to improve customs procedures in Ukraine [2].

Thus, the object of the study is the impact of martial law and threats to national security on the processes of digitalization of customs procedures. The authors consider possible obstacles and challenges faced by the State Customs Service on the way to optimize and improve the efficiency of customs control using digital tools. The authors also analyze possible ways of adapting digital technologies to the conditions of military

conflict and their impact on ensuring the security and efficiency of customs procedures in such conditions.

Objective of the study. Customs should be the center of transparent and uniform rules for all participants in customs operations, which are key to the efficient movement of goods across the border. To improve its operations, the State Customs Service of Ukraine is actively promoting international experience and standards, in particular, European ones, implementing their best practices. However, the question arises as to how this can be realized when a business is operating under martial law?

Although current international practice shows that the introduction of electronic customs control systems, such as NCTS, contributes to a significant improvement in the efficiency of customs procedures, it is still important to carefully analyze and take into account potential challenges and problems that may arise during the implementation of such systems. These include coordination issues in the context of military operations on the customs territory of Ukraine, as the implementation of a new transit system may require cooperation between different agencies and government bodies, which can be challenging in terms of coordination and joint action.

The main part. Ukraine is actively restructuring its customs system, harmonizing it with the norms and requirements of the European Union. Changes in national legislation should be clear and transparent, and not be vague or have problematic aspects in the implementation of international agreements into national legislation. The introduction of the common transit procedure appears to be one of the strategic aspects of economic cooperation between Ukraine and the EU. Accession to the Convention on Common Transit became a mandatory step under the EU-Ukraine Association Agreement. This process was made possible thanks to the support and funding from the European Union through the EU4PFM and RST programs. The NCTS system provides communication between the customs services of the countries participating in the Convention, facilitating the exchange of customs data for the effective control of transit traffic [3,4,5].

Due to the fact that the customs authorities continuously control all goods crossing the borders of the EU countries or imported into Ukraine around the clock and throughout the year, under martial law at the customs of Ukraine, the State Customs Service of Ukraine needs to focus on the speed, ease and efficiency of service provision and information processing. An important factor is also a well-developed customs infrastructure that ensures rapid exchange of information with both domestic and neighboring customs. Therefore, the digitalization of customs processes is one of the most important strategic initiatives for the adaptation of Ukraine's customs system to European standards.

Ukraine exchanges pre-clearance information with the European Union (EU) and other countries participating in the Common Transit System (NCTS). This exchange takes place in the context of the implementation of national legislation in line with European standards and practices [6]. Organizational aspects such as data management, logistics, and customs control processes are also important in this context. Implementation of IT solutions to ensure data exchange and automation of customs procedures is a key element of this process. In addition, staff training on new procedures and technologies plays

an important role in the successful implementation of these initiatives. A comparative analysis of customs procedures between Ukraine and the EU countries in the context of the formation of the main elements in the direction of NCTS implementation is presented in Table 1.

Table 1

Comparative analysis of customs procedures between Ukraine and the EU countries in the areas of NCTS implementation

Criteria	Ukraine	EU countries
Legislation	National	European
Practice	Local	United
Organization	State	State
IT solutions	Own (based on EU experience)	Joint
Training	Own (based on EU experience)	Joint

Of course, when implementing a new transit system in a country, not only Ukraine but also other countries may face certain problems that affect the performance of customs formalities [7]:

1. Technical difficulties: the implementation of a new transit system may require significant technical efforts, in particular, the development and debugging of software to ensure the reliability of the system and the absence of failures in its operation. It is worth noting that Ukraine has made significant progress in fulfilling its European integration obligations by implementing IT solutions based on MASP-C. It is the implementation of MASP-C-based IT solutions that allows optimizing customs procedures, ensuring faster and more efficient customs clearance of goods, reducing the risk of customs violations and increasing security. These systems automate many customs processes, such as collecting and processing cargo data, checking documentation, monitoring and analyzing risks, and cooperating with other customs services and law enforcement agencies to reduce customs violations.
2. Harmonization with existing systems: If a new transit system is not compatible with existing customs procedures and systems, it can cause delays and difficulties in international trade.
3. Bureaucratic obstacles: The implementation of a new transit system may involve bureaucratic procedures such as obtaining permits and approvals from relevant government agencies.
4. Data security concerns: Storing and processing large amounts of data in a new transit system may pose risks in terms of cybersecurity and data privacy.
5. Inadequate support and training: Lack of adequate support and training for staff on how to use the new system can lead to inefficient use and reduced productivity.
6. Coordination issues: The implementation of a new transit system requires proper cooperation between customs authorities and businesses, which can be challenging in terms of coordination and joint action for the smooth functioning of customs procedures and international trade. It is the well-established coordination between the customs authorities

and business enterprises that allows foran increase in the effectiveness of combating customs offenses. Violations of customs rules during international trade operations complicate coordination between customs authorities and business enterprises. This can lead to the following problems:

1. Undermining trust: violations of customs rules undermine trust in the customs authorities and their effectiveness, which can negatively affect the business environment and investment climate of the country.
2. Increased risks: violations of customs rules increase risks for businesses, such as fines, confiscation of goods, and even legal prosecution, which can negatively affect their stability and reputation.
3. Threat to national security, especially during martial law: violations of customs regulations can pose a threat to national security, for example, by illegally importing prohibited goods or items that could potentially harm society.
4. Violation of international treaties: violation of customs rules may lead to violation of international trade treaties and agreements, which may create tensions in international relations and cause trade conflicts.
5. Economic losses: violation of customs rules can lead to economic losses for the country, such as losses from non-payment of customs duties and fees, as well as losses from the depreciation of goods due to illegal actions.
6. Loss of reputation: violation of customs rules may lead to the loss of the country's reputation as a reliable partner in the international community, which may affect its image and international business reputation, which Ukraine is currently struggling to achieve in the international market.

For transparency and control over the implementation of European integration processes, on February 15, 2023, the European Commission monitored Ukraine's compliance with the requirements for Ukraine's approximation to the customs union with the EU. The European Commission highly appreciated the results of Ukraine's approximation to the customs union. The European Commission's conclusion emphasizes Ukraine's significant achievements in the customs area, especially given the martial law in the country's customs territory. Ukraine became a party to the Convention on a Common Transit Procedure and the Convention on the Simplification of Formalities in Trade in Goods on October 1, 2022. In addition, the country is connected to the EU's Common Customs Information System (CCN) and is already successfully using the New Computerized Transit System (NCTS). Ukraine has also fulfilled approximately 80% of its customs obligations under the Association Agreement with the EU [8,10]. The main focus is on key aspects of transit, facilitation systems, rights, and intellectual property rights, as well as on proper support of business enterprises by the customs authorities through development assistance, consultations, and other services aimed at supporting and facilitating customs clearance and international trade.

In addition, the country has a national Authorized Economic Operator (AEO) program, and Ukraine is a contracting party to the Pan-Euro-Med Convention on Rules of Origin. For example, the legislation on the control of cultural property has been brought into line with EU norms, as well as the organization of assistance by customs authorities in the protection of intellectual property rights to trademarks [11, 13].

Looking at the practice of European countries, it can be seen that Ukraine has actively begun to implement programs and initiatives similar to those of the EU, as an example of the introduction of the Authorized Economic Operator (AEO), which operates in Ukraine and was introduced during a period of uncertainty, namely the impact of Covid19 and the risk of a full-scale military invasion of the customs territory of Ukraine. For example, in the European Union (EU), there is a Registered Authorized Economic Operator (R-AEO) program that provides businesses with certain advantages in customs procedures. This program simplifies customs control processes and provides for the acceleration of customs operations for supply chain participants who have the status of Registered Authorized Economic Operator [14,15].

1. Concerning the Pan-Euro-Med Convention on Rules of Origin, it is worth noting that many EU countries also follow similar rules and use them in their trade relations with other countries. These rules simplify customs procedures and provide greater transparency in trade, helping businesses to more easily take advantage of foreign economic relations.

2. Thus, Ukraine, by adopting and implementing such programs and initiatives, reflects its readiness to integrate into European and global trade structures, using best practices and standards to improve the efficiency and competitiveness of its business.

3. Thus, after Ukraine acceded to the NCTS Convention, Ukrainian business received several opportunities, even during the period of martial law in its customs territory, that helped to simplify and speed up the process of customs clearance and movement of goods across the customs border. In particular:

4. Businesses can operate on the principle of "one vehicle - one declaration - one guarantee", which helps to speed up the passage of goods across the customs border.

5. There is an opportunity to use transit simplifications at the international level in 36 countries party to the Convention.

6. Possibility to use simplifications without the status of an Authorized Economic Operator (AEO).

Application of reduced customs rates on raw materials for the production of goods for the domestic market, which contributes to predictability and business development.

It is worth noting that during the first three months of the international application of the Convention, the customs authorities of Ukraine issued 444 declarations under the joint transit procedure, and closed 264 declarations for goods received from the territories of the participating countries. And on October 1, 2023, a year has passed since Ukraine started applying the NCTS internationally. During this period, more than 19.5 thousand movements initiated by the customs authorities of Ukraine were completed in the countries participating in the Convention on the Common Transit Procedure.

Thus, Ukraine continues to actively work on improving the procedures of the common transit and implementing the NCTS system. The plans for the near future include the transition to NCTS in Phase 5, which is scheduled to be completed by the end of 2023. To this end, a contract has already been signed for the development of the relevant software, and the necessary measures are being taken to deploy the updated software. This opens up new opportunities to improve and accelerate customs procedures, which will facilitate trade operations and increase efficiency and transparency in international trade.

Conclusions. The study revealed insufficient automation in the customs clearance

procedure and established that the customs authorities have a large number of obligations, the effectiveness of which would be more appropriate at other stages of the supply chain in the framework of export-import operations. To improve customs procedures in trade between Ukraine and the EU so that each party has to fulfill a minimum of customs formalities for goods coming from the other party, these customs procedures should be optimized and simplified. Therefore, trading countries should take several mutual steps to adapt legislation and implement it to strengthen the customs system, unify norms, procedures, and information exchange systems, and avoid duplicate customs checks.

It is established that the lack of automation of certain customs processes (the failure of customs authorities to fully apply effective control measures for the cargo of large companies) and the lack of control over the circulation of goods within the country are the most significant shortcomings in the performance of customs formalities. Thus, compared to the EU countries, the control of goods during customs clearance by the customs authorities of Ukraine should be more thorough. Therefore, to harmonize customs relations, one of the most important areas of stakeholder activity is to simplify customs clearance procedures use modern information technologies for this purpose, and provide access to them for all participants in the international trade process.

Given that the customs procedures of each country are based on international standards, Ukraine's position in international trade rankings remains low. That is why it is worth implementing automation and simplification of customs procedures and using a strategy aimed at applying innovative technologies. This approach will improve the efficiency of customs regulation and help increase the country's attractiveness for export and import operations.

It should be emphasized that stimulating greater coordination between customs authorities and foreign trade entities should improve the effectiveness of cross-sectoral cooperation between different ministries and agencies, and as a result, strengthen the customs system as a whole.

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COMPARISON OF DENSITY OF ASPHALT CONCRETE MIXTURE WITH FLY ASH AND LIMESTONE FILLER

Ivan Kopynets,
Ph.D. in Technical Sciences,
SE «National Institute for Development Infrastructure», Ukraine,
viddbm@gmail.com; ORCID: 0000-0002-0908-4795
Oleksii Sokolov,
SE «National Institute for Development Infrastructure», Ukraine,
bitumen_lab@ukr.net; ORCID: 0000-0002-4694-9647

Annotation. *The road construction industry is one of the strategic industries of Ukraine. Currently, the issue of quality and availability of basic building materials for road construction is particularly acute, which is directly related to its high material intensity. Known stocks of conditioned raw materials that could be used as components of asphalt concrete are constantly decreasing, so it is necessary to look for alternative sources of raw materials for construction materials and study the possibility of their use. In this regard, the most effective use of local raw materials is the use of industrial production waste, which can become one of the solutions to the problem of the lack of raw materials of inorganic origin.*

In Ukraine, about 30% of all electricity is generated by burning solid fuels such as coal, oil shale, and peat. There are about 15 operating thermal power plants in Ukraine, which generate about 5-6 million tons of ash and slag waste per year. Thus, the fuel and energy complex waste generated at thermal power plants is a huge accumulation of ash in the form of dusty residues and lumpy sludge, as well as various ash and slag mixtures. These products of high-temperature treatment (1200-1700 °C) of the mineral part of the fuel are widely used in many countries and given the global trend towards an increase in the share of the secondary market for the use of secondary industrial products, an increase in the rate of their processing in Ukraine should be predicted.

Keywords: *asphalt concrete mixture, fly ash, industrial waste, locking point.*

Introduction. One of Ukraine's top priorities is the development of its transport infrastructure. The operation of asphalt concrete roads under the aggressive influence of external factors and the continuous increase in the number of vehicles leads to the formation of various defects and, as a result, to premature deformation and destruction of roads [1].

Nowadays, scientists and road industry specialists pay special attention to the quality of road construction, search for new effective solutions to further improve the quality and increase the maintenance-free service life of pavements. At the same time, asphalt concrete remains the main material for road pavement. The length of roads with such pavement in Ukraine exceeds 169.5 thousand kilometers, as well as 250 thousand kilometers of city streets.

Asphalt concrete is an artificial construction material that is formed after compaction of an asphalt mixture prepared in a heated state in mixers and includes rationally selected

mineral materials (crushed stone, sand, mineral powder) and bitumen. The cost of materials makes up the largest part of the cost of producing asphalt mixtures - 80%. The annual increase in the cost of materials (including crushed stone, mineral powder and bitumen) and energy resources leads to an average increase in the cost of producing asphalt mixtures by 10-15%.

This circumstance requires a detailed study of the market for asphalt concrete feedstock, identifying existing problems and methods to solve them.

Improving the quality and service life of asphalt pavement remains a top priority for the road sector. The solution to this problem is the production and use of asphalt concrete with improved performance and service life, as well as cheaper production of asphalt concrete mixtures without reducing the physical and mechanical properties of the material [2].

One of the prerequisites for designing the composition of the hot asphalt concrete mixture is that the density of the samples produced in the laboratory, which are used to determine the optimal bitumen content, should be close to the final density of the asphalt concrete layer of the road surface. If the density of asphalt concrete is too low, then the durability of such material will be reduced, and if the density of asphalt concrete is too high, then such material will have a tendency to sweat or form ruts. The density of asphalt concrete when compacted in the field is almost always 1.5% less than the density of samples made in the laboratory. This indicates that the laboratory compaction effort is too high [3].

The Superpave mixture composition design system takes into account different traffic and environmental conditions. One of the main pieces of equipment in the Superpave system is the Superpave gyratory compactor. The gyrator compactor is used to compact asphalt concrete mixtures of the selected composition at the design number of rotations in the laboratory in order to be able to evaluate the volumetric properties of the compacted sample. The bulk properties evaluated include porosity, mineral aggregate voids, bitumen-filled voids, and the ratio of mineral powder to effective bitumen content.

To check the compaction speed, two additional parameters are included: the density at the initial number of gyrations (Ninitial) and the density at the highest number of gyrations (Nmaximum). It is assumed that the laboratory design amount of residual pores is related to the final density of asphalt concrete. The general characteristics of asphalt concrete strongly depend on the design of the road surface and the quality of construction.

Literature review. The Illinois Department of Transportation has developed an alternative to Ndesign called the “lock point” concept to prevent over compaction and subsequent failure of the aggregate in the asphalt mixture [4]. The lock point, defined as the rotation at which the aggregate "locks" together and further compaction results in aggregate failure and very little additional compaction, was compared to a growth curve constructed to determine the highest number of roller passes along the road before density increases is leveled or reduced on the spot.

It was noted that mixes do not compact with the same number of passes because

each mix is different. Compaction was stopped at peak density before excessive aggregate failure occurred. The concept of the locking point was developed based on a comparison of three years of Marshall and Superpave data and the density growth curves during pavement placement [4]. Originally, the Illinois lock point was defined as the first rotation in a set of three rotations at the same height, preceded by one set of two rotations at the same height (each 0.1 mm greater than the set of three rotations). The locking point was believed to indicate the development of some degree of coarse aggregate cohesion and was related to the density reached on the field growth curves. The standard deviation of the number of gyrations equal to the locking point was less than the standard deviation of the number of gyrations to obtain 4% air voids.

Vavryk and Carpenter [5] refined the definition of the locking point as the first rotation in the first occurrence of three rotations at the same height, preceded by two sets of two rotations at the same height (each 0.1 mm higher than the set of three rotations), as shown in Figure 1.

The objective of the study. In previous studies, [6-8], it was found that the physical and mechanical characteristics of asphalt concrete with fly ash practically do not differ from those of asphalt concrete with standard aggregate. Moreover, water resistance and frost resistance in some cases are even higher in samples using fly ash, while the optimal bitumen content in asphalt concrete with fly ash is 0.5% less than in standard asphalt concrete.

According to the data obtained, it was hypothesized that the compaction of asphalt concrete mixtures with fly ash may be faster than that of mixtures with limestone aggregate. However, national standards do not establish a method for determining the compaction of such a mixture. Therefore, it was decided to conduct additional research and establish an effective method for determining the compatibility of an asphalt concrete mixture with fly ash.

Test methods. *Bulk density of asphalt concrete.*

The bulk density of asphalt concrete was determined by its weight and volume in accordance with Method B of DSTU EN 12697-6 [9] (water-saturated state with a dried surface). The mass of the sample was determined by weighing the dry sample in an air environment (in air). The volume of the sample was determined by its weight in air and water.

The determination of the bulk density of asphalt concrete was performed in the following sequence:

a) the mass of the dry sample (m1) was determined;

b) the density of water (ρw) was determined at the test temperature with an accuracy of 0.0001 Mg/m³ in accordance with formula (1):

$$\rho_w = 1{,}00025205\left(\frac{7{,}59 \times t - 5{,}32 \times t^2}{10^6}\right), \qquad (1)$$

where — t is the water temperature, in degrees Celsius (°C);

P_w is the density of water at the test temperature, in megagrams per cubic meter (Mg/m³);

c) the sample was immersed in a water bath in which the test temperature was maintained and kept for at least 30 minutes;

d) determine the mass of the saturated sample in water (m_2), making sure that during weighing no air bubbles adhere to the surface of the sample or escape from it;

e) remove the sample from the water and dry its surface from residual water by wiping it with a damp cloth;

f) immediately after drying the surface of the sample, the mass of the saturated sample with the dried surface in the air was determined (m_3);

f) calculate the bulk density of the sample (P_{bssd}) to the nearest 0.001 mg/m3 in accordance with formula (2):

$$\rho_{bssd} = \frac{m_1}{m_3 - m_2} \times \rho_w, \quad (2)$$

where — P_{bssd} is the bulk density, in megagrams per cubic meter (Mg/m^3);

m_1 is the mass of the dry sample, in grams (g);

m_2 - mass of saturated sample in water, in grams (g);

m3 is the mass of the saturated sample with a dried surface, in grams (g);

P_w is the density of water at the test temperature, in megagrams per cubic meter (Mg/m_3).

Air pore content (air void)

Air pores are the voids between the bituminous aggregate grains in a compacted asphalt sample.

Air pore content is the volume of air pores in an asphalt specimen expressed as a percentage of the total volume of the specimen.

The air pore content of the asphalt concrete sample was calculated using the maximum density of the asphalt mixture and the bulk density of the asphalt concrete with an accuracy of 0.1 % according to formula (3):

$$V_m = \frac{\rho_m - \rho_b}{\rho_m} \times 100, \quad (3)$$

where — V_m is the air pore content, % by volume;

pm is the maximum density of the mixture, in megagrams per cubic meter (Mg/m_3);

pb is the bulk density of the sample, in megagrams per cubic meter (Mg/m_3).

Binder-filled pores

Binder-filled pores are the percentage of pores in the mineral aggregate that are filled with binder.

The percentage of pores in the mineral aggregate filled with binder was calculated from the content of binder and pores in the mineral aggregate, as well as the bulk density of asphalt concrete and the density of binder to the nearest 0.1% using formula (4):

$$VFB = ((B \times \frac{\rho_b}{\rho_B}) \times VMA) \times 100\ \%, \quad (4)$$

where — VFB is the percentage of pores in the mineral aggregate filled with binder, % by volume;

B - percentage of binder in the sample (in 100% of the mixture), % by volume;

ρ_b is the bulk density of the sample, in megagrams per cubic meter (Mg/m3);

ρ_B is the density of the binder, in megagrams per cubic meter (Mg/m3);

VMA - pore content in mineral aggregate, % by volume.

Pore content in mineral aggregate

The pore content in mineral aggregate is the volume of intergranular voids between the aggregate grains of the compacted asphalt mixture, consisting of the volume of air pores and the volume of bituminous binder in the asphalt concrete sample, determined as a percentage of the total sample volume. The pore content in the mineral aggregate was calculated to an accuracy of 0.1 % using formula (5):

$$VMA = V_m + B \times \rho_b / \rho_B \quad (5)$$

where —VMA is the pore content in the mineral aggregate, determined to within 0.1% (by volume);

V_m - air pore content in the sample, % by volume;

B - binder content in the sample (in 100% of the mixture), % by weight;

ρ_b is the bulk density of the sample, in megagrams per cubic meter (mg/m3);

ρ_B is the density of the binder, in megagrams per cubic meter (Mg/m3).

Maximum density

Maximum density is the mass of asphalt mixture per unit volume without air voids at a given test temperature. The maximum density in combination with the bulk density is used to calculate the air pore content of the compacted specimen and other bulk properties of the compacted asphalt mixture.

The maximum density was calculated to the nearest 0.001 mg/m³ using formula (6):

$$\rho_{mc} = \frac{100}{(p_{a1} / \rho_{a1}) + (p_{a2} / \rho_{a2}) + ... + (p_b / \rho_{b1})}, \quad (6)$$

where ρmc is the maximum density of the material, in megagrams per cubic meter (Mg/m³);

p_{a1} - content of mineral aggregate 1 in the mixture, % by weight;

ρ_{a1} is the bulk density of mineral aggregate 1, in megagrams per cubic meter (Mg/m3);

p_{a2} - content of mineral aggregate 2 in the mixture, % by weight;

ρa2 is the bulk density of mineral aggregate 2, in megagrams per cubic meter (Mg/m3);

p_b - content of binder in the mixture, % by weight;

ρ_b - density of the binder, in megagrams per cubic meter (Mg/m3);

$p_{a1} + p_{a2} + ... + p_b = 100.0$ % (by weight).

Presentation of the main material. The concept of the locking point was taken as

a basis for developing a method for comparing the technological properties of asphalt concrete mixtures with different types of fillers. Thanks to this method, it is possible to evaluate the compaction of asphalt concrete mixtures with obtaining the optimal residual porosity of the material.

The essence of this method is to evaluate the technological properties of the asphalt concrete mixture by the locking point as the first rotation in a block of three consecutive rotations during which the thickness of the sample decreases by less than 0.1 mm, which is preceded by two blocks of two rotations during which the thickness of the sample decreases by less than 0.1 mm, as shown in Figure 1 and Table 1.

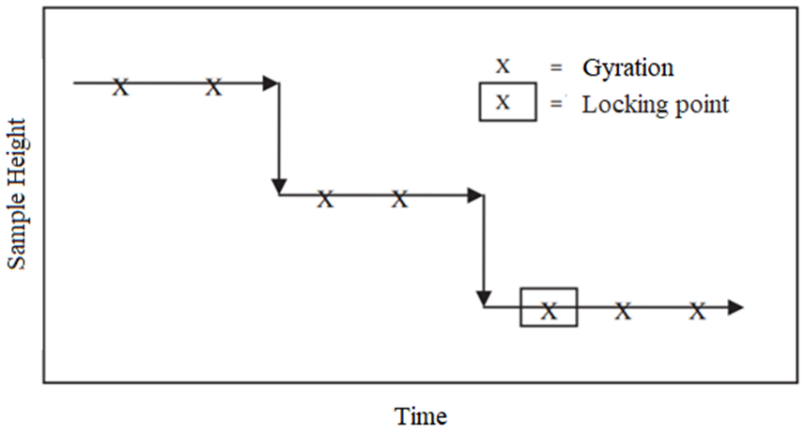

Fig. 1. Locking point definition

Table 1

Determination of the locking point by the number of gyrations

Number of gyrations	Height	Density	Blocks
70	105.258	2341	**1**
71	105.215	2342	**2**
72	105.179	2342	**1**
73	105.139	2343	**2**
74	**105.098**	2344	**1**
75	105.054	2345	**2**
76	105.007	2346	**3**
77	104.973	2347	
78	104.940	2348	
79	104.897	2349	
80	104.867	2349	

For testing, the grain composition of the asphalt concrete mixture was selected according to DSTU EN 13108-1 [4].

Table 2

Asphalt concrete test results

Indicator	Asphalt concrete with limestone		Asphalt concrete with fly ash	
Number of gyrations	74	80	69	80
Apparent density of coarse aggregate fraction 8/16 mm, Mg/m^3	2,653	2,653	2,653	2,653
Apparent density of coarse aggregate fraction 4/8 mm, Mg/m^3	2,689	2,689	2,689	2,689
Apparent density of coarse aggregate fraction 2/4 mm, Mg/m^3	2,675	2,675	2,675	2,675
Apparent density of coarse aggregate fraction 0/2 mm, Mg/m^3	2,676	2,676	2,676	2,676
Apparent density of mineral powder, Mg/m^3	2,84	2,84	2,61	2,61
Apparent density of bitumen, Mg/m^3	1,016	1,016	1,016	1,016
Bulk density of asphalt concrete, Mg/m^3	2,380	2,385	2,397	2,407
The content of the coarse aggregate fraction 8/16 mm, %	35,0	35,0	35,0	35,0
The content of the coarse aggregate fraction 4/8 mm, %	19,0	19,0	19,0	19,0
The content of the coarse aggregate fraction 2/4 mm, %	7,0	7,0	7,0	7,0
The content of fine aggregate fraction 0/2 mm, %	33,0	33,0	33,0	33,0
Filler content, %	6,0	6,0	6,0	6,0
Bitumen content (over 100 %), %	5,3	5,3	5,3	5,3
Bitumen content (in 100 %), %	5,03	5,03	5,03	5,03
Calculated maximum density of the mixture of mineral materials, Mg/m^3	2,680	2,680	2,666	2,666
The average density of the aggregates, Mg/m^3	2,260	2,265	2,276	2,286
The maximum density of the asphalt concrete mixture, Mg/m^3	2,476	2,476	2,465	2,465
Void in mineral aggregate, % by volume	15,65	15,47	14,62	14,27
Air void, % by volume	3,9	3,7	2,7	2,3
Void filled with binder, % by volume	11,8	11,8	11,9	11,9
Void filled with binder, %	75,3	76,4	81,2	83,6

According to the results of the test, it was established that the locking point for asphalt concrete mixture with fly ash corresponds to 69 gyrations of the gyratory compactor, and the locking point for asphalt concrete mixture with limestone filler corresponds to 74 gyrations. That is, it can be argued that the compaction of asphalt

concrete mixture with fly ash occurs faster than asphalt concrete mixture with limestone filler. It was also established that the bulk density of asphalt concrete with fly ash at a lower number of gyrations is greater and is 2.397 g/cm3, and in asphalt concrete with limestone filler - 2.380 g/cm3. According to the results of the study, it was found that the air void of asphalt concrete using fly ash at a higher volume density is 1.1% lower than that of asphalt concrete with limestone aggregate. In addition, the percentage of pores filled with binder in the mixture with fly ash is 6.9% higher than in the case of limestone aggregate. These results indicate the possibility of reducing the amount of bitumen in asphalt concrete, which has potential economic and environmental benefits.

Conclusions. The residual porosity of asphalt concrete samples was determined by the calculation method and it was established that asphalt concrete with fly ash, obtained after 69 gyrations of the gyrator compactor, has a lower residual porosity than asphalt concrete with limestone filler. This indicates the possibility of bitumen reduction in the asphalt concrete mixture with fly ash.

The use of fly ash as part of the asphalt concrete mixture is a promising solution, as it allows reducing the negative environmental impact on the environment, reducing costs from ash waste storage, while ensuring proper quality.

Development and modernization of road infrastructure is of strategic importance for economic growth and increasing competitiveness of Ukraine.

The introduction of fly ash asphalt mixtures in Ukraine opens up new opportunities for infrastructure development, providing the opportunity to repair old and build new roads at more favorable prices.

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SOCIAL AND CULTURAL SCIENCES

CREATIVE INDUSTRIES AS A MEANS OF INCREASING THE ECONOMIC POTENTIAL OF THE DNIPROPETROV REGION (UKRAINE)

Serhii Vytkalov,
Doctor of Cultural Studies, Professor,
Rivne State University for the Humanities, Ukraine
sergiy_vsv@ukr.net; ORCID: 0000-0001-5345-1364
Marina Shpakovska,
Master of specialty 028 «Management of socio-cultural activities»,
Rivne State University for the Humanities, Ukraine
shpakovskaya0504@gmail.com; ORCID: 0009-0000-7711-6499

Annotation. *The material of the article examines the evolution of creative industries in Ukraine, highlighting their growing role in both the economic and cultural spheres. A comprehensive analysis is presented that reveals the multi-level economic impact of these industries, including direct, indirect and induced effects, as well as their role in facilitating innovation and technological progress. These industries, according to the definition of the Ukrainian Government, cover 34 different types of economic activity, which significantly affects such sectors as IT, advertising and publishing. In 2020, their contribution to the economy of Ukraine was noticeable: they accounted for 4.2% of the added value and employed hundreds of thousands of workers. The multifaceted impact of creative industries on the economy of Ukraine is emphasized, including direct contributions to production and employment, as well as indirect impacts through supply and consumption chains, as well as their social and economic consequences.*

SWOT analysis and strategic recommendations provide insight into internal and external factors affecting these institutions, outline effective strategies for increasing competitiveness. The role of creative industries in the economic and cultural development of Ukraine is substantiated, their contribution to GDP, employment and exports, as well as their impact on society is emphasized.

Keywords: *creative industries, economic influence, cultural development, transformation, Dnipropetrovsk region, innovations, regional practice.*

Introduction. Statement of the problem and relevance of the research. The problem and relevance of the topic of creative industries in Ukraine lies in the recognition and optimization of their significant contribution to the country's economy and culture. This sector, which includes traditional art forms: theatre, music, visual arts, as well as new forms brought about by digital technologies such as cinema, IT, mobile application development and video games, has historically been under-represented.

In 2018, the concept of creative industries was legally recognized in Ukraine, which gave impetus to their development and integration into the wider economic context. The creative industries have a significant impact on the economy, generating 4.2% of added value and employing 360,000 people. It is also important to support and develop this sector through various initiatives and organizations. The impact of these industries on the economy is multi-level, including direct, indirect and induced effects, as well as facilitating innovation and technological development. This highlights the need to develop comprehensive strategies to optimize the potential of creative industries in regions such as Dnipropetrovsk Oblast, with an emphasis on digital transformation, international cooperation, program expansion and public engagement. This is especially relevant during the war.

Recent research and publications. The phenomenon of Ukrainian culture is the subject of constant scientific study and interest in it does not wane, as evidenced by a multifaceted view of its history and economic potential. O. Vysotsky's book "History of Ukrainian Culture" [1] offers a comprehensive overview of the history of Ukrainian culture. "Culturology" by P. Herchanivska [2] aims to investigate various cultural aspects of this issue and give them a theoretical understanding. Lectures by K. Kostyleva on the topic "History of Ukrainian culture" [3] and "History of Ukraine" by N. Levytska, V. Kolosyuk, S. Buravchenkova [4] provide a fairly broad idea of Ukrainian history and its culture. S. Kinal's work [5] focuses on cultural development in communities, and D. Lull's [8] exploration of media, communication and culture provides an international perspective on these influences. However, there is still a lack of works where the regional segments of the development of the outlined problem become the center of attention. Presenting main material. Creative industries in Ukraine have made a significant contribution to the country's economic development, including traditional forms such as theatre, music and visual arts, as well as new forms emerging with digital technologies such as cinema, IT, mobile application development and video games. Historically, these industries have not received adequate attention, but over time, their integral role in various industries and professions has been recognized, especially in terms of impacting other areas of the economy through digital technologies. In Ukraine, the concept of creative industries was legally recognized in 2018. In particular, the Law of Ukraine "On Culture" defines creative industries as "types of economic activity aimed at creating added value and jobs through cultural (artistic) and/or creative self-expression." This definition covers 34 economic activities, including visual arts, performing arts, literature, publishing, audio arts, audiovisual arts, design, fashion, new media and ICT, architecture and urban planning, advertising, marketing, PR, libraries, archives, museums and folk art. Creative industries in Ukraine make a significant contribution to the economy. In 2020, they generated 4.2% of the added value in the country (132 billion UAH), employed 360,000 people (4% of the total employment of the population) and had a significant impact on such sectors as IT, advertising, audiovisual arts, architecture and publishing. The export of creative services in 2019 amounted to $5.4 billion, which is 30% of the total export of services. Investments in the sectors of creative industries lead to a significant increase

in the total GDP. For example, an investment of 1 hryvnia in programming sectors has a more significant multiplier effect compared to other industries. The contribution of creative industries to the economy of Ukraine can be compared with their influence in countries such as Germany. A number of initiatives and institutions operate in Ukraine to support creative industries. Among them are the Ukrainian Cultural Fund (UKF), Book Institute, State Cinema, Ukrainian Startup Fund, international and Ukrainian funds, such as House of Europe, Creative Europe Ukraine, Zagoriy Family Fund, Zenko Foundation, etc. [7].

The analysis of the main types of economic activity belonging to the creative industries in Ukraine, defined by the Cabinet of Ministers of Ukraine in Resolution No. 2019 of 05/26/2019, highlights the wide range and importance of these industries. Creative industries are defined as covering a range of 34 different types of economic activity that make a significant contribution to the economy and cultural development of a country. These activities cover different sectors, demonstrating the diverse nature of the creative economy. These industries include: fine arts, including activities such as painting, graphics, sculpture and photography. The performing arts include live music, theatre, dance, opera, circus and puppetry. Literature, publishing and mass media covers literary works, publishing and various forms of mass media. Audio Arts: This includes all forms of artistic expression based on sound. Audiovisual arts: involving film, television, video, animation and multimedia productions. Design encompasses various fields of design, including graphic and industrial design. Fashion: This sector includes the design, production, marketing and sale of clothing and accessories. New media and information and communication technologies, covering software development, video games and digital technologies in the arts such as 3D printing and virtual reality. Architecture and urban planning, which includes the design and planning of buildings and urban spaces. Advertising, marketing, PR and other creative services: These services are critical to the creative promotion of products and services. Libraries, archives and museum institutions that store and exhibit cultural and historical artifacts. Folk arts and crafts, in particular traditional arts and crafts practiced by communities. The regulation also recognizes the important role of related fields (such as communication, printing, tourism, etc.) that support, facilitate and enable the creation, production and distribution of creative industries products. However, there are also methodological differences in the definition of creative industries in different countries. Approaches range from specific categorization in the UK for creative, digital, cultural sectors, telecommunications, gambling, sports and tourism to more detailed classifications in Canada and the US. The report highlights that while there is general agreement on what constitutes creative industries, specific definitions and classifications may vary [6].

The influence of creative industries (CI) on the economy operates at different levels. First of all, the direct impact of CI on the economy is considered, which is the direct quantitative contribution of these industries to the total production, added value, income and employment. In addition, the indirect and induced effects of CIs are significant due to their positive multiplier effect on the economy as a whole and other sectors (production,

income, employment). They are interconnected with CI through supply and consumption chains. Creative industries also have a wider impact on society and the economy by spreading concepts, ideas, skills, knowledge, facilitating innovation, technological progress and improving the quality of life. This includes CI externalities, such as spillovers or positive externalities, which can also affect cross-industry linkages and alter indirect and induced impacts. In particular, CIs are important drivers of economic and social innovations in the economy. They support innovation in many other sectors (e.g. industrial innovation) by providing creative ideas for new products (e.g. innovative content), creative goods and services used in production processes (e.g. software) and marketing support for innovative products (innovative design, etc.). They contribute to the development of flexible, mobile and multidisciplinary networks, project organization of work processes, development of human capital and creative problem-solving skills. Therefore, CIs contribute to the introduction of new ideas and technologies into other sectors, increasing their productivity and competitiveness. They are also significant users of innovative technologies and create demand for equipment manufacturers, particularly in information and communication technologies. It is worth noting the positive influence of CI on the development of the tourism industry, which is associated with an increase in the flow of tourists participating in artistic and cultural events (cultural tourism). External effects include the growth of brand value, improvement and popularization of the country's international image, as well as contribution to the development of territories and communities [12].

The impact of creative industries on the economy can be understood through different levels of influence. First of all, the direct impact of CIs on the economy is considered, including their quantitative contribution to total production, added value, income and employment. In addition, the indirect and induced effects of CIs are recognized for their positive multiplier effects on the overall economy and other sectors (such as output, income and employment) through cross-industry linkages through supply and consumption chains. These consequences also affect government tax revenues. In addition, the wider impact of AI on society and the economy is recognized through the dissemination of concepts, ideas, skills and knowledge, which contributes to innovation, technological progress and improved quality of life [10]. These are known as CI externalities, including facilitating cross-industry linkages and changing indirect and induced effects. In the context of the Ukrainian economy, creative industries are important drivers of economic and social innovations. They support innovation in different sectors (e.g. industrial innovation) by providing creative ideas for new products (innovative content), creative goods and services used in production processes (e.g. software), and marketing support for innovative products (innovative design etc). In addition, CIs contribute to the development of flexible, mobile and multidisciplinary networks, the organization of project workflows, the development of human capital and creative problem-solving skills. Thus, CIs not only contribute to the introduction of new ideas and technologies in other sectors, increasing their productivity and competitiveness, but also act as significant users of innovative technologies, creating demand for

equipment manufacturers, in particular in information and communication technologies. The positive influence of CI on the development of the tourism industry, due to the increase in the number of tourists participating in artistic and cultural events, deserves attention. In addition, external effects include increasing the value of the company's brand, improving and popularizing the country's international image, and developing territories and communities. This analysis highlights the multifaceted impact of CIs on Ukraine's economy, highlighting their role in driving innovation, productivity and overall economic growth. The economic impact of creative industries (CI) can be assessed using various methodologies, including multiplicative analysis. This approach examines how investment and activity in CIs stimulate additional economic activity in other sectors. There are two main types of multipliers: Type I and Type II. Type I multipliers cover direct and indirect effects. The direct effect refers to the direct economic impact of CIs, such as jobs and output in the sector. Indirect effects include economic activity arising in other industries as a result of CI, such as supply chain impacts. Type II multipliers include both direct and indirect effects, as well as induced effects. Induced effects are the additional economic activity that occurs as a result of the income earned by workers in CI and related sectors being spent in the wider economy. An example of such an analysis can be found in the study "Do creative industries generate a multiplier effect? Evidence from UK Cities 1997-2018' from the Creative Industries Policy and Evidence Centre. This study adapted Moretti's system of local multipliers to estimate the long-term causal effects of CIs on the surrounding urban economy. The study found that each creative job generated at least 1.9 non-tradable jobs in the UK between 1998 and 2018, primarily due to local spending by creative business services workers. The overall impact of CI on the economic development of cities turned out to be positive, but partial, forming only a small part of non-tradable changes in urban employment. The study also found no causal evidence of spillovers from creative activities to other trade sectors. This suggests that although CI-led policies can have positive effects, they are not the only drivers of urban economic development [11].

On February 21-22, 2017, the first Creative Industries Forum was held in Dnipro, organized under the auspices of the "Bridges of Public Activity" project with the support of the EU. This ground-breaking event called "Creative Industries for Territorial Development" brought together a diverse range of participants, including representatives of the Ministry of Culture of Ukraine, local authorities, creative entrepreneurs, artists, territorial development experts and investors. The program of the forum was rich and multifaceted, focusing on topics of crucial importance for the development of creative industries and their role in social and territorial development. Key topics included "Partnership and innovation - the path to success", "Cultural and creative industries for community development", "Participatory budgeting mechanisms for cultural development in communities", "Cultural integration and interaction for peace and development", "Business development in creative industries". One of the main entertainments of the forum was the presentation of various successful practices and new projects that are looking for funding and partnerships for their implementation. Among the presentations that deserve attention were O. Boyarynova's report "Mapping citizens as a tool for city development" from the Ukrainian Library Association in Kyiv; V. Veres "Creating a cluster of culture and event tourism in Zaporizhzhia region" from the NGO "Kultprozhektor" in Zaporizhzhia; the project of S. Prokopenko "Audio books" from Kharkiv; R. Pomazan

"TPP Center in Kherson"; "Mariupol on the border" by O. Ukraintseva from Mariupol, Donetsk region; and M. Pavlyuchenko "Evacuated collection. Embroidery: protection, resistance, weapons" from Zelenodolsk, Dnipropetrovsk region. The forum also facilitated the Open Mic session, a unique platform where participants whose presentations and talks were not included in the main agenda could share their experiences and ideas. This segment greatly enriched the discussion on the forum by bringing in a wider range of voices and perspectives. A distinctive feature of the Forum was the emphasis on live video broadcasts, which showcased a number of projects and products of the cultural industries of Ukraine, which further expanded the reach and impact of the event. The first forum of creative industries in Dnipro became an important milestone in the development of the creative sector of Ukraine. She not only highlighted the diverse and dynamic nature of the creative industries in the country, but also highlighted their critical role in promoting economic growth, cultural development and community engagement. The event became a platform for dialogue, cooperation and innovation, setting a precedent for initiatives in the field of creative industries [9]. Dnipropetrovsk region is distinguished by its unique cultural diversity and historical wealth, having played a key role in the development of the region. A variety of institutions, including museums, theaters and libraries, are important for regional cultural identity and promotion. Dnipropetrovsk National History Museum plays a key role in the preservation of historical heritage, the integration of digital technologies here can significantly improve interactivity and visitor engagement. The Dnipropetrovsk Art Museum has an impressive collection of Ukrainian art, and international cooperation can strengthen its global presence. The Dnipro Academic Ukrainian Music and Drama Theater can attract a wider audience by expanding its repertoire with modern and experimental performances. The Dnipropetrovsk Philharmonic can use new forms of funding and organize special events involving international musicians. Dnipropetrovsk Academic Youth Theater has great potential in educational work with young people through modern theater techniques and educational programs. Library of the Dnipro National University named after O. Honchara can become a center of digital learning and cultural exchange through the introduction of electronic systems. Menorah cultural and business center demonstrates the possibilities of public-private partnership in the cultural sphere.

Cultural institutions of the Dnipropetrovsk region have a unique potential due to the rich history and cultural heritage of the region. These features not only make local residents proud, but also attract cultural tourists. The region has a strong network of cultural institutions and a skilled workforce consisting of artists and managers. However, there are certain challenges, including limited funding, lag in the implementation of modern technologies and low international popularity. Therefore, the integration of digital technologies, such as virtual reality in museums, can radically change the interaction with cultural content and attract more visitors. Cooperation with international cultural institutions and the private sector opens up additional opportunities for funding and knowledge exchange. Investing in cultural management training can improve efficiency and optimize the use of resources. Competition with other cultural hubs and changes in consumer patterns, especially among young people, require adaptation and innovation. Economic fluctuations also create additional challenges for the financial sustainability of cultural institutions. To solve these problems, it is recommended to develop an integrated approach. It is necessary to focus on digitalization, provision of various sources of funding, strengthening of international presence, development of cultural tourism and diversification

of program offers. The implementation of these strategies can not only solve existing challenges, but also significantly expand the influence and visibility of cultural institutions of Dnipropetrovsk region.

Table 1

Results of the SWOT analysis

Strong	**Weaknesses**	**Opportunities**	**Threats**
Rich cultural heritage	Limited financing	Digital transformation	Competition
Established cultural infrastructure	Insufficient technological integration	Cooperation and partnership	Changing cultural consumption
Qualified worker power	Low international «visibility»	Cultural tourism	Economical Fluctuation

The summary table of the SWOT analysis contains an overview of internal and external factors affecting cultural institutions. Strengths are outlined, including a rich cultural heritage and skilled workforce, as well as weaknesses, including limited funding and technological integration. The Opportunities segment highlights areas for growth, including digital transformation and cultural tourism, while the Threats highlights the challenges faced, such as competition and changing cultural consumption patterns. The "Strategic Recommendations" table shows effective strategies for increasing the competitiveness of these institutions. This includes implementing digital innovations, finding different sources of funding, strengthening marketing and international cooperation, engaging the community and diversifying program offerings. Each strategy is accompanied by specific action items, providing a clear road map for implementation.

Table 2

Strategic recommendations

Strategy	Task
Digital innovation and information and educational work	Implement VR, develop a cultural portal
Financing and investments	Look for alternative financing, invest in management training
Marketing and international cooperation	Cooperate with foreign institutions, use digital marketing
Community involvement and cultural tourism	Initiate public projects, develop packages cultural tourism
Program diversification	Implement a variety of programs, regularly update exhibitions and events

Conclusions. Creative industries in Ukraine have demonstrated a significant impact on both the economy and the cultural landscape. This sector includes a wide range of activities, from traditional arts to modern digital forms such as IT and video games. Legally recognized in 2018, these industries make a significant contribution to Ukraine's GDP, employment and export services. Investments in creative sectors demonstrate a multiplier effect for the economy. The growth and support of these industries is evident through a variety of initiatives and foundations, highlighting their integral role in facilitating economic and social innovation, technological progress and improving the quality of life. The influence of creative industries is multifaceted, it affects not only direct economic indicators, but also promotes cultural tourism and community

development. And their active promotion in social practice will help Ukraine to quickly overcome apathy and social passivity, will stimulate the formation of a socially active personality that sees itself as a participant in social transformations.

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FEATURES OF THE CREATION AND DEVELOPMENT OF ORGANIZATIONS IN THE MANAGEMENT OF SOCIO-CULTURAL ACTIVITIES

Oleksandr Tadlia,
Senior Lecturer,
Science and Research Institute of Social and Economic Development, Ukraine,
tadlya@ukr.net; ORCID: 0000-0002-2576-8599

Annotation. *The article substantiates and analyzes the peculiarities of the creation of organizations as a strategic tool that can ensure an effective implementation process in the activities of the manager of the socio-cultural sphere. The factors influencing the manager's activity on the formation and promotion of the individual's own socio-cultural experience are characterized. The principles of the organization, the philosophy of which corresponds to the institutional theory, the balance between the tasks determined by the specific internal socio-economic policy and the public interests of the economic system in which this organization operates are emphasized and defined. The category "organization" serves as a fundamental basis for the formation of general explanatory principles, which are used to analyze the relationships between the subject and the object of management and other phenomena and processes. The structure, directions and forms of activity of the manager of the socio-cultural sphere, who carry out their activities while applying the principles of formation, functioning of the management system, professional experience, technologies, finances and legal components for the development of the organization, are characterized.*

Keywords: *organization, activities of the manager of the socio-cultural sphere, socio-cultural activity, principles, regularities, functions, systematic approach, socio-cultural organization.*

Relevance of the research topic. In the socio-cultural sphere, the organizational component allows you to systematize the competent actions of specialists, maintain the relationships of various structures, attract resources, and act as an effective modern management model. Management is understood as organizational activity aimed at the development of certain stages that contribute to the effective solution of tasks, being a means of direct interaction, a resource potential and, in the conditions of certain time frames, a specific systemic form of regulation of socio-cultural processes. Given that the specific feature of the manager's activity is related to the analysis, design and implementation of various measures, this aspect has the ability to be influenced by technologies that provide answers to the modern needs of the socio-cultural sphere. Thus, in determining the problematic direction of the research, it is worth focusing attention on the peculiarities of the creation and development of the organization in socio-cultural activities.

Analysis of research and publications. A modern manager of the socio-cultural sphere constantly works in an environment where he himself becomes a subject of activity. The problem of the technology of creation and development of the organization

in the activities of the manager of the socio-cultural sphere deserves constructive attention. The following scientific works are devoted to solving problematic issues related to the functioning and development of management processes in the sphere of culture and art, the development and testing of sociocultural management technologies: Kipping, M., Yusdiken, B. (2014) formulates history in the theory of organization and management ; Alaimo, K., & Kallinikos, J. (2022). reveal decentralized organizations: data objects, technologies and knowledge; Martinsuo, M., and Ahola, T. (2022) note that managing multiple projects in inter-organizational contexts; Dufour, Y., Steen, P., & Coriveau, A. M. (2018). analyze from the life cycle of the organization to the "ecocycle": a configurational approach to strategic thinking; Fairley, E., Ongaro, E. (2022). focuses on strategic management in public organizations: concepts, schools and contemporary problems; Jin, B.E., Shin, D.K. (2020) Unpacking and making sense of the competitive game changer: fashion retail industry innovation from disruptive business model; Mueller, J., Renzl, B., & Will, M.G. (2020) Characterizing Two-Way Leadership: A Meta-Review Using Static and Dynamic Multilevel Perspectives; Lis A. M., Rozkvitalska M. and Lis A. (2023) sustainable development goals and the life cycle of cooperation in cluster organizations; Martynyshyn Y., Khlystun O., Adamonene R., Dibrova V. (2020). system analysis in sociocultural management: theory, methodology and technology; Vinch, H.M., Maitorena-Sanchez, E., and Sergeyeva, N. (2022). organization of a strategic project.

Noting the importance of the scientific research of these scientists, it is necessary to emphasize that the mentioned problem requires further research, activities that allow to supplement the very nature of practical work, to identify and form competent actions of the manager of the socio-cultural sphere in the management of the organization. In particular, this concerns the prerequisites for distinguishing technologies and features of creation, clarifying individual stages and forms of activity in the socio-cultural sphere. Thus, the identified unsolved problems allow us to formulate the purpose of our work.

The aim of the study. Identify and analyze the technologies and features of the creation and development of organizations in the management of socio-cultural activities.

Presenting main material. The organization initiates and plays a special economic role in the life of society and is the main structural and socio-cultural element of market realities.

The activities of organizations have a multi-functional nature, and sometimes they have an ambiguous theoretical and methodological basis, where in the process of constant knowledge there is a conflict situation with certain contradictions between the fundamental level of cultural experience of the past heritage and specific operational practice, which is specified by real events that lead to the generation of certain concepts, which in turn substantiate the stages of its emergence and further functioning.

The theoretical description of the phenomenon "organization" can be found in various theories and purely management concepts, where the organization acts as an object of management (Kipping, M., & Üsdiken, B., 2014) [1].

The awareness of the essence of the organization is understood as such a holistic

entity that transforms initial resources into a final product, where the parameters of its production function are determined by the technological processes used for the production of this product (Alaimo, C., & Kallinikos, J., 2022) [2].

The main task facing the organization should be focused on finding such a volume of resources and their ratio, which will allow producing a sufficient number of products or, in our case, socio-cultural services. Cultural products and services in this area: television and radio programs, entertainment, thematic, game events, festivals, concerts, competitions, production shows, club events, video production, technical equipment for spectacular events, publishing, production of professional light, sound and stage equipment.

In this case, the sufficiency and necessity of provision will be determined by the ratio of the organization's marginal costs to the market price.

Thus, the function of such an organization is limited to an instrumental nature: it serves only as a "transfer link" between market demand and the conditions of resource markets for a given production technology.

Scientists emphasize the need to take into account the simultaneous pressure on the organization and its environment of factors of external and internal origin, where a dilemma constantly arises regarding the possibilities of using available resources. Each socio-cultural organization chooses its personal individual project, combining the relationships between external and internal factors, motivations for action and system limitations.

At the same time, the ascending fundamental principles, according to which the organization was created and built, as well as the initiation of management, are of particular importance (Martinsuo, M., & Ahola, T., 2022) [3]. These basic provisions are a reflection of those laws that will determine the design features of organizations and the mode of coordination of all types of its relations with both the external and internal environment.

According to this understanding of the essence of internal and external organizational processes, a number of problems that are primarily related to the life of the organization may become aggravated, namely:

- making and implementing management decisions;
- organizational structure;
- establishment of strategic targets;
- means of achievement.

According to P. Drucker, market institutions of all types, sizes, purposes and structures exist in modern society (Bijuklič, I., 2022) [4].

Institutes are characterized by the following main parameters: 1) purpose of existence; 2) field of activity; 3) meaningful content; 5) the period of time regarding the change; 6) functional expenses; 7) perception of innovations; 8) measure of stability; 9) resistance to transformations.

Thus, the purpose and target priority of an organization whose philosophy corresponds to the institutional theory is to establish a balance between the tasks

determined by a specific internal socio-economic policy and the public socio-cultural interests of the system in which this organization carries out its activities.

Institutional theory assumes that the external environment has a certain pressure on the organization and forces it to develop relevant rules that correspond to socio-cultural norms.

Therefore, the creation of an organization is conditioned by the need to increase efficiency from the use of internal connections between its members. A typical task, which is solved by the organization according to the institutional theory, can be represented as the optimization of the mode of operation in the conditions of the presence of the range of interests of the market subjects and the available asymmetric information space.

Thus, the level of efficiency of the organization and its management system will be the higher the quality of the amount of information at their disposal, and the more quickly and fully it will be used.

Today, the need for careful planning and control of general processes in the socio-cultural organization: 1) preparatory stage: study of the environment, creative possibilities, material and technical base and financial support; 2) development stage: consideration and approval of the plan of activities, operational activities and financial plan; 3) implementation and implementation of creative and production activity plans.

Therefore, the organization becomes appropriate for creation only if the operating costs are lower than the corresponding costs in open markets. According to these provisions, the organization works efficiently and is a priori competitive if the costs within it are lower than those of other market participants. Such a requirement can be achieved under the conditions of reassignment of routine non-productive work or part of it to other organizations or specialists, partial or full performance of individual management and production functions outside the organization and regulation of distributed activities in order to achieve maximum satisfaction of consumer needs.

Thus, the main task of the organization is the comprehensive reduction of operating costs, which becomes a powerful lever that ensures organizational development.

Evolutionary organizational theory has gained considerable popularity as an ideological basis for the concepts of the "organizational life cycle" (Dufour, Y., Steane, P., & Corriveau, A. M., 2018) [5]. The priority for the functioning of an organization whose internal ideology of creation corresponds to the principles of ecological theory should be the development of its own characteristics that correspond to the parameters of the external environment.

The main task of management from the point of view of the ecological model of the creation of the organization consists in the formation of one's own potential with a clear orientation to the external environment (Ferlie, E., & Ongaro, E., 2022) [6].

The problem of current efficiency comes first, that is, the transformation of existing resources and competencies into competitive advantages, rather than the development of resources and competencies that would allow generating only certain opportunities, for example, market ones.

It is extremely useful from the point of view of management, in our opinion, that the

evolutionary model is based on the principles of situationism and assumes the absence of a single criterion for optimizing management decisions. From these positions, the criterion is personified and can have both a subjective-objective and an objective-subjective character.

The most important thing in the evolutionary theory, in our opinion, is the assumption about the possibility of changing the criterion of the effectiveness of the organization's functioning and the duality of its status, namely: belonging to a certain "population of organizational formations" and the possibility of having "its own traditions in a certain direction of activity, volumes and offers of involved factors » (Grinin, L., 2022) [7].

That is, he will take into account the advantages that will be provided when making a management decision and the real mode and experience of success - failure of the organization's functioning.

The entrepreneurial model of the organization is based on the existing variety of forms of ownership and organizational and legal forms of organizations and the inevitable overcoming of contradictions, which are caused by the need to subordinate the result of the organization to the multiplicity of goals and interests of parties or stakeholders interested in its activities, that is, those who influence the activities of the organization, and those who is influenced by it Jin, B. E., & Shin, D. C. (2020) [8].

Social groups of stakeholders include: competitors; consumers of goods and services of the enterprise; territorial communities; ecological condition of the territory affected by organizational activity; resource providers and business partners; other interested groups that significantly influence the operations of the organization.

The basis of this theory is the obligation to coordinate the interests of the participants in the organization's activities. The main idea of this concept is that the results of the organization's activities have multiple subordination and are a source of problems and contradictions between the state, owners, management system and the collective. The process of prioritizing and aligning the interests of the parties involved in the distribution of the results or the final product is complex, because it is a mandatory procedure to maintain the integrity of the organization and ensure its development.

To reflect all the diversity of aspects of the organization's functioning, a concept is proposed that integrates the positives of the above theories and can be recognized as active-adaptive (Nadim, A., & Singh, P., 2019) [9]. The active-adaptive theory of the organization is based on the fact that organizations do not simply play the role of a passive observer of the changeability of the external environment, but must manage the external conditions of their functioning.

According to the theory, the achievement of the set goals takes place under the conditions of the existing potential and strategically oriented active influence on the external environment. The components of success are synergistic relationships and interdependencies between the limited available resources of the organization and the principles of their use, which correspond to the well-founded utility function of the organization's behavior.

One of the key reasons for not ensuring the effective management of the organization

- the impact of the uncertainty of the external environment on the company's activities - are eliminated or leveled, which allows managers to focus on making management decisions with the maximum usefulness of the final results.

In our opinion, the active-adaptive model of organization creation and behavior is the most promising and effective. It forms the basis for full and indisputable use of the existing potential of the organization, aggressive search for new opportunities, prevention of conflicts and problems, provides the possibility of using extensive and intensive technologies.

The extraordinary importance for maintaining the essential significance of the concept "organization", from our point of view, is that it belongs to a group of economic categories. According to the possibility of considering a concept as an economic category, it depends on the degree of its compliance with the criteria that allow to attribute this or that concept to the rank of economic categories.

The concept of "organization" acquires the status of "economic category" according to the following criteria: universality, fundamentality, interconnectedness.

The category "organization" is characterized by universality, which is manifested in the similarity of the system of subject-object and object-subject relations in the general structure of relations, including management From this point of view, the properties of internal organizational interaction should be "predictable, orderly, expedient, sustainable." This ensures compliance of the organization category with the "versatility" criterion.

At the same time, the organization acts as a "multidimensional and multispatial system." The system paradigm assumes, on the one hand, a clear identification of the organization in one of the structured meaningful spaces (economic organization, state or market institution, labor collective, focus group, etc.), and on the other hand, the organization cannot be such that it exists only in one identification space and should be considered comprehensively. A specific category, an organization can simultaneously be both an economic and a social entity Mueller, J., Renzl, B., & Will, M. G. (2020) [10].

Thus, the category "organization" serves as a fundamental basis for the formation of general explanatory principles, with the help of which the relationships between the subject and the object of management or between other phenomena and processes are analyzed. It should be emphasized that for completely independent systems, not only the types of intersystem interaction can be extremely diverse, but the interaction itself will acquire both an irrational and a rational character.

The category "organization" interconnects other economic categories. This testifies to the fact that for such a category as "organization", the changeability of its individual components determines the provision of a new meaning to the whole concept.

The identification of the organization in a new context should contribute to the acquisition of new content for other categories and their threshold values. This criterion has an extremely important theoretical and methodological significance, because it actualizes the obligation to conduct continuous research of significant parameters of the organization and its environment.

There are different approaches to the interpretation of the term "organization". It should be noted that even today the understanding of the essence of the category "organization" is a debatable issue and even one that introduces a certain dissonance into the practice of research.

The search for the most accurate definition of the essence of the concept of "organization" within the framework of the classical and neoclassical paradigms that dominated economic science, remains for scientific thought the object of the greatest attention. The version that an organization is a group of people whose activities are consciously coordinated to achieve a common goal has become the most widespread (Lis, A. M., Rozkwitalska, M., & Lis, A., 2023) [11].

This approach involves the selection of the following elements among the key elements of the "organization" category (although there are some differences in the interpretation of terms): man (society), structure, goal, technology, functions, which are the object and means of organizational transformations.

Martynyshyn, Y., Khlystun, O., Adamonienė, R., & Dibrova, V. (2020) add that it is a "systematic formation" useful, from our point of view, to ensure the completeness of the content load of the "organization" category[12] and Winch, G. M., Maytorena-Sanchez, E., & Sergeeva, N. (2022) on "the integrity of the organization as a complex of interconnected elements that organizes itself at all stages of the life cycle", their "special unity with the external environment"[13].

Thus, every social entity interpreted as an "organization" must meet the following characteristics: have at least two persons in its composition, united by a common goal, activity and conscious coordination of actions.

Summarizing the scientific-theoretical and empirical results published in the scientific literature, we will come to the conclusion that the term "organization" also exists in another context: to define activity as "ordering of all elements of a certain object in time and space" or as "an aggregate about cesses or actions that lead to the unification of elements, parts into a whole" and "the formation of a viable sustainable system", and "improvement of the relationships between the parts of the whole".

In addition, it is identified with the simple creation of a formal organizational structure as "the process of creating an enterprise structure, transferring tasks and powers to a person who takes responsibility for their implementation" and "correct selection of personnel."

In our opinion, this interpretation is more in line with the concept of "organizing". Because the term "organize" is appropriate to use when it refers to a process involving "people, their work, their efforts", on the one hand, and on the other - when it is necessary to "group people for some purpose, coordinate and regulate their actions in the spirit of expediency".

In explanatory dictionaries, you can find the cognate words organization and organize (English), organization and organizer (French), which correspond to the static "organization" and the dynamic "organize" contextual content, respectively. They have the same etymological roots and come from the Greek word oryavov "organon", which

means a device, a tool.

In our opinion, considering the organization in the context of "action" contradicts systemic ideology, because a system cannot be considered "such a set of objects that does not acquire integrity, or does not have single management subjects, or has antagonistic and conflicting relationships" .

So, the advantages of the innovative approach, which is a continuation and development of the processional, system and situational approach in management, are:

1) a fundamental basis that provides a wide range of research, where approaches are considered that are the boundaries of the whole and determine its stages within these boundaries;

2) a combination of new modern theoretical developments and their practical application to increase the effectiveness of the activities of organizations in the socio-cultural sphere;

3) the possibility, based on system forecasting, to choose the optimal way of effective development, which takes into account the unity of the mission, goals, tasks of the organization in its relations with the external environment [14].

Thus, managers of the socio-cultural sphere must confidently navigate the modern social space of actual needs, evaluate and draw up business plans, a strategy for the promotion of goods or services, or orient the socio-cultural market according to their individual values; analyze information materials, be able to turn information into a business or social component, while applying the principles of formation, functioning of the management system, professional experience, technologies, finances and legal components for the development of the organization and the realization of one's artistic project [15], [16].

Conclusions. In determining the problematic direction of our research, we focused our attention on the creation and development of the organization in the activities of the manager of the socio-cultural sphere, the features of which are: the organizational component, which allows systematizing the competent actions of specialists, acts as an effective modern model of management; managerial activity as a specific systemic form of regulation of organizational processes; a specific feature of the manager's activity, related to the analysis, design and implementation of various measures, this aspect has the ability to be influenced by technologies that provide answers to modern needs in the organization of the socio-cultural sphere.

The substantiation of the above-mentioned components was carried out taking into account the orientation of the organizational technologies of creation and the professional competencies of the manager in the socio-cultural environment.

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