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Rubna 716/24
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Východoevropské centrum
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ECONOMICS

RETROSPECTIVE OF THE HUMAN CAPITAL THEORY DEVELOPMENT

Nataliia Ivanova,
Candidate of Economic Sciences, Associate Professor,
National University of Kyiv-Mohyla Academy, Ukraine,
n53ivnova@gmail.com; ORCID: 0000-0003-4182-5829;
Artem Horilyi,
postgraduate student,
National University of Kyiv-Mohyla Academy, Ukraine,
a.horilyi@gmail.com; ORCID: 0000-0003-2043-5768

Annotation. *The challenges that Ukraine has faced in recent years have created a real threat to its existence. To effectively counter the current situation, it is required to find resources that would allow Ukraine to win the war, recover and become a free and economically developed state. One of these extremely important resources is human capital.*

The evolution of the human capital theory in the works of world and domestic scientists is investigated in this article. The main components of human capital and their importance in the multiplication of national wealth are highlighted. It is demonstrated that the origins of the evolution of the human capital theory reach the works of ancient thinkers. However, the design of the concept into a separate human capital theory took place only in the 60s of the XX century. It has been established that representatives of all schools and directions in economic science agree that human knowledge and abilities are one of the most important sources of the nation's wealth, and investments in science and education are the most promising and profitable. All these improvements serve as the important information base for modern economic science and determine the prospects for further study in this direction.

Keywords: *human capital, human capital theory, evolution of human capital theory.*

Introduction. The economic development of a country and its human capital are closely interconnected. Human capital has impact on the economic growth of a country and can contribute to the development of its economy by expanding the knowledge and skills of people. Human capital has already become the leading factor of production and occupies about 70% in the structure of the national wealth of developed countries, although in the middle of the 20th century it accounted for only 48% of the national wealth. The fact that human capital makes up the largest part of the wealth of countries with a high level of economic development, regardless of their other particularities, suggests that investing in human capital is a sound development strategy for countries. Such a significant increase in the share of human capital in national wealth is primarily due to the formation of a knowledge economy, which is the highest stage in the development of a post-industrial society. The human capital development is especially important in Ukraine, which in 2022 took 57th place in the global innovation rating [1], and the human

capital index of Ukraine in 2020 was 0.64 [2]. The studies conducted by scientists from the Ukrainian Institute for the Future show that there is a strong link between human capital and economic growth and the human capital development can help stimulate the economy. People with the best skills, the highest level of education, are in demand in the labor market and are capable of high social mobility, not only provide better labor productivity and create more high value-added products, they also receive higher incomes, respectively, spending more as well, which further stimulates the growth of the domestic market and provokes the economy. The human capital development is the correct and effective way of economic recovery and sustainable growth of Ukraine. After all, people are the main capital of the state. The above confirms the importance of developing the human capital theory, which provides the methodological foundations and theoretical basis for the successful formation and human capital development.

Study analysis and problem statement. The human capital theory is a scientific way of understanding socio-economic processes in society regarding the formation and human capital development, the organization of the use of human resources, human potential in the production of social wealth, the creation and appropriation of income by different social groups of people. The emergence and development of conceptual ideas and provisions of the human capital theory goes from the origins of the development of political economy to modern studies.

Both foreign and domestic researchers dealt with issues of human capital. The most prominent representatives of the definition of the human capital essence were American scientists, Nobel laureates T. Schultz and G. Becker. The creation of a theoretical basis for the study of human capital was facilitated by the works of W. Petty, A. Smith, D. Ricardo, A. Marshall, I. Fisher, F. Liszt, T. Veblen, R. Coase, D. North et al.

It should be noted that domestic scientists were engaged in theoretical and practical aspects of the formation of human capital. Thus, the works of A. Grishnova, D. Bogini, N. Dovbenko, A. Nosyk, N. Stativka are devoted to the methodological understanding of the category of "human capital", structuring, periodization and systematization of economic ideas of classical political economy and institutional theory, the development of their theoretical foundations, L. Tertychna, D. Melnychuk, N. Glikova, V. Antonyuk, B. Danylyshyn, G. Proshak, A. Stefanyshyn et al..

However, according to the authors, the issue of developing the human capital theory and its application in the field of public administration and the formation of human capital remains more relevant than ever.

The purpose of this article is to study the process of emergence and development of the modern human capital theory, to analyze modern scientific approaches to this category, to reveal the key conceptual provisions of the human capital theory.

To achieve the goals set, the following methods were used: historical and logical methods to clarify the patterns of formation and development of the human capital theory, the evolution of its formation; system analysis to establish the essence of the main characteristics of human capital; functional system method for the analysis of world and domestic experience in the human capital development; abstract-logical method for

formulating general conclusions and study results.

Study results. The prerequisites for the emergence of the human capital theory can be divided into two components: objective and subjective. The objective prerequisites include: the growth of interest in the labor sphere after the Second World War; scientific and technological revolution of the 60s of the XX century; intellectualization and informatization of production processes; the growth of the role of a person's personality, its level and scientific knowledge, experience and qualifications; sharp competition between the largest states for superiority in the scientific field and dominance in the economy; focusing on the problems of creating a qualitatively new labor force; increasing the role of professional and qualification training of an employee, etc. The subjective prerequisites include the development of classical economic theory (XVIII century); neoclassical direction of economic thought (XIX century); human capital theory (twentieth century).

Even Plato in his treatise "The State" noted that "people have a different nature, as well as abilities for this or that business" and "every business can be done not only in more quantity, but also better, making less effort when doing it for their natural abilities" [3, p. 60]. Aristotle also pointed out the various natural abilities of people, who noted that those who own any art are wiser than those who have experience [4]. In the treatise "The sum of theology "Thomas Aquinas noted the importance of human intelligence. He valued spiritual, mental work, emphasizing that only the intellect captures the essence of things. Thus, he put mental work above physical [5]. A. Montchretien in his work "Treatise on Political Economy" wrote that for the revival of the country's economy, among other economic measures, it is important to improve the quality of labor, which occurs through the use of vocational training of people [6].

All these developments were further developed in the works of representatives of the classical economic school W. Petty, A. Smith, D. Ricardo. Specifically, they laid the methodological foundation of the human capital theory . W. Petty in his "Political Arithmetic" was the first to attempt to investigate the influence of knowledge and education on economic phenomena and processes. His developments on the quantitative assessment of the country's economic potential and national income have taken a special place in the development of the methodology of economic science [7].

A. Smith's doctrine of the social division of labor contributed to the definition of the role of labor as a function of man in the production of society's wealth. In his work "A Study on the Nature and Causes of the Wealth of a Nation", he noted that the work that an individual learns will allow him to realize his human capital and reimburse him for all the costs of education [8]. In his works, A. Smith explores the model of economic man and speaks of productive and unproductive labor. In his opinion, it is fair that the wages of craftsmen, artisans and manufacturing workers in Europe are somewhat higher than the wages of ordinary workers involved in agriculture [8].

The representative of school A Smith, D. Ricardo continued to consider the problem of reproduction of human abilities. According to the point of view of D. Ricardo, the value of goods is determined not by how much product can be bought on the market, but

by the amount of labor embodied in them by the costs of producing a particular product. As for the process of production of human abilities, he considers a set of costs for their creation, and also determines the role of education in shaping the country's wealth [9].

The theory of labor force reproduction by K. Marx became the development of the concepts of A. Smith, D. Ricardo and other representatives of classical political economy on the human capital theory. In his work "Capital", K. Marx added a detailed definition of the concept of "labor force", by which he understands the totality of physical and spiritual abilities that an organism possesses, a living personality of a person and which he uses whenever he produces certain consumer values [10].

It should be noted that representatives of economic schools of the late XIX and early XX centuries in their works analyzed the nature of man and his/her abilities quite widely. The opinion that a person can be considered capital became more and more popular. Further, this approach is developed within the framework of neoclassical economic theory and, first of all, it concerns such areas as health care, education, family economics. We are talking about the neoclassical human capital theory , which was formed and developed in their works by A Marshall, M. Blaug, G. Becker, B. Weisbrod, J. Mintzer, R. Nelson, J. Heckman, R. Layard, F. Welch, B. Chiswick, R. Lucas, E. Phelps, T. Schultz, L. Walras, G. McLeod, S. Walsh, I. Fischer, S. Huebner and many other researchers.

T. Schultz was the first to publish scientific works on the human capital theory. We are talking about the works "Formation of the capital of education" and "Investment in human capital". In them, the scientist argues that investing in human capital will provide a significant increase in output and will become a source of growth in future earnings or satisfaction. He noted that a person acquires the properties of capital only after spending on it, aimed at improving the quality of his work. In his work "Investments in Human Capital", T. Schultz placed special emphasis on the issues of the influence of the educational level on the level of economic growth, the effectiveness of investing in a person [11].

When justifying the need to invest in human capital to generate added value in the future, Schultz focuses on five main areas: 1) medical institutions and services, including all costs that affect life expectancy, endurance, strength and vitality of people; 2) on-the-job training; 3) formal education at primary, secondary and higher levels; 4) training programs, in particular in agriculture; 5) migration of people and families to adapt to changing jobs. In addition to education, T. Schultz notes, the costs of this activity should also be attributed to human capital [11].

The concept of human capital was significantly developed in the works of G. Becker, who in 1964 published the scientific work "Human Capital: Theoretical and Empirical Analysis", for which he was awarded the Nobel Prize in Economics in 1992 [12]. G. Becker singles out knowledge, production skills and motivation in the human capital of an individual. The increase in investments in the training of future specialists and the training of qualified workers, he believes, can bring in the future no less profit than the cost of machinery. Combining traditional and alternative interpretations and using economic approach based on the principle of rational behavior of individuals,

G. Becker defined human capital as a set of innate abilities and knowledge, skills and motivations, the arbitrary use of which contributes to increase in income (at the level of an individual, enterprise or society). However, knowledge, skills and abilities in themselves are not human capital, they become it when they begin to generate income. The views of T. Schultz, E. Dolan, J. Lindsay et al. closely converge with this position.

Common in the views of representatives of the neoclassical school is the following: a person and his/her abilities, knowledge, skills are considered as capital capable of generating income for its carrier, in addition, the development of such capital is possible only if it is invested . This statement is based on the following arguments: firstly, the motives that encourage a person to accumulate human capital in the form of contributions to education, similar to those that determine the accumulation of material capital; secondly, the cost of raising and educating a person is a real cost; thirdly, the work of an educated person is more productive, which means that spending on education increases national wealth.

At the end of the XIX century, the school of institutionalism emerged from the neoclassical trend and the German historical school. To date, the classification of "Institutionalisms" has been extended into early (traditional) institutionalism and modern (new) institutionalism, represented by two main currents: neo-institutionalism and new institutional economic theory.

The emergence of traditional institutionalism is associated with the works of T. Veblen, J.R. Commons, W.L. Mitchell and J.K. Galbraith. T. Veblen, considering the ways of formation and evolution of various social institutions, formulates a peculiar model of a person, which is fundamentally different from the model of "economic man" that prevailed in the economic science of that time.

According to T. Veblen, some innate instincts lie at the basis of human behavior: parental, i.e.. According to some researchers [14, 15], the new institutional economic theory creates methodological prerequisites and provides certain tools for the human capital development. The methodology of the new institutional economic theory is based on clarifying the types and nature of institutions with the help of the interests and behavior of individuals who use them to coordinate their activities. The individual becomes the starting point in the analysis of human capital institutions. In turn, the features of choice theory depend on the use of the concept of rationality (full or limited).

It must be emphasized that representatives of institutionalism do not offer a new approach to the definition of the category of "human capital". They noted the need to use the achievements of the social sciences (sociology, psychology, anthropology and law), supplemented the "hard core" of neoclassical theory with the concepts of collective actions of institutions, economics of expectations, incomplete information, etc.; approached the definition of the tasks of economic science in a new way. For example, the founder of the socio-psychological direction E. Veblen believed that the task of economists is to study the norms, customs and habits, as well as their evolution in order to interpret decisions made by economic agents under any circumstances. The founder of the socio-legal direction of institutionalism, J. Commons, focused on the

analysis of the legal foundations for the functioning of the economic system. In the future, the human capital theory was developed by such well-known foreign scientists as M. Fischer, M. Blaug, L. Turow et al.

However, according to Ukrainian researcher D.A. Tereshchenko, despite different approaches, the basis for combining the above theories and schools into a single institutional direction is the similarity of methodology, which is characterized by an emphasis on change, the principle of combining economic and humanistic approaches to the definition of the concept under study, the dynamism of public (economic, political, social and cultural) structures and society as a whole and the use of a similar categorical apparatus with special reliance on "social institutions" [16].

Summarizing the above, it should be noted that the works of representatives of classical political economy, neoclassical and institutional theories act as a theoretical basis for a deeper understanding and allow us to determine the main methodological features of the human capital theory, notes D.A. Tereshchenko in his article "The Genesis of Scientific Approaches to the Human capital theory ":

1. Using the interdisciplinary approach to consider the processes of formation and human capital development with the involvement of data from psychology, philosophy, political science, sociology, etc.;

2. Compliance with the principles of methodological holism (integrity), historicism (identification of the main trends in social evolution, driving forces and factors of development); institutional determinism (the degree of development of institutions is considered both as a determinant of development and its stabilizing factor);

3. Focusing on the determining role of the state in the process of transforming institutions for the human capital development, on the change and mobility of individual components of human capital; awareness of the need for purposeful investment in a person and the study of the problems of public administration in the formation and human capital development;

4. Understanding society as the organic whole, consisting of separate groups and institutions, each of which plays its own functional role; strengthening in the methods of study of "human dimensions", attention to the real, and not to the "economic man"; refusal to understand the market as a neutral and universal mechanism for allocating resources; requirement of social control over social infrastructure;

5. Combination of economic and humanistic approaches to the definition of the concept under study [16, pp. 97-98].

As for domestic study, the human capital theory has received wide recognition among scientists. The beginning of the study of the problem of human capital by Ukrainian scientists and the development of this theory in the context of the characteristics of national socio-economic development dates back to the second half of the 90s. In modern Ukrainian economic literature, human capital is considered as a fundamental category. Questions of the essence, structure, trends in the formation, development and accumulation of human capital in the domestic scientific literature are considered by V. Antonyuk, V. Bliznyuk, O. Borodina, N. Glikova, A. Grishnova, D. Boginya,

B. Danylyshyn, G. Zelinska, I. Kaleniuk, V. Kutsenko, L. Tertychna, A. Chukhno et al.

The comprehensive Socio-economic analysis of the category "Human capital" was carried out by A. Grishnova. In the monograph "Human capital: formation in the system of education and training" the author conducted a deep study of the essence of the category of human capital, analyzed the current state and development trends of human capital in Ukraine, substantiated the economic role of education and training for the formation and accumulation of human capital, considered foreign experience economic support of education, the influence of the level of education on employment and the amount of income of workers has been studied. According to A. Grishnova, human capital is the economic category that characterizes the totality of the productive abilities, personal traits and motivations of individuals owned by them that have generated and developed as a result of investments, are used in economic activity, contribute to the growth of labor productivity and, due to this, affect income growth (earnings) of the owner and state income. [17, pp. 16-17]. Therefore, in her opinion, human capital is the category that should take its rightful place in the domestic economic culture.

Some Ukrainian researchers have noted the relationship of social and economic phenomena in the definition of human capital. Thus, Kutsenko and Yevtushenko consider human capital as "a set of knowledge, abilities and qualifications, as the ability of a skilled workforce to create profit in the form of a part of the wages and profits of enterprises" [18, p. 136].

O. Borodina considers human capital as a set of invested socially expedient production and general human skills, knowledge, abilities possessed by a person, which belong to him/her, are inseparable from him/her and are practically used in everyday life [19, p.51], adding that human capital is intangible goods of long-term use, which are accumulated and realized as a result of the creative activity of people over time.

In her publications, I. Kaleniuk considers the concept of human capital in terms of social and economic positions. She notes that a person himself cannot be an object of economic analysis, an assessment of human value, therefore it should not be reduced to an economic category, and the stock of knowledge, skills, abilities and other qualitative social characteristics should not be interpreted as human capital, since the category "capital expresses a system economic relations. According to her, "only the inclusion of a certain set of abilities and acquired knowledge of a person in the corresponding system of socio-economic relations allows us to identify them as capital." Based on the above. And Kaleniuk gives the following definition of human capital: "It could be defined as a value advanced and materialized in the form of a stock of knowledge, information, experience, skills, motivations and health, which have the property to bring more income" [20, pp. 67-68].

N. Golikova also interprets the concept of human capital in a socioeconomic context, namely as the value of a stock of abilities, experience and knowledge involved in the management system and capitalized on the basis of employment relations, capable of generating added value (profit) [21, p.9].

She notes that the category of "human capital" arises in the conditions of the formation

of the information-technotronic economy, in which talent, abilities and knowledge become the main production resource. Conducted by N. Golikova microanalysis of the economy of Ukraine led to the conclusion that the main reason for the significant decline in production in 1991-1998. there is the underutilization of human capital, its organizational, political and organizational and technical capabilities: miscalculations in the organization of the management of the transition to developed market relations and free enterprise, a policy of ignoring the factors of technological progress and, as a result, underutilization of production capacities, shutdown of enterprises, unemployment and devastation in general. However, N. Golikova proves that since 2000 a new quality of human capital has been emerging in Ukraine: the proportion of university graduates in socio-economic disciplines has increased significantly, which contributes to improving the quality of management of both public and private enterprises, but the fixed assets that are introduced into operation, which does not compensate for the reduction in labor resources in GDP growth, which indicates their insufficient productivity.

L. Tertychna is also engaged in the study of social problems of human capital formation. In her publications, she analyzes the relationship between innovative development and human capital, taking into account the socio-economic state and the specifics of the processes of transformation of society in Ukraine; considers the features of the main types of investment in human capital and the factors affecting its formation and functioning in the domestic economy, since investments in human development at all levels are an effective source of growth not only in the economy, but also in the standard of living, which will provide Ukraine with a worthy place in the world of civilization [22, p. 179].

G. Zelinska investigates the regional features of the formation and implementation of human capital, its various components, namely: demographic, educational, environmental, and labor. With the help of an expert survey of young people in higher educational institutions of Ivano-Frankivsk, conducted by a scientist, a connection between the market of educational services and the regional labor market was established [23, p.9].

The significant contribution to the development of the modern concept of human capital was made by V. Antoniuk. In the monograph "Formation and use of human capital in Ukraine: socio-economic assessment and ensuring development", the scientist presents the results of a comprehensive study of the socio-economic foundations of the formation of human capital in Ukraine and the results of its functioning, determines the ways of its accumulation and effective use; provides an assessment of the amount of human capital in Ukraine and its impact on the economic, innovative, and social parameters of the country's development; analyzes the sources and volumes of investments in the human capital of Ukraine at the macro and regional levels; determines directions of increased interest of the state, enterprises and the population in increasing investments in human capital [23].

Analyzing the evolution of the human capital theory, it is worth emphasizing that it occurred simultaneously with the understanding of the essence of such categories as "capital" and "human capital". Yes, Davidyuk T.V. in the article "Analysis of the

category “human capital” in relation to the etymology of the concept of “capital”” notes three approaches to the essence of capital. The first approach: determination of the material capital base. Representatives of this approach define capital as a set of means of production. The second approach: definition of capital from the point of view of its monetary nature. Capital is considered as a collection of various forms of money, securities, the movement of which generates income in the form of interest. And the third approach: definition of capital as a social relation. Representatives of this approach consider capital as a relationship between people in the process of production based on property relations regarding the reproduction of the economic system and profit, regulated by the system of interests of the subjects of such relations [25].

In accordance with the change in the essence of the “Capital” category, there is a change in the place of human capital. Thus, the physiocrats point out that a person is the owner of “labor power”, a participant in labor activity, which is ensured by the right to property capital. A. Smith defines human capital as the acquired or useful abilities of all residents or members of society, that is, human capital is part of the basic capital. Zh.B. Sei points out that human capital is entrepreneurial abilities that are involved in the creation of value in the production process and create added value, that is, they are also part of fixed capital. K. Marx talks about a specific commodity “labour power”, the feature of which is the ability to create added value greater than its own, which is a consequence of the functioning of labor power, its union in the production process with the means of production. And Fisher refers to capital as any ability, special capabilities and characteristics of a person [25].

Summarizing the results of the study of the evolution of the human capital theory , M. Khromov gives the following definition: “Human capital is a socio-economic category that characterizes the totality (system) of social relations by appropriate, conscious and professional use in the process of production and formation of new value in a certain economic sphere activities acquired naturally, formed and developed as a result of investments, embodied in a person and accumulated by him certain reserves of health, knowledge, abilities, skills, experience, motivations, own personal qualities and other productive abilities that belong to him by property rights, which contributes the growth of labor productivity and incomes of the subjects of the process of using human capital and the person itself, as well as the achievement of the ultimate goal of social development - increasing human well-being, socio-economic development of society and human development in general” [26, pp. 170 - 171].

So, the human capital theory defines the goal of national production to ensure the quality of life, that is, the creation of conditions for the all-round development of a person, emphasizes A. Chukhno, thereby identifying it with the theory of human development [27, p. 95]. At the same time, G. Mankiv believes that “human capital is the knowledge and qualifications that employees receive through education, from initial children’s programs to on-the-job training” [28, p. 144].

In the article devoted to the genesis of scientific approaches to the human capital theory, D.A. Tereshchenko notes that “the works of representatives of classical political

economy, neoclassical and institutional theories serve as a theoretical basis for a deeper understanding and allow us to determine the main methodological features of the human capital theory " [16, p. 97].

Conclusions. Over a long period of study, the human capital theory has undergone certain changes and it would be more expedient to qualify them as the gradual development of economic science. On the basis (and not in contradiction) of the foundations of classical political economy, T. Schultz and G. Becker proposed a scientific justification for the new economic category "human capital". During the last decades of the 20th century, Western economists developed a methodology for studying human capital. The human capital theory has undergone further development in the scientific works of modern researchers, including domestic ones. The most conceptual characteristics of human capital as the economic category were developed, its interrelations with other economic categories were studied, cost aspects of evaluation, features of formation in modern conditions of socio-economic development, etc. were proposed.

References:

1. Informational materials on the state of innovative activity. URL: https://www.me.gov.ua/Documents/Print?lang=uk-UA&id=69b9a9bf-5fbc-4035-8c0f-ac26b853c0eb

2. The importance of human capital development in the modern world. What should be Ukraine's strategy. (Ukrainian Institute of the Future) URL: https://uifuture.org/publications/vazhlyvist-rozvytku-lyudskogo-kapitalu-u-suchasnomu-sviti-yakoyu-maye-buty-strategiya-ukrayiny/

3. Plato. State/ Plato: trans. from ancient Greek and comments by D. Koval. - K.: Osnovy Publishing House, 2000. - 355 p.

4. Aristotle. Metaphysics / Aristotle: 2020. – 370 p. URL: https://folio.com.ua/system/books/samples/000/002/214/original/%D0%90%D1%80%D1%96%D1%81%D1%82%D0%BE %D1%82%D0%B5%D0%BB%D1%8C_%D0%9C%D0%B5%D1%82%D0%B0%D1%84%D1%96%D0%B7%D0%B8%D0 %BA%D0%B0.pdf?1589358090

5. Thomas Aquinas. Compedium of theology / St. Thomas Aquinas; trans. from Latin: Kotusenko V. et al. [prev., p. 7 – 40, Jean-Pierre Thorel]. - K.: Romanyuk M.G.: Religious Institute. Sciences of St. Volumes of Aquinas, 2011. – 423 p.

6. Mytsyuk O. K. History of political economy [Electronic resource] / O. K. Mytsyuk. - Electron. text. data. – Podebrady, 1922. – T. 1. – 254 p. - with. 155: Antoine Montcretien. URL: http://diasporiana.org.ua/politologiya/12096-mitsyuk-o-istoriya-politichnoyi-ekonomiyi-t-1/

7. E. E. Slutsky on Sir William Petty: A Short Essay On His Economic Views—Kiev, 1914

URL: https://www.tandfonline.com/doi/abs/10.1080/09557570500183587?journalCode=cjht20

8. Smith A.A. An Inquiry into the Nature and Causes of the Wealth of Nations. Illustrated

URL: https://pocketbook.ua/ua_ua/an-inquiry-into-the-nature-and-causes-of-the-wealth-of-nations-illustrated

9. David RicardoOn the Principles of Political Economy and Taxation Batoche Books 52 Eby Street South, Kitchener, Ontario. N2G 3L1 Canada email: batoche@gto.net

URL: https://socialsciences.mcmaster.ca/econ/ugcm/3ll3/ricardo/Principles.pdf

10. Marx K., Engels F. Create. - 2nd view. - In 30 volumes / Marx K., Engels F. : per. from the 2nd dew. View. - K .: Derzhpolitvidav URSR, 1963. - T. 23. - 847 p.

11. Shultz T. Investment in Human Capital / T. Shultz/ - N.-Y., L., 1971/ - 272 p.

12. Becker G.S. Human Capital: Theoretical and Empirical Analysis / G.S. Becker. - N.-Y., 1964/ - 356 p.

13. History of economics and economic theories: textbook / V.O. Syvokon, N.V. Stativka, V.L. Minenko et al.; for ag. Ed.. Candidate of Economic Sciences, Associate Professor. V.O. Syvokonya, d.gov. manager, prof.. N.V. Statistics. Kharkiv: KharZSh Publishing House of NADU «Master», 2019. 620 p.

14. North D.C. Institutions, Institutional Change and Tconomic Performance. England: Cambridge University Press, 1990. URL: https://books.google.fr/.../Institutions_Institutio

15. Williamson O.E. Economic institutions of capitalism: Firms, marketing, contracting. Kyiv: Artek, 2001. 472 p.

16. Tereshchenko D.A. The Genesis of scientific approaches to the theory of human capital / D.A. Tereshchenko // Public administration and customs administration - 2019. - #4 (23). - with. 90-101.

17. Grishnova O.A. Human capital: formation in the system of education and professional training / O.A. Grishnova. - K.: T-vo «Knowledge», KOO, 2001. - 254 p.

18. Kutsenko V.I. Human capital as a factor of social protection of the population: problems of strengthening / V.I. Kutsenko, G.I Yevtushenko // Employment and the labor market: interdepartmental. Science coll. – 1999. - No. 10. - with. 136-145

19. Borodina O. Human capital as the main source of economic growth / O. Borodina // Economy of Ukraine. - 2003. - No. 7(500). - p. 48-53

20. Kalenyuk I. Education in the market environment and non-economic values / I. Kalenyuk // Economy of Ukraine. 2003. - #7. P. 67-73.

21. Golikova N.V. Human capital as a factor of economic growth and development: autoref. Diss.. for obtaining sciences. candidate degree Economics of Science / N.V. Golikova - K.: Institute of Economic Forecasting. NAS of Ukraine, 2004. – 24 p.

22. Tertychna L.I. Innovative development and human capital / L.I. Tertychna // Bulletin of the Khmelnytskyi National University. Economic sciences. – 2005. - No. 2, volume 2. - with. 179 -183.

23. Zelinska G.O. Regional features of the formation and realization of human capital: autoref. Diss.. for obtaining sciences. Bachelor's degree in economics. Science: special. 08.09.01 / G.O. Zelinska / NAS of Ukraine, Institute of the Region. Research - Lviv, 2004. - 21 p.

24. Antonyuk V.P. Formation and use of human capital in Ukraine: socio-economic assessment and development support: monogr./V.P. Antonyuk / National Academy of Sciences of Ukraine, Institute of Industrial Economics. - Donetsk, 2007. - 348 p.

25. Davidyuk T.V. Analysis of the category «human capital» in relation to the etymology of the term «capital». URL: https://library.ztu.edu.ua/e-copies/Zbirnyk/Problems_%20 accounting_1_13/49.pdf.

26. Khromov M. Evolution of the theory of human capital / M. Khromov // Bulletin of TNEU. - 2011. - No. 2. - pp. 170 – 171.

27. Chukhno A.A. Modern economic theories: a textbook / A.A. Chuhno, P.I. Yukhymenko, P.M. Leonenko / edited by A.A. Chuhna - K.: «Knowledge» Publishing House, 2007. - 878 p.

28. Mankiv N.G. Macroeconomics: a textbook [for Ukraine]: trans. from Eng.. / Science. ed.. trans.. S. Panchyshyna. - K.: Osnovy Publishing House, 2000. - 588 p.

KEY ASPECTS OF PROJECT IMPLEMENTATION OF LOCAL AND REGIONAL PROGRAMS

Anton Hayduk,
postgraduate student,
National University of Kyiv-Mohyla Academy, Ukraine,
agajduk34@gmail.com; ORCID: 0009-0009-4094-2135

Annotation. *This scientific article examines key aspects of project implementation of local and regional programs. It focuses on the importance and impact of local and regional programs on the economic, social, technical and environmental development of individual territories. The article examines the main stages of planning, implementation and monitoring of the implementation of such programs, as well as the success factors and challenges faced by the organizers and participants of these projects.*

Keywords: *local and regional programs, project implementation, territorial development, project financing, partnership.*

Introduction. Local and regional programs are an important tool for stimulating the development of a certain area. They contribute to the development of infrastructure, improving the quality of life of residents, increasing the competitiveness of the region and attracting investments. However, for the successful implementation of such programs, it is necessary to take into account various aspects. The purpose of the study is a deep and comprehensive substantiation and analysis of factors affecting the successful implementation of projects of local and regional programs. Domestic scientists deal with topical issues of implementation of local programs and projects and have a significant scientific contribution to this field: A. Vrzhesnevskyi – specializes in the study of regional programs and development of territories; O. Kutovyi – investigates the implementation of local programs in the field of territorial development; O. Izmailova – specializes in researching local development programs and projects; O. Zaitseva – studies the implementation of local programs in the field of economy and development; T. Kushnir - specializes in the research of social programs and development policy. Their research can be useful for in-depth study of this topic.

Results of research. The implementation of projects of local and regional programs requires attention to several key aspects for the successful completion of tasks and the achievement of the program's goal:

1. Strategic planning. Proper strategic planning is the foundation of any program. Defining the goal, objectives, success indicators and evaluation criteria helps ensure clarity and focus of the project. Planning must also take into account the needs and expectations of stakeholders and ensure the efficient use of resources.

2. Community participation. Community involvement is an important aspect of successful implementation of local and regional programs. Dialogue with the public and stakeholders helps to take into account diverse views, ensures support and involvement

in the project. Community involvement can also improve decision-making and ensure sustainability of outcomes.

3. Financing and budgeting. One of the key aspects of project implementation is securing financing. Clear budgeting allows you to effectively allocate resources and plan expenses. It is also important to ensure stable financing for the entire period of project implementation.

4. Project management. The use of project management methodologies (such as PRINCE2, Agile, etc.) helps to organize work, manage risks, establish control mechanisms and ensure that tasks are completed on time.

5. Monitoring and evaluation. Careful monitoring of the program implementation process and assessment of its results allows timely identification of problems, making corrections and ensuring compliance of the achieved results with the specified goals.

6. Involvement of partners. Collaboration with various partners, such as non-profit organizations, businesses, academic institutions, etc., can increase the impact of the program and provide access to additional resources and expertise.

7. Constancy and heredity. Ensuring the sustainability of the program after the end of the funding period is an important goal. Transfer of knowledge, skills and resources should be ensured, as well as a plan for further support of the program should be developed.

8. Communication. Clear and effective communication with all stakeholders helps to maintain interest in the program, avoid misunderstandings and ensure public support [1].

Ensuring the implementation of these key aspects contributes to the successful implementation of projects of local and regional programs and ensures the achievement of their goals.

I. Analysis of needs and purpose of the program. Before developing and implementing a local and regional program, it is necessary to conduct a thorough analysis of the needs and priorities of the target audience. Such an analysis will help determine the main areas of activity and goals of the program, as well as justify the necessary resources for the successful implementation of projects. We have outlined the general steps of the needs analysis and the purpose of the local development program.

The first step is to collect and analyze data about the community or area. These can be data on the demographic situation, economy, education, infrastructure, environmental conditions and other relevant indicators. It is important to understand the strengths and weaknesses of the region and identify the problems that need to be solved.

The next step is to identify needs. Based on data and consultation with relevant stakeholders (local residents, business community, public organizations, etc.), the main needs and problems faced by the community are identified.

Based on the identified needs, the purpose of the local development program is being developed. It can be increasing access to education and training, developing local enterprises, improving infrastructure, preserving the environment, providing access to healthy drinking water, improving the quality of life of the population, etc. The program may also target certain vulnerable groups, such as youth, the elderly, the disadvantaged or the disabled [2].

Development of strategy and goals. Formulate specific goals that the program should achieve and develop a strategy to achieve them. Determine measures of success by which the effectiveness of the program will be evaluated.

Selection of methods and tools. Consider possible methods and tools that will help to achieve the defined goals. These can be support programs, financial measures, trainings, infrastructure development, involvement of partners, etc.

Assessment of resources. Estimate the necessary resources for the implementation of the program, such as finance, personnel, technical facilities, expertise, etc.

Involvement of interested parties. Communicate the local development program to all stakeholders and solicit their support and feedback. Take into account the opinion of citizens and create opportunities for their participation in the development of the territory.

Monitoring and evaluation. Regularly monitor and evaluate the performance of the program to ensure that it is achieving the planned objectives and adjust it if necessary.

It is important to remember that the local development program must be adapted to the specific needs and characteristics of the local community, as well as take into account changes in the socio-economic context and territorial situation.

II. Funding mechanisms. Effective funding is a key factor in the success of local and regional programs. The article analyzes various sources of funding, such as state budget funds, international grants, investments, and public-private partnerships. Attention is paid to the involvement of the private sector and the role of banks in financing programs.

Financing of projects of local and regional programs can be carried out from various sources and with the help of various mechanisms. Here are some of the most common financing mechanisms for such projects:

− budget allocations. Local and regional programs can receive funding from the state or local budget. This can be provided in the form of grants, subsidies, subventions or other types of financial support;

− investment loans. Local governments or regional organizations can attract investment loans from commercial banks or financial institutions to finance projects. Such loans may be repaid from project profits or other sources of funding;

− European and international funds. In some countries and regions, European or international funds may be available that provide financial support for the implementation of various projects aimed at the development of local territories, economy, infrastructure, etc.;

− partnerships and sponsorships. Local organizations and businesses can enter into partnerships with state or regional institutions to co-finance projects. Also, they can attract sponsorship from private companies.

− public-private partnerships (PPP). This is a mechanism by which government organizations cooperate with the private sector to implement projects. The private sector invests financial resources in the project, and the state can provide benefits, land plots, permits or other benefits;

− crowdfunding. An innovative way of attracting funding, where the public can provide financial support to projects through online platforms;

− financing through international organizations. Local and regional projects can also receive financial support through cooperation with international organizations such as the World Bank, the European Bank for Reconstruction and Development (EBRD), UN agencies and others [3].

These mechanisms can be applied separately or in combination depending on the type of project, its scale and the resources available for implementation.

III. Partnership and cooperation. The successful implementation of local and regional programs requires broad partnership and cooperation between various stakeholders, such as government bodies, civil society organizations, the business environment and international partners.

Involvement of various stakeholders and joint activities between various organizations make it possible to ensure the success and effectiveness of projects. Here are some aspects to consider when implementing partnerships and collaborations:

− involvement of the public. It is important to take into account the interests and needs of the local population, because programs that are supported by the community have a better chance of success. Public involvement through public consultations, public meetings and other forms of feedback help build support and trust for the project;

− cooperation with local authorities. Partnering with local authorities, such as local municipalities or regional governments, allows you to get the necessary support and permission for the implementation of the project. In addition, local authorities may provide additional resources and expertise;

− private sector. Cooperation with the private sector can provide additional financial resources for the project and provide access to technology and innovative solutions. Public-private partnerships can be particularly useful in this context;

− non-profit sector. Civil society organizations, charitable foundations, voluntary organizations and other non-profit organizations can also be important partners in the implementation of projects. They may have specialized expertise and connections with the community that contribute to more successful implementation of projects;

− international organizations. Cooperation with international organizations can help ensure access to international funding and expertise. Such organizations can provide support in the form of grants, technical assistance, knowledge and networks;

− academic and research organizations. Cooperation with universities and research centers can help provide research support for the project, the introduction of new technologies and innovations, and also increase the degree of project effectiveness [4].

Successful collaboration between different stakeholders allows resources, knowledge and expertise to be combined to achieve common goals, ensuring greater impact and sustainability of local and regional programs.

IV. Monitoring and evaluation of results. Effective monitoring and evaluation of results is an important stage in program implementation. Methods and tools for collecting data, assessing progress and identifying achievements are analyzed. This approach makes it possible to make timely adjustments to the projects and ensure the compliance of the program with the planned goals.

Monitoring and evaluation of the results of the implementation of local and regional

programs are critical stages that allow us to understand the effectiveness and impact of programs on target groups and territories. These processes help identify achievements and problems, make necessary adjustments and improve future programs. Here are some key aspects of monitoring and evaluating results:

− definition of indicators. Defining clear, specific and measurable indicators allows establishing qualitative and quantitative indicators of program success. These can be indicators such as the number of involved participants, costs, time of completing tasks, changes in socio-economic indicators, etc.;

− data collection and analysis. Establishing a data collection system on the progress of program implementation is an important stage of monitoring. This can be done through surveys, interviews, statistical data analysis, observation and other information gathering methods. After data collection, their analysis is carried out to understand the degree of achievement of the program goals;

− expert evaluation. Involvement of experts who have experience in the field of the program can help to make an objective assessment of its results. Experts can give their recommendations for improving the program and identify possible problems;

− determination of impact and effectiveness. Evaluation of impact and effectiveness helps to find out to what extent the program contributes to the achievement of the set goals and the development of the region or locality. This may include examining changes in socio-economic development indicators that are associated with the program;

− publication of results and involvement of the public. Clear communication about the results of monitoring and evaluation allows for the involvement of the public and stakeholders. Publishing data helps ensure transparency and interaction between program implementers and the community;

− adjustment and improvement of efficiency. Based on the obtained results of monitoring and evaluation, adjustments can be made during the implementation of the program or in the preparation of future programs. This helps to increase efficiency and achieve greater impact [5-6].

Monitoring and evaluation are an integral part of the life cycle of programs and help to ensure efficient use of resources and achievement of set goals.

V. Challenges and prospects. The article also highlights the challenges that local and regional programs may face, such as bureaucratic obstacles, insufficient funding, political instability, etc. On the one hand, these challenges can complicate the implementation of projects, but on the other hand, they create opportunities for the development and improvement of programs [7].

Achieving program success requires clearly defined metrics and indicators that measure results. Also, it is necessary to take into account the opinions and needs of the community, involving them in the process of monitoring and evaluation. Engagement with various stakeholders, such as local authorities, the private sector, the non-profit sector and international organizations, also helps to ensure the successful implementation of programmes. Assessment of impact and effectiveness allows you to understand how effectively the programs affect the socio-economic development of the region or locality. Publication of results and public involvement help ensure transparency and

accountability in program work. Taking into account the obtained results of monitoring and evaluation allows to make the necessary adjustments during the implementation of the program or the planning of future programs. This helps to increase efficiency and achieve greater impact on target groups and regions.

Conclusions. Successful implementation of local and regional projects requires an integrated approach, effective planning, financing, interaction with the community, communication and involvement of experts. It is also necessary to ensure systematic control over the progress of the project and risk management. Government support can be a significant help in the implementation of large-scale projects. Planning is a key stage in the implementation of local and regional projects. A clearly formed action plan helps ensure the organization of the process and avoid delays. Funding is a necessary factor for the success of the project. Provision of stable and sufficient financial resources allows to perform tasks according to the plan. Interaction with the community is important. The active participation of local residents and the involvement of their opinion helps to create a project that meets the needs of the community. Effective communication with all parties of the project helps to resolve problems and conflicts that may arise during implementation. Involvement of experts from various fields ensures high quality of work and reduction of risks. A monitoring and evaluation system helps track progress and ensure timely corrective actions. Government support provides additional resources and political level support. Risk management is an important element for successful project execution.

References:

1. Decentralization (2020) Monitoring decentralization of power and reforming local self-government on 10.01.2020. Kyiv. Available at: https://decentralization.gov.ua/ uploads/ library/ file/526/10.01.2020.pdf

2. Chorna O. Ju., Chornyj V. O. (2018) Concepts and main features of the amalgamated territorial communities of Ukraine. Proceedings of the Technology 2018: XXII (Ukraine, Severodonetsk, April 20-21, 2018). Severodonetsk: Volodymyr Dahl East Ukrainian National University, pp.155–157.

3. Rach V. A., Rossoshansjka O. V., Medvedjeva O. M. (2010) Project management: practical aspects of implementing regional development strategies. Kyjiv: «K. I. S.». [in-Ukrainian].

4. Mamatova T. V., & Hladka O. M. (2020) Innovative approaches to the administrative services' providing system development in the conditions of decentralization. Public administration and local self government, 1(44), 86-91. [inUkrainian].

5. The State Fund for the Promotion of Local Self-Government in Ukraine. URL: www. municipal.gov.ua.

6. What are grants and what are they like. URL: http://www.zomc.org.ua/granti-programi-stazhuvannya/yak-otrimati-grant/item/1072-shcho-take-hranty-i-iakymyvony-buvaiut

7. Sustainable development strategies. URL: https://translate.google.com/ translate?hl=ru&sl=uk& u=http://www.ua.undp.org/content/dam/ukraine/docs/ SD%2520Project_Ukraine_version%25203–2-1.pdf% 3Fdownload&prev=search

ORGANIZATIONAL AND ECONOMIC MECHANISM OF IMPLEMENTATION OF STATE INFORMATION POLICY

Denis Dubovik,
recipient of the third educational and scientific level of higher education
Higher Educational Institution «Academician Yuriy Bugay
International Scientific and Technical University», Ukraine
dubovik202@ukr.net; ORCID: 0009-0009-6034-6322

Annotation. *The article examines the concept, structure and main aspects of the organizational and economic mechanism for the implementation of the state information policy, as well as approaches to its optimization. The key elements of such a mechanism are discussed, including the legal framework, organizational structure, economic and technical instruments.*

Keywords: *state information policy, organizational and economic mechanism, economic tools, organizational structure, digital literacy, information security.*

Introduction. In modern conditions of globalization and rapid development of information technologies, the role of state information policy is becoming increasingly important for every country. Information processes determine the development of socio-economic systems, shape the international image of the state and influence the quality of life of its citizens. In this regard, the study, development and implementation of effective mechanisms for the implementation of state information policy becomes an urgent task for state administration. In the context of growing cyber threats and information wars, an effective mechanism for the implementation of state information policy is a key factor of national security. The country's integration into the world economy, attractiveness for investors and the development of innovative industries depend on the implementation of the state information policy. Information policy affects the formation of civic consciousness, the cultural image of the country and ensuring the rights of citizens to access quality and objective information. Taking into account the rapid development of IT technologies, artificial intelligence and other innovations, the formation of an effective state information policy is necessary for the state's adaptation to changes and use of the opportunities they offer. Thus, the organizational and economic mechanism of implementation of the state information policy is of strategic importance for the development and security of the state, which makes this topic relevant for research in scientific and practical aspects.

Results of research. The organizational and economic mechanism for the implementation of the state information policy is a key tool for achieving strategic goals in the field of information technologies, communications and the development of the information society in the state. It includes a complex of regulatory, organizational, economic and technical means aimed at the implementation of information policy. The main components of the organizational and economic mechanism include:

1. Regulatory and legal framework. Laws, decrees, regulations, etc., which

determine the main principles, tasks, functions and powers of state bodies in the field of information policy.

The regulatory and legal framework is one of the key elements of the organizational and economic mechanism of implementing the state information policy. It consists of a complex of laws, resolutions, regulations, directives and other normative documents that regulate activities in the field of information technologies, communications and information security at the state level. The main aspects covered by the legal framework: principles and tasks (definition of the main principles and tasks of the state information policy); standards and norms (establishment of standards of quality, availability and security of information resources and services); information protection (legally regulated system of information protection, including personal data of citizens); responsibility (establishing types of responsibility for violations of legislation in the field of information technologies and communications); support and development (legislative acts that stimulate innovation, research and development in the field of IT); international cooperation (norms regulating international cooperation in the field of information and communications) [1-2].

In order to create an effective legal framework, it is important to: adapt to changes (in a world where technology is developing rapidly, legislation must remain flexible and meet modern challenges); harmonization with international standards (adherence to international standards and agreements can contribute to international cooperation and integration); interaction with the community (it is important to involve experts, business, and the public in the process of forming information policy in order to take into account the interests of various parties); development and implementation of the legal framework requires a systematic approach, cooperation with experts and constant monitoring of its effectiveness.

2. The organizational structure. Responsible state bodies, institutions, enterprises and other entities that ensure the implementation of information policy. The organizational structure of the organizational and economic mechanism for the implementation of the state information policy involves a set of state and non-state structures that interact to achieve the goal of the information policy. This structure may include: an executive authority in the field of information policy (for example, the Ministry of Information Technologies or the Ministry of Communications); specialized sub-departmental agencies and administrations responsible for specific areas: Internet regulation, digital broadcasting, information security, etc.; regulatory bodies that control the provision of standards, licensing and other aspects of IT activity; research institutes that carry out analytical work, develop new technologies and strategies for the development of information policy; educational institutions that train specialists in the field of IT and ensure the preparation of citizens for life in a digital society; public councils and advisory bodies, including representatives of business, the public, experts, to ensure a broad dialogue in the formation and implementation of information policy; partnerships with the private sector, such as associations of entrepreneurs, coalitions, clubs, which contribute to the implementation of the state information policy through cooperation

with the state; international organizations and partnerships for cooperation with other countries in the field of information technologies and communications; the effectiveness of the organizational structure largely depends on the quality of coordination of actions between its various elements, as well as on the ability to quickly respond to external challenges and internal needs of society [3].

3. Economic instruments. Budget allocations, tax incentives, grants, loans, investments, etc., which are aimed at supporting the implementation of information policy. Economic tools are important components of the organizational and economic mechanism of implementing the state information policy. Their use is aimed at stimulating, regulating and controlling activities in the field of information technologies and communications. The main economic tools include: budget allocations (direct funding from the budget to support the development of IT infrastructure, educational programs, scientific research, etc.); tax benefits (reduction or postponement of taxes for enterprises that invest in the development of innovative technologies or conduct research); grants and subsidies (providing financial support to specific projects, organizations or initiatives in the field of information technologies); credit programs (provision of loans on favorable terms for the development of technologies, creation of new products or services); investment support (stimulation of foreign direct investment in the field of IT and communications); licensing and concessions (establishing the procedure for obtaining rights to certain activities in the IT field, which may include fees for licenses or other conditions); tariff regulation (setting price limits for certain services in the field of communications, which is especially relevant for monopolized markets); creation of special economic zones (special zones with preferential treatment for IT companies, where they can receive tax, customs or other benefits); public procurement (using public procurement as a tool to stimulate the internal market of IT products and services); regulation of prices for information resources (this may be relevant in cases where information resources are strategically important or have a social nature). Economic tools should be used in such a way that they effectively contribute to the achievement of the goals of the state information policy, while taking into account the needs of the market, the interests of consumers and businesses [4].

4. Technical and technological means. Infrastructure, standards, protocols, software, etc., used to implement information policy. Technical and technological means are an integral part of the organizational and economic mechanism of implementing the state information policy. Their presence is necessary to optimize processes, increase productivity and ensure an adequate level of information security. The main technical and technological means include: information and communication technologies (ensure collection, processing, storage and transmission of information); computing resources (servers, cloud platforms, data centers and other resources for data processing and storage); network infrastructure (includes broadband access, mobile networks, optical data transmission lines, etc.); information protection systems (antiviruses, network filters, intrusion prevention systems, cryptographic means, etc.); e-government platforms (systems for electronic procurement, registration, submission of documents,

interaction between state bodies and citizens); analytical and BI tools (for processing large volumes of data, creating reports, forecasting and decision-making based on data analysis); blockchain technologies (can be used to ensure transparency, security and immutability of data); Internet of Things (IoT) (connection of various devices and systems for process automation, monitoring and management); automated management systems (for optimization of work processes, monitoring, control and coordination of various aspects of activity); artificial intelligence and machine learning (to automate routine tasks, analyze data and support decision-making) [5].

Implementation and effective use of these technical and technological means requires coordination, planning and management at the state level. Investments in modern technologies can become a driver of development and innovation in public administration, as well as contribute to the implementation of the strategic goals of the state information policy.

The effectiveness of the implementation of the state information policy can be measured using a number of indicators and criteria. It is important to note that the assessment of effectiveness may vary depending on the specifics of the country, its information needs and strategic priorities. Here are some aspects to consider when evaluating performance:

− availability and quality of ICT infrastructure. Growth of broadband access, mobile internet coverage, availability of digital services for citizens.

− the level of digital literacy of the population. Percentage of citizens who have ICT skills, know how to use electronic services, etc.

− use of electronic services. The percentage of citizens and enterprises that actively use electronic services of state bodies.

− level of information security. The number of cases of violations of information security, the effectiveness of measures to ensure it.

− innovative activity. The number of new technologies, products or services that were developed or implemented within the framework of the state information policy.

− satisfaction of citizens. Assessment of citizens' satisfaction with the quality of electronic services, availability of information, etc.

− economic effect. GDP growth, creation of new jobs, attraction of investments in the ICT sector.

− transparency of state administration. Transparency of budget expenditures, availability of state data in an open format, public participation in decision-making.

− integration with international standards. Compliance of national norms and standards with international recommendations and practices in the field of information technologies.

− implementation of strategic initiatives. Implementation of plans and tasks defined in strategic documents of the state information policy [6-7].

It is important to regularly analyze and monitor these indicators to ensure timely adjustment of the policy and its implementation strategy.

Effective implementation of the state information policy requires: strategic

planning (determination of long-term and short-term goals, as well as monitoring of their achievement); involving the public (conducting consultations, discussions, surveys among citizens and experts to take into account their interests and needs); interdepartmental coordination (interaction of various state bodies to achieve common goals in the field of information); constant monitoring and correction (analysis of the effectiveness of actions and making the necessary corrections in the strategy and tactics of information policy implementation).

In the conditions of globalization and the spread of digital technologies, the state information policy plays a key role in the socio-economic development of the country. Therefore, an effective organizational and economic mechanism for its implementation is one of the main tasks of the modern government.

Conclusions. State information policy is an important element of modern management, which helps to implement the strategic directions of the country's development, improve the quality of life of citizens and ensure information security. The organizational and economic mechanism for the implementation of the state information policy includes the legal framework, organizational structure, economic tools, and technical and technological means. The legal framework provides a regulatory framework for the implementation of information policy, including norms, principles, duties, rights and restrictions. The organizational structure ensures coordination and management of information policy implementation processes at various levels. Economic tools, such as budgeting, financing, investments, taxes and others, help provide financial resources for the implementation of information policy. Technical and technological means, including ICT, cloud technologies, data processing systems, information security systems, etc., provide the infrastructure for the effective implementation of information policy. The effectiveness of the implementation of the state information policy is measured using a number of indicators, including the availability and quality of ICT infrastructure, the level of digital literacy of the population, the use of electronic services, the level of information security, innovative activity, etc. For the effective implementation of the state information policy, it is necessary to constantly monitor, analyze and adjust the implementation of strategic goals, assess citizens' satisfaction with the quality of services provided, and emphasize the development of innovative technologies and training the population in digital literacy skills.

References:

1. Hlushko, A.D., Pantas V.V. and Babenko S.R. (2022), "Institutional and legal support of information policy of Ukraine", EURASIAN SCIENTIFIC DISCUSSIONS, Barcelona, Spain, 13 February, Pp. 511–514.

2. Varnalii, Z.S. (2020), Ekonomichna ta finansova bezpeka Ukrainy v umovakh hlobalizatsii [Economic and financial security of Ukraine in the context of globalization], Znannia Ukrainy, Kyiv, Ukraine.

3. Pechenyuk, A.V. (2020), "Information security of Ukraine as a component of

national security", [Online], available at: https://www.ndifp.com/1561/

4. Onyschenko, S.V. and Hlushko, A.D. (2020), "Conceptual principles of information security of the national economy in the conditions of digitalization", Sotsial'na ekonomika, HNU, vol. 59, pp. 14–24, available at: https://periodicals.karazin.ua/soceconom/article/view/16114

5. Mohova, Yu.L. and Lutska, A.I. (2018), "The essence and main directions of the state information policy of Ukraine", Derzhavne upravlinnia: udoskonalennia ta rozvytok, [Online], vol. 12, available at: http://www.dy.nayka.com.ua/pdf/12_2018/27.pdf

6. Shlomo Mizrahi, Eran Vigoda-Gadot & Nissim Cohen (2021) Drivers of trust in emergency organizations networks: the role of readiness, threat perceptions and participation in decision making, Public Management Review, 23:2, 233-253

7. Ernazarov Dilmurod Zukhriddinovich (2020). Analysis of the Policy of the Republic of Uzbekistan Regarding International Non-governmental OrganizationJournal of Political Science and International RelationsVolume 3, Issue 1, March 2020, Pages: 9-15

CBDC AS A CHALLENGE TO COMMERCIAL NEO-BANKS

Karina Kapliar,
postgraduate student,
Taras Shevchenko Institute of International Relations, Ukraine
karina.kapliar@gmail.com; ORCID: 0000-0002-3502-4980

Annotation. *As more central banks investigate the possible advantages and drawbacks of issuing their own digital currencies, CBDC have gained a lot of momentum in recent years both on micro-level and macro-level. In this respect CBDC have posed not only opportunities for supporting monetary policy changes and boosting financial inclusion, yet also created challenges for private digital currencies and neo-banks operating them. Aim of this paper is to identify current situation and future tendencies in terms of CBDC launch progress with a special focus on legislative and governance and its impact on private digital currencies. Major benefits of CBDCs (i.e., programmability, financial inclusion, and security & privacy) are outlined. Current statistics on CBDC development trends is analyzed, namely more than 110 nations are considering a CBDC at some stage of development. Nigeria's case as the first nation in Africa to introduce a CBDC (eNaira) is analyzed. It is outlined that eNaira has potential advantages such as improved transmission of monetary policy, convenience, effective payments, increased financial inclusion, and increased remittance inflow. This research stresses that digital illiteracy, cyberattacks, data theft, and the shifting role of banks are key hazards to successful CBDC launch and future functioning. Outlined experience of Nigerian CBDC launch is transferred to Ukrainian case of CBDC launch initiative. This study emphasizes that successful launch of CBDC in Ukraine will positively influence economic growth and changes in monetary policy. Legislative changes, monetary policy changes, and major governance structure changes may all be necessary for the CBDC implementation to be successful. This study may be used by researchers and analysts in the field of digital currencies, central banks and other regulators, banking associations, commercial banks, state authorities. Future perspective of this research may lay in considering CBDC functioning peculiarities from the point of view of major user groups.*

Keywords: *central bank, private digital currency, neo-bank, financial inclusion, governance.*

Introduction. Central Bank Digital Currency (CBDC) is a digital version of a nation's sovereign currency that is issued and governed by that nation's central bank. It is meant to serve as a reliable, safe, and effective form of payment, settlement, and value storage that can coexist with more conventional physical forms of currencies. In response to the explosive expansion of digital payments, cryptocurrencies, and other technical breakthroughs in the financial industry, the development of CBDCs has accelerated significantly in recent years. CBDCs have the same legal tender status as conventional money and are backed by the full confidence and credit of the government, in contrast to cryptocurrencies like Bitcoin or Ethereum that are issued and controlled by the issuing nation. Moreover, CBDCs have an impact on monetary policy. CBDCs may provide central banks new instruments for carrying out monetary policy, such as the capacity to more successfully apply negative interest rates or target certain economic

sectors. China, Sweden, and others are just a few nations that have already started trial programs or completely adopted CBDCs. The prospective creation and implementation of their own CBDCs are now being actively researched and considered by other central banks, including the Federal Reserve and the European Central Bank. Therefore, CBDCs are one of the major research lines in terms of analyzing both macro-level and micro-level financial behavior and policy.

Literature review. A number of research papers consider different aspects and issues of CBDCs. In this context Ammous (2018) researched CBDC nature in the aspect of fulfilling money functions. Further, Yao (2018) analyzes nature of CBDCs in comparison with private digital currencies and electronic currencies. In turn, Brunnermeier, Niepelt (2019) study nature of private and public money with a focus on CBDC. Adrian, Griffoli (2019) analyze key trends of micro-level and macro-level in terms of CBDCs development. Further, Griffoli, Peria, Agur, Dell'Ariccia, Kiff, Popescu, Agur (2018) analyze various stakeholder groups in terms of developing and implementing CBDCs. In turn, Andolfatto (2021) analyzes impact of CBDC on privately-owned commercial banks. Wadsworth (2018) researched major challenges of issuing CBDC in terms of technological, safety and policy aspects. Lee, Yan, Wang (2021) consider a conceptual framework for CBDC adoption from the perspective of different stakeholders (e.g., user groups and central banks). Further, Zhang, Li, Xiong, Wang (2021) study various aspects of risk concerning cryptocurrencies and response on behalf CBDCs. In turn, Qian (2019) overviews aspects of optimizing CBDCs issuance and operational functioning. Fernández-Villaverde, Sanches, Schilling, Uhlig (2020) research differences between CBDCs and privately owned digital currencies with a focus on financial sector stability. Further, Mishchenko, Naumenkova, Mishchenko (2021) overview future trends in institutional transformation of financial sector in terms of CBDCs. Bossu, Itatani, Margulis, Rossi, Weenink, Yoshinaga (2020) research legal grounding for CBDCs in the operational and strategic aspects. Further, Agur, Dell'Ariccia (2019) analyze the major issues of designing CBDCs in response to various stakeholder needs in terms of technological and financial inclusiveness, and planning and realizing policy. Niepelt (2020) researched peculiarities monetary policy planning and realization with a component of CBDC.

However, issue of framework of successful launch of CBDCs in developing countries and its impact on private digital currencies is not sufficiently studied in the existing body of research.

Aim of this research is to determine the current state and future trends of CBDC launch progress with a special focus on legislative and governance and its impact on neo-banks operating private digital currencies.

Methodology. This study uses several research methods. Namely, synthesis methods were used to identify and summarize the key findings regarding the current state of CBDCs in the context of the tasks of different stakeholder groups, as well as to form trends in its development in the future under the influence of micro-level and macro-level challenges. Statistical analysis methods were used to analyze the key indicators of the state of CBDCs. Strategic analysis, another research technique employed in this study, establishes the top benefits for CBDC development. The framework of this technique

makes use of the instruments listed in the BIS Innovation Hub (2022) methodology, which aids in the identification of significant exogenous and endogenous development concerns for CBDCs. The methods used by a variety of regulators and international organizations, Asian Development Bank (2021), G7 – UK (2021), as well as the best practices of relevant research, were used to design this research. Data collected by Atlantic Council (2023) was used for the purposes of statistical analysis in this research.

Results. CBDCs are using cutting-edge technologies like blockchain or distributed ledger technology (DLT) – therefore CBDCs are produced, stored, and transferred electronically. This lowers the price of printing and managing actual cash while enabling quicker and more secure transactions. However, actual benefits of CBDCs at both macro-level and micro-level are far wider. Key benefits of CBDCs that are outlined on Figure 1.

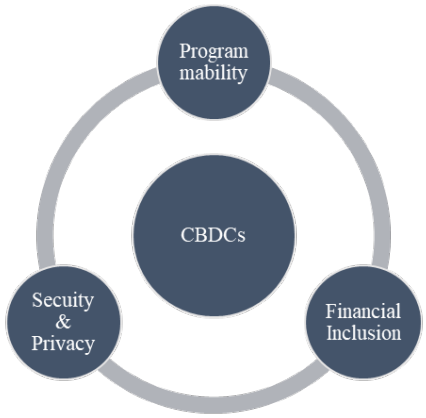

Fig. 1. Key benefits of CBDCs
Source: compiled by author.

We consider the outlined benefits in more detail:

• *Programmability:* CBDCs may be built with features that are programmable, allowing for the deployment of smart contracts, automated transaction execution in response to particular situations, and other sophisticated features. This may increase transaction efficiency, make new financial services possible, and make it easier to comply with rules.

• *Financial Inclusion:* CBDCs may help to advance financial inclusion by providing underbanked and unbanked people with simpler and more affordable access to digital financial services.

• *Security & Privacy:* Depending on the laws in each area, different degrees of privacy may be included into CBDCs. However, given that they are governed by central banks, transaction monitoring will probably be used to some extent in order to stop money laundering, financing of terrorism, and other illegal activities.

CBDCs mark an ascent due to a number of exogenous and endogenous factors. In reaction to the acceptance of cryptocurrencies that have no official support and the rising cash-lessness of many societies, central banks have introduced digital currencies.

Intentional initiatives are being taken by several central banks to create their own CBDC. According to a poll of central banks conducted in 2021 by the Bank for International Settlements (BIS, 2022), 86% are actively examining the possibilities of CBDCs, 60% are experimenting with the technology, and 14% are implementing CBDC pilot projects. While some central banks, like those in China, Sweden, and the Bahamas, have advanced in their development of a CBDC, others, like those in Canada and the U.S., Thailand and Singapore are still in the early stages. Additionally, while other central banks adopt different technologies, some are implementing blockchain and cryptography to develop their own CBDC.

According to Atlantic Council data (Atlantic Council, 2023) more than 110 nationals in total representing over 95% of the world's GDP, are considering a CBDC at some stage of development. However, only 35 nations were exploring a CBDC as of May 2020. By December 2022, every G7 economy would have advanced to the CBDC development level. Project Cedar, a large-scale CBDC experiment by the New York Federal Reserve, has moved the US from research to development. More than 10 nations have fully launched a digital currency by end of 2022, also China's pilot, which reaches more than 0.25 billion people, is set to expand to most of the country in 2023. Jamaica is the latest country to launch its CBDC (JAM-DEX). Over 20 nations plan a considerable progress in launching a CBDC in 2023. In 2023, Australia, Thailand, Brazil, India, Korea, plan to either start or continue pilot testing.

Additionally Atlantic Council outlined dynamics for CBDC development and launch progress for 1.5-year period (April 2021 – December 2022). On April 2021 38% researched nations were researching CBDCs, 19% nations have been developing CBDCs, 24% nations have been piloting CBDCs. At the same time, in 1.5-year time by December 2022 27% researched nations were researching CBDCs, 30% nations have been developing CBDCs, 16% nations have been piloting CBDCs, 10% nations have launched CBDCs. That demonstrates a significant progress in terms of CBDCs. In more detail statistics on CBDCs progress by researched nations sample is presented in Figure 2.

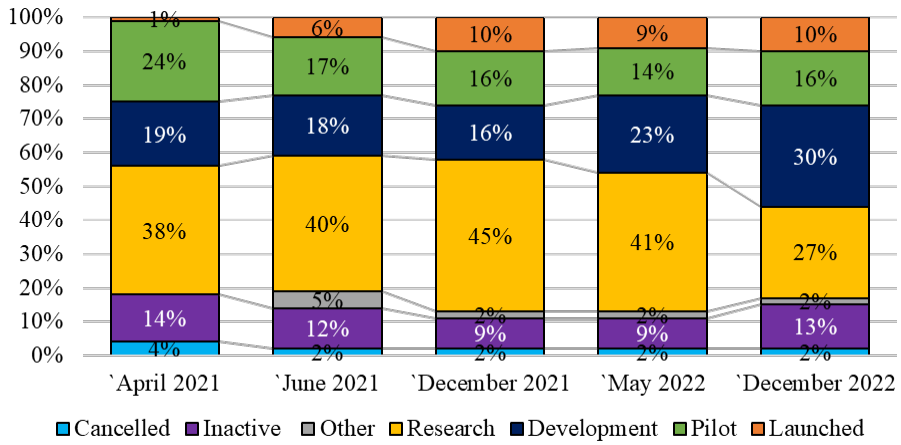

Fig. 2 CBDCs global progress state, %, April 2021 – December 2022

Source: compiled based on Atlantic Council data.

It has to be outlined that CBDCs may lead to the collapse of private digital currencies as a major product and tool of neo-banks. Firstly, due to confidence in CBDCs, and secondly, due to authority of central banks. The first factor is confidence in CBDCs. The future of fiat money will be represented by CBDCs. People already trust fiat money, so it will be very simple for them to believe in fiat digital currency when it is introduced because it is backed by governments, a central bank liability, and is subject to regulation. The ability of central banks to declare all non-fiat digital currencies unlawful is the second justification. The central bank is authorized by law to be the only issuer of a legal tender currency in the majority of nations. This gives the central bank the authority to declare all neo-bank private digital currencies unlawful when necessary and to create new money, such a digital currency. While many central banks have strongly cautioned against using neo-bank digital currencies for financial transactions, other nations like Algeria, Bolivia, Morocco, Nepal, Pakistan, Vietnam have outright banned them.

Central banks are under a lot of pressure to take the lead in the digital currency field since private digital currencies are attracting a lot of attention from economic actors, particularly from people and enterprises. Because of this, it is likely that central banks will give in to pressure by launching their own fiat digital currency and then declare that other non-fiat private digital currencies, notably bitcoin, are prohibited from being used as money in the economy. A central bank or government action like that might cause cryptocurrencies to disappear. Cryptocurrencies may be utilized as investment assets by central banks who do not wish to outlaw them, but not as a medium of exchange for fair-trade transactions.

Nigerian CBDC case analyzed by Ozili (2021) is worthwhile to be considered in the respect of financial sector transformation at both macro-level and micro-level. Nigeria is the first nation in Africa to introduce a fiat digital currency, sometimes referred to as a CBDC. In order to be utilized alongside paper Naira, the eNaira CBDC was created. Opportunities presented by CBDC to Nigeria include enhanced transmission of monetary policy, convenience, effective payments, increased financial inclusion, and increased remittance inflow. Digital illiteracy, a rise in the likelihood of cyberattacks, data theft, and the shifting role of banks in a fully developed CBDC economy are just a few of the hazards that have been highlighted. Nigerian economy may benefit from a CBDC issued by a central bank in a number of ways outlined in Table 1. These changes are concerning first of all:

1. Transition to cashless policy,
2. Lowering costs of banking system;
3. Increase in financial inclusion.

Concerning other developing countries cases – including Ukraine – CBDCs will likely face the same progress pathway, with a reservation for national legislative aspects and local financial market aspects. In this respect Mishchenko, Naumenkova, Mishchenko (2021) outline that CBDC launch in Ukraine will positively influence trend of contraction of shadow economy – since monetary transactions will be more transparent to the regulator and commercial banks. Therefore, significant boost bot economic growth and changes in monetary policy are expected due to successful launch of CBDC. In light of

these, Tereshchenko, Aleksin (2019) stress that such changes will require an informed governance framework in order to, firstly, enable successful long-term functioning of these changes, secondly, make Ukrainian market more transparent to international stakeholders who expect the same control and monitoring mechanisms as they have established internally and internationally. Grytsay (2022) additionally outlines need for legislative changes in order to support both monetary policy changes in the light of CBDC launch and its adequate functioning in Ukraine among households, corporations, banks and other economic agents. However, successful launch of CBDC in Ukraine will further support economic transformation and bring Ukraine among the selected group of developed and developing economies with CBDC effectively functioning.

Table 1

Potential advantages of the eNaira launch in Nigeria

Benefits	*Comments*
Transition to cashless policy	Incentive on CBDC launch in Nigeria may *improve the push toward a cashless policy*, offer cash alternatives and lessen the dependence on cash, promote diversified payment options in the nation, increase remittance inflows by making diaspora remittance transfers quicker and less expensive, and increase financial inclusion because consumers will be able to send direct payments to government officials using the eNaira.
Lowering costs of banking system	Nigerian CBDC may *lower the cost of managing cash by lowering the cost of handling cash, printing cash, and destroying cash, saving the government money*; it will lower settlement risk; it will make cross-border transactions simpler. As a result, that will lower illegal activities like fraud and money laundering. This is because eNaira-based digital payments and transfers will be simpler to identify and link back to the specific ID of the originator, lowering the risk of fraud and money laundering.
Increase in financial inclusion	CBDC in Nigeria will *boost financial inclusion* making it simple for people in remote areas who have long been financially excluded to access financial services, and it will make tax evasion in Nigeria more challenging when it is used to pay for goods and services. It will also stop money from being hidden and transferred outside the financial system. Cross-border transfers will become more affordable and secure thanks to the eNaira, which will also make taxable assets traceable and impose transparency in the taxation system.

Source: compiled by author based on Ozili (2021)

Discussion. Thus, the peculiarities of the development of CBDC from the point of view of the evolution of the financial services market and competition trends in the banking sector, including impact on neo-banks, are established. This study indicates that globally, the adoption of CBDCs is gaining speed, with various central banks actively doing research, creating, and putting experimental programs into practice. Research by

Yao (2018) supports this result outlining that nature of CBDCs (in comparison with private digital currencies) is formed under both need for an adequate response on macro-level and fulfillment of stakeholder needs on micro-level.

This study indicates that programmability, financial inclusion, improved security and privacy are outlined as a few advantages that CBDCs provide. Due to growing confidence in CBDCs and central bank authority, the introduction of CBDCs might potentially result in a drop in the popularity of cryptocurrencies. Research by Wadsworth (2018) supports this result indicating major challenges of issuing CBDC in terms of technological, safety and policy aspects. Additionally, this result is supported by study by Zhang, Li, Xiong, Wang (2021) in terms of multiple aspects of risk concerning cryptocurrencies and role of CBDCs.

This study shows that CBDCs are being adopted by developing nations (like Nigeria and Ukraine) to encourage economic development, financial inclusion, and transparency. Implementation of CBDC has the potential to have a beneficial economic effect by eliminating the shadow economy, allowing more transparent financial transactions, and promoting global collaboration. This result is supported by study by Mishchenko, Naumenkova, Mishchenko (2021) overviewing future needs in institutional transformation for developing countries in terms of CBDCs launch.

However, this study indicates more complex challenges in the light of CBDC development, signaling a significant change in the financial industry that might have an impact on monetary policy, financial services, and the state of the economy as a whole. Therefore, an adequate legislative and governance instrumentation is required to better manage the consequences, difficulties, and potential of CBDCs as central banks continue to investigate and deploy them.

Conclusions. CBDCs have a number of key benefits, such as programmability, financial inclusion, security and privacy. Central banks are actively examining the possibilities of CBDCs, 60% are experimenting with the technology, and 14% are implementing pilot projects. More than 110 nations in total representing over 95% of the world's GDP are considering a CBDC at some stage of development. More than 10 nations have fully launched a digital currency by the end of 2022, and China's pilot is set to expand to most of the country in 2023. Over 20 nations plan to either start or continue pilot testing. CBDCs may lead to the collapse of orivate cryptocurrency due to two factors: confidence in CBDCs and the authority of central banks. Central banks are under pressure to take the lead in the digital currency field due to private digital currencies attracting attention from economic actors.

Central banks are likely to launch their own CBDCs and declare that other private digital currencies, notably bitcoin, are prohibited from being used as money in the economy. Nigeria is the first nation in Africa to introduce a CBDC, known as eNaira. The potential advantages of the eNaira include improved transmission of monetary policy, convenience, effective payments, increased financial inclusion, and increased remittance inflow. However, digital illiteracy, cyberattacks, data theft, and the shifting role of banks in a fully developed CBDC economy are just a few of the hazards. Nigeria's CBDC will boost financial inclusion, make tax evasion more challenging, and make cross-border

transfers more affordable and secure.

In other developing countries, such as Ukraine, CBDCs will likely face the same progress pathway, with a reservation for national legislative aspects and local financial market aspects. Successful launch of CBDC in Ukraine will positively influence economic growth and changes in monetary policy. Legislative changes, monetary policy changes, and major governance structure changes may all be necessary for the CBDC implementation to be successful.

Future line of this research may be developed in the direction of considering in more detail aspects of CBDC functioning from the point of view of major user groups which will enhance researchers' understanding of CBDCs future development trends.

References:

1. Ammous, S. (2018). Can cryptocurrencies fulfil the functions of money? The Quarterly Review of Economics and Finance, 70, 38–51. https://doi.org/10.1016/j.qref.2018.05.010

2. Yao, Q. (2018). A systematic framework to understand central bank digital currency. Science China Information Sciences, 61(3), 1–8. https://doi.org/10.1007/s11432-017-9294-5

3. Brunnermeier, M., Niepelt, D. (2019). On the equivalence of private and public money. Journal of Monetary Economics, 106, 27–41. URL: https://econpapers.repec.org/article/eeemoneco/v_3a106_3ay_3a2019_3ai_3ac_3ap_3a27-41.htm

4. Adrian, T., Griffoli, T. (2019). The Rise of Digital Money. IMF Fintech Notes, 19(01). 1–20. https://doi.org/10.5089/9781498324908.063

5. Griffoli, T., Peria, M., Agur, I., Dell'Ariccia, G., Kiff, J., Popescu, A., Agur, I. (2018). Casting Light on Central Bank Digital Currencies. IMF Staff Discussion Note, 18(08), 1. https://doi.org/10.5089/9781484384572.006

6. Andolfatto, D. (2021). Assessing the impact of central bank digital currency on private banks. The Economic Journal, 131(634), 525–540. https://doi.org/10.1093/ej/ueaa073

7. Wadsworth, A. (2018). The pros and cons of issuing a central bank digital currency. Reserve Bank of New Zealand Bulletin, 81, 1–21. URL: https://www.rbnz.govt.nz/-/media/project/sites/rbnz/files/publications/bulletins/2018/2018jun81-07.pdf

8. Lee, D., Yan, L., Wang, Y. (2021). A global perspective on central bank digital currency. China Economic Journal, 14(1), 52–66. https://doi.org/10.1080/17538963.2020.1870279

9. Zhang, W., Li, Y., Xiong, X., Wang, P. (2021). Downside risk and the cross-section of cryptocurrency returns. Journal of Banking & Finance,133, 106246. https://doi.org/10.1016/j.jbankfin.2021.106246

10. Qian, Y. (2019). Central Bank Digital Currency: optimization of the currency system and its issuance design. China Economic Journal, 12(1), 1–15. https://doi.org/10.1080/17538963.2018.1560526

11. Fernández-Villaverde, J., Sanches, D., Schilling, L., Uhlig, H. (2020). Central

12. Bank Digital Currency: Central Banking for All? Federal Reserve Bank of Philadelphia Working Paper Series. WP20-19. 1–32. https://doi.org/10.21799/frbp.wp.2020.19

13. Mishchenko, V., Naumenkova, S., & Mishchenko, S. (2021). Central bank digital currency: the future of institutional changes in the banking sector. Finance of Ukraine, 2021(2), 26–48. https://doi.org/10.33763/finukr2021.02.026 [in Ukrainian].

14. Bossu, W., Itatani, M., Margulis, C., Rossi, A., Weenink, H., & Yoshinaga, A. (2020). Legal Aspects of Central Bank Digital Currency. IMF Working Paper, 20(254), 1–51. https://doi.org/10.5089/9781513561622.001

15. Agur, I., Dell'Ariccia, G. (2019). Designing Central Bank Digital Currencies. IMF Working Paper, 2019(252), 1–38. https://doi.org/10.5089/9781513519883.001

16. Niepelt, D. (2020). Monetary Policy with reserves and CBDC: Optimality, equivalence, and politics. CEPR Discussion Paper Series, DP15457, 1–46. URL: https://cepr.org/publications/dp15457

17. BIS (2022). Project mBridge: Connecting economies through CBDC. Retrieved 05 May 2023 from https://www.bis.org/publ/othp59.pdf

18. Asian Development Bank (2021). Redefining Strategic Routes to Financial Resilience in ASEAN+3. Retrieved 05 May 2023 from https://www.adb.org/publications/strategic-routes-financial-resilience-asean3

19. G7 – UK (2021). Public Policy Principles for Retail Central Bank Digital Currencies. Retrieved 05 May 2023 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1025235/G7_Public_Policy_Principles_for_Retail_CBDC_FINAL.pdf

20. Atlantic Council. (2023). Central Bank Digital Currency Tracker - Atlantic Council. Retrieved 05 May 2023 from https://www.atlanticcouncil.org/cbdctracker/

21. Ozili, P. K. (2021). Central Bank Digital Currency in Nigeria: Opportunities and Risks. MPRA Paper Series, 111218, 1–12. https://doi.org/10.2139/ssrn.3917936

22. Tereshchenko O., Aleksin G. (2019). The role of the supervisory board institutions and the independent director in maximizing the value of the company. Finance of Ukraine, 9(286), 81–93. DOI: https://doi.org/10.33763/finukr2019.09.081 [in Ukrainian].

23. Grytsay, S. (2022). Digital Money in Ukraine – CBDC? Juridical Scientific Electronic Journal, 4, 247–249. DOI: https://doi.org/10.32782/2524-0374/2022-4/57 [in Ukrainian].

CHARACTERISTICS OF THE PROCESS OF STRATEGIC PLANNING OF FOREIGN ECONOMIC ACTIVITY OF AN ENTERPRISE DEPENDING ON THE CONDITIONS OF WAYS TO ENTER A NEW MARKET

Damir Kulish,
Doctoral student, Zaporizhzhya National University, Ukraine,
damir.kulish@gmail.com; ORCID: 0000-0003-2224-1078

Annotation. *The article examines the characteristics of the process of strategic planning of foreign economic activity of an enterprise, depending on the conditions of ways to enter a new market. It is determined that foreign economic activity is the process that a company follows in order to enter international markets and export the goods and services that it produces in its market of origin. A methodology is presented with the aim to analyze the probability of implementing a company's foreign economic activity. This method will help the company enter international markets and gain important advantages: greater competitiveness, better margins and diversification of market risk. First of all, the work carried out confirms that companies achieve better results by implementing foreign economic activity than by not implementing it in terms of operating profit and normal results.*

Keywords: *characteristics, process, strategic planning, foreign economic activity, conditions, new market.*

The company's foreign economic activity is a logical step that will allow it to continue developing through the development of new markets. Exploring the opportunities offered by an international business is exciting, but at the same time more difficult than doing business in your own country. And it's not just because customers are different. In addition, you will have to deal with Customs and other government agencies, banks, insurance companies, import or export service providers, and international transportation. In addition, you need to familiarize yourself with business practices in other countries, with different cultures and currencies. Success largely depends on an appropriate foreign economic strategy, starting with market analysis and obtaining the necessary assistance and support.

Despite the fact that there is no consensus in the literature on international business about the impact of foreign economic activity on the results that the company achieves (Malyshko, Ye., & Chernyshov, V.., 2020), several studies have shown that FEA has a positive impact on such outcomes, at least to the extreme point from which the costs of coordinating and managing business activities in countries that are very remote, geographically and institutionally, can negatively affect outcomes (Dobrostok Yu. B., 2019). This effect was found for both large companies (Ievtushenko V. A., Liashevska V. I., Chupryniuk Yu. V, 2020), and for small and medium-sized enterprises. In particular, before the mentioned extreme point, the positive effect of foreign economic activity is justified, since companies can create advantages related

to the relationship of activities between different geographical areas, for example, by sharing activities necessary to work in different countries (Kovbatiuk, M. V., Shkliar, V. V., & Pietukhov, A. S., 2023), enjoy higher growth rates and therefore access to sources of benefits in key costs, such as the experience curve or economies of scale and volume (Zhyhalkevych Zh.M., Stanislavskyi O.V., 2019). Foreign economic activity companies can also take advantage of the resources available in different markets, as well as capitalize on market imperfections and achieve greater profitability of their resources; thus, these companies face fluctuations in the domestic market with greater solvency and reduce the risks associated with dependence on the single market.

Foreign economic activity is the process that a company follows to enter international markets and export the goods and services it produces in its market of origin. Export activities are not the ultimate activity that responds to market situations, but require a medium-term vision and a well-defined strategy. This process takes time and requires a lot of effort on the part of the company. But with an adequate strategy and the necessary knowledge, internationalization can bring very positive results to your company. You need to create a company, thinking from the very beginning about foreign economic activity, that is, about how to also win the customers who are located in other countries. The foreign economic activity process is usually gradual: first it involves random exports or imports, then a phase of regular international activity, in order to finally achieve establishment abroad through commercial or manufacturing subsidiaries.

Sometimes it is difficult for small and medium-sized companies to know the trends of the global economy in order to take advantage of new business opportunities and determine a strategy that will lead to successful foreign economic activity, but you need to be careful and use all the opportunities. Digital companies are just a click away from all the customers in the world, but there is no point in trying to win over customers who live in other countries if you haven't already won those who are close. Traveling abroad involves additional efforts, partners, resources, investments, and people who need to be well prepared (Oh, C., Cho, Y. y Kim, W., 2015). If a business model doesn't work properly in a region where companies don't need to improve, repeating it in other countries can actually make the situation worse by willing to reach the international level ahead of time. Investors want startups with broad growth potential, and this requires the entrepreneur to have big ambitions for the company's fastest-growing foreign economic activity. It is good to think on a large scale, but it is right to start implementing small and reach the international level in time. In foreign economic activity, the method of entering a new market depends on a number of characteristics that depend on the conditions of the destination country, those related to the country of origin, and those that compete with the company itself (fig.1).

Source: author's summary

1. for characteristics related to the destination country , the most recommended method of entry will vary depending on:

− Market growth potential. If the market is small or the opportunities to increase the company's market share are low, it is advisable to start the foreign economic activity

process with a market entry method that involves little risk and investment, such as exports. On the other hand, if the destination country has high growth forecasts, the company should consider, if its resources allow it, settling in the destination country and starting production activities in that market in the medium or long term.

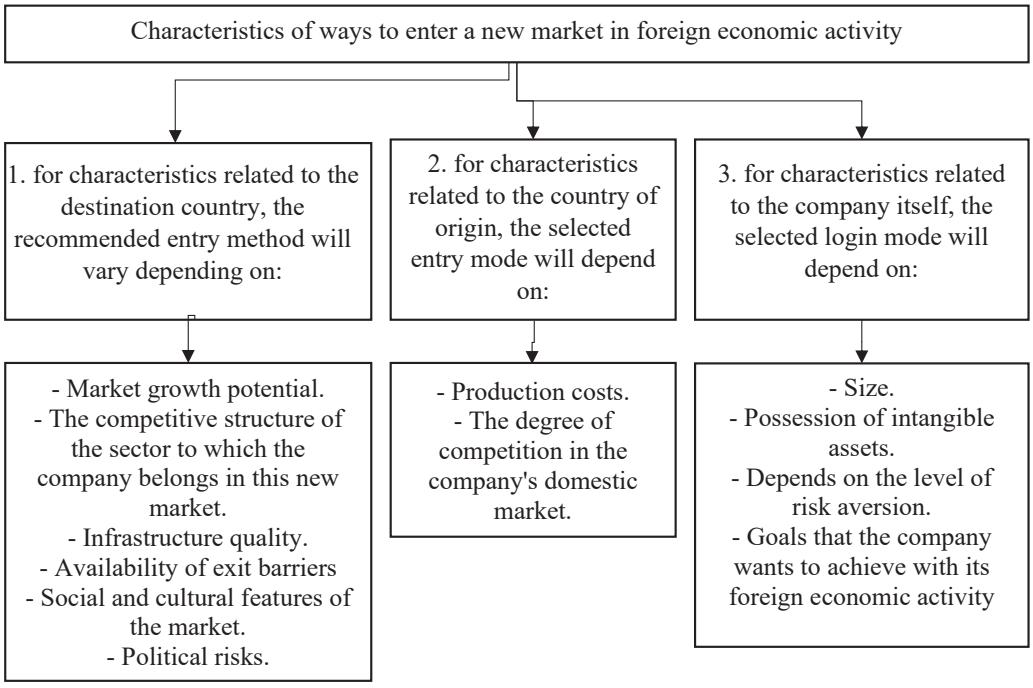

Fig. 1. Characteristics of ways to enter a new market in foreign economic activity that depend on the conditions of the destination country, those related to the country of origin, and those that compete with the company itself.

− The competitive structure of the sector to which the company belongs in this new market. The presence of markets with a small number of competitors, as in the case of sectors with a certain oligopoly situation, promotes acquisition as a method of entering a new market.

− Infrastructure quality. A good infrastructure network promotes exports (either through its own channels or through intermediaries) as a possible way to enter the territory due to low risk and investment, as this encourages an adequate distribution of the company's products in the country. The distribution and logistics system is improved, with low cost and adequate service.

− The presence of entrance barriers. If there are barriers to entering the market, it is very likely that the company will not be able to export as a method of entering the market, because duties make the product too expensive and

uncompetitive. The company will then be forced to establish a specific type of institution that performs a stage in the product's value chain, with sufficient value to qualify the product as a product originating from a new market, or alternatively assign a license to manufacturers in the country.

− Social and cultural features of the market. Segmentation of potential customers with certain characteristics in a new market often determines whether it will be convenient to apply new market entry methods that will allow the company to have greater control in the new market, such as direct investment or alliances with local partners.

− Political risks. In some markets, it is advisable for companies to look for a local partner who provides experience and security in the new market in order to reduce this type of risk in the markets that are exposed to it, so it is necessary to study the country's macroeconomic and regulatory structure in advance.

2. for characteristics related to the country of origin, the selected entry mode will depend on:

− Production costs. If production costs are relatively lower in the country of origin compared to the country of destination, the appropriate form of receipt is export, so that products produced in the country of origin are more competitive abroad. On the other hand, if costs in a new country are relatively lower, the company should consider setting up production in the new country and thus take advantage of the cost opportunities offered by the new market. Such determinitorialization was a common practice of Western companies moving their manufacturing facilities to countries with cheaper labor, such as many Asian countries. However, after the decline in wages caused by the crisis and the increase experienced by some of these markets, such as China, some countries have ceased to be as attractive to certain sectors. Therefore, it is necessary to first study the cost structure in each market before making a decision to postpone production.

− The degree of competition in the company's domestic market. If the country of origin of the sector from which the Company originates is characterized by a structure with a small number of competitors, it may be advisable to choose quick entry methods, such as acquiring or finding reliable partners in a new market.

3. for characteristics related to the company itself, the selected login mode will depend on:

− Size. Larger companies have more technical options to choose between one or the other login method; however, the smallest ones often only have access to exports. The company's own ability to be competitive, directives, organizations, and so on. These features affect the mode of administration during foreign

economic activity.

− Ownership of intangible assets – such valuables as trademarks, patents, know-how, etc. In this case, it is recommended to rely on entry methods that allow the company to have more control over these assets in a new market, such as direct investment or alliances that provide high control. However, sometimes this is usually the most appropriate method when there are valuable assets that can potentially be licensed. For example, technology transfer is the initial method.

− Depends on the level of risk aversion. A company with strong risk avoidance should avoid significant investments; it is advisable to use entry methods that allow you to use local knowledge and share risks, such as transferring licenses, forming alliances, or low-risk methods, such as exporting.

− Goals that the company wants to achieve with its foreign economic activity . The company should try to adopt an entry method that will allow it to achieve its goals in the target market. If, for example, a company wants to expose itself to domestic demand, exports will be sufficient. On the other hand, if you want to learn how to take into account differences in consumer tastes and preferences, you will have to internationalize marketing, research and development, or even production capabilities.

Therefore, depending on this, a practical and flexible methodology has been developed that allows you to analyze the country in order to determine priorities and focus your efforts on finding opportunities for international business expansion. The methodology is based on a number of filters that allow you to narrow the portfolio of countries by analyzing available public information, while at the same time deepening the analysis of countries that pass each filter. The methodology consists of 3 stages:

Stage 1 deals with the pre-selection of countries. Based on the foreign economic activity strategy defined by the company, senior management adopted guidelines for the regions or groups of countries in which the company is interested to be present, and then information from these countries became the source of the analysis model.

Phase 2, which focuses on setting country priorities, will include a methodology whose primary purpose was to qualify pre-selected countries according to the overall country and sector capacity. The result suggests an index number with values from 0 to 1, so that the higher this index was, the greater the attractiveness of the country. The composition of the index provides 35% of the weight of the country's potential and 65% of the potential of the sector in which the company is located.

Stage 3 deals with the feasibility of entry strategies. This stage is a financial

translation of various scenarios. This phase consisted of a thorough understanding of the aspects listed below to evaluate the most viable type of Entry Strategy (open field investment, acquisition, export, distribution, among others):

− Evaluating a portfolio of acquisition opportunities, i.e. identifying a specific target size for local laboratories.

− Assessment of the feasibility of creating your own business or export, taking into account such factors as the time of registration and territory, the intellectual property regime, and the bioequivalence regime.

− Assessment of specific restrictions or incentives that may exist both for trading and for the company to operate in another country.

After identifying the priority countries, in order to find opportunities for international expansion, it is necessary to identify possible steps in these countries, seeking to assure the availability of production, marketing and communication platforms, distribution and sales necessary to establish a successful company in the selected country. Scenarios are evaluated using an evaluation matrix based on 2 criteria: the first is financial attractiveness, i.e. how much value these scenarios add to the business, and the second is the probability of covering the added value that the strategy represents. Movements that do not meet the requirements of some axes can be changed to improve their positioning through various actions, such as: linking a financial partner, linking a strategic partner, maintaining a local management team. The result of applying this methodology is an index from 0 to 1, which served to localize the course in the upper quadrant of the matrix (if it is>0.5) or in the lower quadrant (if it is<0.5). Evaluating financial attractiveness has been an evolutionary process in which, as more information becomes available, there is greater confidence in the results of evaluating opportunities. Taking into account the above, the company will have 2 stages of work:

− Phase I: return, the initial phase at which it was determined whether an opportunity represents potentially interesting value; this is the go/don't go phase.

− Phase II: due diligence and evaluation , when an opportunity passes Phase I and a preliminary agreement is reached with potential «sellers», due diligence and a detailed assessment of the opportunity should be carried out.

So, this method will help the company enter international markets and get important advantages: greater competitiveness, better margins and diversification of market risk.

Conclusions. First of all, the work carried out, confirms that companies achieve better results by implementing foreign economic activity than by not implementing it in terms of operating profit and normal results.

Moreover, this paper presents a methodology that aims to analyze the probability of implementing a company's foreign economic activity. These results have relevant implications for both founders and managers, as well as for government agencies that can offer support programs to promote successful international expansion. On the one hand, it would be advisable for managers to be trained in issues related to international business so that they can recognize and use business opportunities in foreign markets, preferably from the very beginning of the business project concept. On the other hand, these results can be useful for building an institutional support program for FEA to promote its outcomes and survival.

References:

1. Malyshko, Ye., & Chernyshov, V. (2020). Analiz vplyvu stratehichnykh priorytetiv na rozvytok zovnishnoekonomichnoi diialnosti pidpryiemstv. Financial and Credit Activity Problems of Theory and Practice, 3(34), 322–329. https://doi.org/10.18371/fcaptp.v3i34.215553

2. Zhyhalkevych Zh.M., Stanislavskyi O.V. (2019). Osoblyvosti zovnishnoekonomichnoi diialnosti vitchyznianykh pidpryiemstv v umovakh Yevrointehratsii. Ekonomichnyi visnyk NTUU «KPI». № 16. S. 116–123

3. Dobroskok Yu. B. Innovatsiina stratehiia yak osnova rozvytku zovnishnoekonomichnoi diialnosti pidpryiemstva (2019). / Yu. B. Dobroskok // Biznes Inform. – 2019. – № 11.

4. Kovbatiuk, M. V., Shkliar, V. V., & Pietukhov, A. S. (2023). Systema stratehichnoho upravlinnia zovnishnoekonomichnoiu diialnistiu pidpryiemstv. Economic Synergy, (1), 151–162. https://doi.org/10.53920/ES-2023-1-12

5. Yevtushenko V. A., Liashevska V. I., Chupryniuk Yu. V. (2020). Doslidzhennia ta vdoskonalennia stratehichnoho planuvannia zovnishnoekonomichnoi diialnosti pidpryiemstva. Biznes Inform. №6. C. 23–29. https://doi.org/10.32983/2222-4459-2020-6-23-29

6. Oh, C., Cho, Y. y Kim, W.(2015). The effect of a firm's strategic innovation decisions on its market performance. Technology Analysis & Strategic Management, 27(1), 39-53.

7. Van Tulder, R.(2015). Getting all motives right: a holistic approach to internationalization motives of companies. The Multinational Business Review, 23(1), 36-56.

INCREASING THE EFFICIENCY OF PUBLIC MANAGEMENT OF CRYPTOCURRENCY CIRCULATION IN UKRAINE: CHALLENGES AND PROSPECTS

Andriy Pinezhko,
recipient of the third educational and scientific level of higher education
Higher Educational Institution «Academician Yuriy Bugay
International Scientific and Technical University», Ukraine
pinegko23@ukr.net; ORCID: 0009-0007-2148-4568

Annotation. *This article is devoted to the problem of improving the efficiency of public management of cryptocurrency circulation in Ukraine. Prospects for solving these problems are presented, such as the development of clear regulation, promotion of innovation, protection of the rights and interests of investors and educational programs. Optimizing public administration will help create stable and transparent conditions for the development of the trade market in Ukraine.*

Keywords: *cryptocurrency, public administration, blockchain, innovation, efficiency, market.*

Introduction. Cryptocurrency has become one of the most influential financial instruments in the modern world. It changes approaches to payment systems, investment opportunities and banking. In Ukraine, the cryptocurrency market is still developing, but its potential is clear. To achieve successful and sustainable development of cryptocurrency circulation in the country, effective public management is necessary. In this article, we will consider the challenges and prospects for improving the efficiency of public management of cryptocurrency circulation in Ukraine. This research can become the basis for the development of effective strategies and policies on cryptocurrencies by the Ukrainian government and help the country use the advantages of cryptocurrencies and blockchain technologies to ensure sustainable economic development and modern public administration. The task of the research is to study the possibilities of using cryptocurrencies to stimulate investment and economic development, to develop recommendations for improving the regulatory environment, ensuring financial stability and protecting consumer rights.

Scientific research in the field of cryptocurrencies and their regulation is carried out by scientists, lawyers, economists and experts in the field of finance and technology. The scientists investigating this issue include: O. Zhukov – researcher in the field of finance and cryptocurrencies; V. Lavreniuk – investigates the regulation and development of the cryptocurrency market in Ukraine; V. Kysil – expert in the field of blockchain technologies, fintech and cryptocurrencies, vice-president of the Ukrainian FinTech Association; R. Yaremenko – researcher in the field of cryptocurrencies and blockchain technologies, founder of Blockchain4Ukraine; O. Tsibulko – expert in the field of finance and blockchain technologies, head of the “Blockchain Lab” research center; M. Pryimachenko – specialist in financial technologies and blockchain, cofounder

of Kyiv Blockchain Hub; O. Vyshnevska – researcher in the field of regulation of cryptocurrencies, vice-president of the Ukrainian FinTech Association; A. Nedilya is an expert on blockchain and cryptocurrencies.

Results of research. To date, cryptocurrency in Ukraine is under the direct control of the National Bank of Ukraine (NBU) and other relevant authorities. The legal framework for regulating cryptocurrency activities is progressing, but at the same time, it is being challenged by new technological and economic realities. Public administration is necessary, which will contribute to the creation of transparent and stable conditions for the development of the market. In September 2021, cryptocurrencies were legal in Ukraine, and their circulation and use were not prohibited. At that time, there was no special regulatory law in Ukraine that regulates the broad aspect of cryptocurrency activity, but some initiatives in this direction were discussed.

Regarding the taxation of cryptocurrencies, the Ukrainian legislative bodies had a certain level of interest in certain methods of taxation of transactions with cryptocurrencies, but clear and unambiguous regulations did not exist. At the time, cryptocurrencies were considered the most for tax purposes when they were sold at a profit. As cryptocurrencies have the potential to change the financial landscape and influence the country's economy, regulation of the cryptocurrency industry has become a focus of attention for Ukrainian lawmakers. Probably, since then, new bills or changes in the existing rules that regulate the cryptocurrency space in Ukraine have been adopted [1].

The key elements of the current state of cryptocurrency in Ukraine are systematized:

1. Legalization: In September 2021, the Verkhovna Rada of Ukraine adopted a law that legalizes and regulates the cryptocurrency market. With the help of this law, Ukraine tried to create a clear regulation for crypto-exchanges, cryptocurrency exchange companies and other market participants.

2. Definition of Terminology: The Act defines key terms such as virtual assets, virtual asset custodians etc. which help in the regulation and control of this sector.

3. Taxation: Although the cryptocurrency market has been legalized, the details of the taxation of crypto-transactions have not yet been fully resolved.

4. Support for innovation: the government of Ukraine is interested in the development and support of innovative technologies, including blockchain and cryptocurrency. In addition, there were attempts to cooperate with global blockchain initiators and companies [2-3].

Increasing the effectiveness of the public management of cryptocurrency circulation in Ukraine is achieved with several challenges, which are systematized in Table 1. Taking into account all these challenges, the key to success is a systematic approach aimed at creating an effective, safe and stable environment for the development and implementation of cryptocurrency in Ukraine. Considering all these challenges, it is important to approach the issue of cryptocurrency regulation in Ukraine with openness, flexibility and readiness to cooperate with open stakeholders.

On the basis of the conducted research, the systemic problems of the public management of cryptocurrency circulation in Ukraine were identified: regulatory

ambiguity (the lack of clear and unambiguous rules can lead to the danger of using them for illegal purposes, as well as create obstacles for law-abiding market participants); security and protection of investors (the high level of anonymity of cryptocurrency transactions can lead to the risk of fraud, loss of funds and mistrust on the part of investors); lack of a tax base (the absence of a tax system can lead to a loss of revenues to the state budget); lack of education (many citizens and entrepreneurs do not understand the level of influence of possible market risk, which can limit its development).

Table 1

Challenges and factors of increasing the efficiency of public management of cryptocurrency circulation in Ukraine

№	Challenges and factors	Characteristic
1	Regulation	Creating a clear and stable regulatory environment for cryptocurrencies is key. This includes established rules for consumer protection, anti-money laundering and other aspects of market abuse.
2	Technical training	Government structures need to have the appropriate technical expertise and knowledge to monitor and analyze cryptocurrency transactions.
3	Financial literacy	In order for the population in Ukraine to understand and correctly use cryptocurrencies, it is necessary to strengthen work on increasing financial literacy.
4	Consumer protection	Development of a mechanism to protect consumers from fraudulent schemes related to cryptocurrencies
5	Involvement of stakeholders	For successful regulation, it is necessary to interact with the main market participants: crypto exchanges, miners, developers, etc.
6	Anti-abuse	It is necessary to identify and stop the activities of shadow markets and other illegal platforms that buy cryptocurrency for illegal transactions.
7	Adaptation of traditional financial institutions	Traditional financial institutions such as banks must adapt to the new cryptocurrency environment, which may require changes to their operating models.
8	Increasing trust in cryptocurrencies	In some manifestations, there is a lack of trust in cryptocurrency, and in order to ensure widespread use, work must be done to increase trust in this technology.
9	Educational programs	Training personnel who understand the specifics of blockchain technology and cryptocurrencies is a key factor. This includes the creation of specialized courses at universities and other educational institutions.
10	Dialogue with the public	It is important to ensure that the public is included in discussions about cryptocurrency regulation, including through public hearings, workshops and working groups.

Source: systematized by the author [4-5]

On the basis of the conducted research, the systemic problems of the public

management of cryptocurrency circulation in Ukraine were identified: regulatory ambiguity (the lack of clear and unambiguous rules can lead to the danger of using them for illegal purposes, as well as create obstacles for law-abiding market participants); security and protection of investors (the high level of anonymity of cryptocurrency transactions can lead to the risk of fraud, loss of funds and mistrust on the part of investors); lack of a tax base (the absence of a tax system can lead to a loss of revenues to the state budget); lack of education (many citizens and entrepreneurs do not understand the level of influence of possible market risk, which can limit its development).

Solving these challenges requires a deep understanding of the cryptocurrency market, collaboration with industry experts, and a willingness to quickly adapt in response to changes in this dynamic field. Directions for solving the problem of managing the circulation of the cryptocurrency market include:

− regulatory measures. The government can take regulatory measures to ensure the legality, stability and security of the cryptocurrency market. This may include the development of new laws and regulations, as well as the adaptation of existing ones to regulate cryptocurrency transactions;

− licensing and registration. Through the use of licenses or market registration, transparency and accountability in the industry can be increased;

− control against money laundering (AML) and financing of terrorism (CFT). The AML/CFT security standard will help prevent illegal activities and protect investors and users;

− consumer rights protection. The government may establish mechanisms to protect the rights of cryptocurrency users, including compensation mechanisms in the event of theft or fraud;

− professional development. Ensuring proper professional development of employees in the field of cryptocurrencies will help improve the quality of service and reduce risks for customers;

− cooperation with international organizations. Ukraine can cooperate with international organizations and countries to exchange information, provide assistance in the investigation of criminal cases and develop international regulatory standards;

− promotion of innovations. The government can actively promote the development of innovations in the field of blockchain and cryptocurrencies, as well as fintech solutions. Innovative projects and start-ups can contribute to the development of the country and attract investments;

− financial literacy. Ensuring financial literacy among the population will help reduce the risks of uncontrolled use of cryptocurrency and help investors make effective decisions;

− dialogue with industry experts and the community. It is important to include industry experts, representatives of the crypto community and other stakeholders in the process of developing regulatory measures. Dialogue and collaboration can lead to more informed and effective decisions;

− international cooperation. The field of cryptocurrencies is global in nature, so it is

important to cooperate with other countries and international organizations to develop common standards and regulatory approaches;

− emphasis on safety. Ensuring a high level of cyber security and protection against cyber attacks can prevent the loss of funds and maintain trust in the cryptocurrency platform;

− stimulation of research. Cryptocurrency market support and analysis can increase government and regulatory research for decision-making [6-7].

These directions can help create a more stable and trusting climate for the market in Ukraine. However, before making any decisions, it is necessary to constantly research the issues and consult with experts in the fields of law, finance and cryptocurrencies.

The state has a significant potential to influence the formation and development of the cryptocurrency market in Ukraine. A balanced approach that combines strategic planning, adaptive regulation and active support for innovation can lead to stability, growth and competitiveness of the Ukrainian crypto industry market in the world market.

Given the rapid development of the cryptocurrency market and technology, it is important to remain flexible and ready to quickly adapt new rules and regulations in response to emerging challenges.

Financial Literacy and Education: A targeted campaign to increase public financial literacy in the field can help cryptocurrency prevent certain scams while promoting informed decision-making on the part of investors.

Supporting the ecosystem for development: Instead of regulation, the government can actively support and stimulate the development of the cryptocurrency sector by creating platforms for communication, startup funding and research.

Creation of public digital assets: The government may consider the possibility of creating its own digital currency (CBDC - Central Bank Digital Currency), which can serve as a means to modernize the national financial system and increase its competitiveness.

Encouraging IT infrastructure: Investments in the development of IT infrastructure can contribute not only to the circulation of cryptocurrency, but also to the integration of blockchain technologies into various sectors of the economy.

Data security: The protection of personal data and the confidentiality of transactions has a high status, in particular in the context of the storage and transfer of information through the blockchain.

Creation of specialized bodies: Considering the possibility of creating dedicated regulatory bodies that have an in-depth understanding of the crypto industry can help in carrying out regulatory tasks more effectively.

Public participation in the management of cryptocurrency circulation is a large aspect of the functioning of decentralized systems. The main ways in which the public can participate in this process include [8]:

1. Mining. In some cryptocurrency systems, like Bitcoin, miners maintain a decentralized network by confirming and storing transactions on the blockchain.

2. Participation in consensus. Some cryptocurrency protocols, for example, those

that use the Proof of Stake mechanism, can allow coin holders to participate in the process, after which transactions are confirmed.

3. Development and improvement of protocols. The public can participate in changes to cryptocurrency protocols through change proposal processes (such as Bitcoin Improvement Proposals or Ethereum Improvement Proposals).

4. Voting. Some platforms, such as Decred or Tezos, include voting mechanisms that allow communities to vote on changes to the protocol.

5. Public discussion. Forums, social networks and other platforms allow participants to discuss the direction of cryptocurrency development and circulation of funds.

6. Regulation. Citizens can influence governments' regulatory decisions through cryptocurrency public consultation and lobbying processes.

7. Education. Educating and informing people about cryptocurrency can help shape public opinion and influence decision-making [9].

In general, public participation provides a more transparent and open process for managing cryptocurrencies, allowing many participants in the network to interact and influence its development.

Conclusions. The public management of cryptocurrency circulation in Ukraine faces many challenges that require a complex and balanced approach. The development of the cryptocurrency market can bring significant benefits to the country's economy, including attracting investment, stimulating technological development and ensuring greater inclusive financial efficiency. However, it also requires appropriate regulation to prevent exposure to risks such as fraud, money laundering and volatility.

Among the key challenges that need to be taken into account are the development of clear legislation, the creation of a favorable innovation environment, increasing the level of education about cryptocurrencies, ensuring transparency and protection against cybercrimes. In addition, aspects such as integration with traditional financial systems, prevention of volatility, ethical aspects and environmental issues should be taken into account. Ukraine should also spread the experience of other countries introducing their own digital currencies. Given the speed of development of the cryptocurrency sector, the Ukrainian government should now begin to develop a strategy for managing cryptocurrency at the national level, including the development of appropriate legislation, the creation of consumer protection mechanisms and the stimulation of innovation. All stakeholders must be included in this process to ensure its effectiveness and legitimacy. Thus, improving the efficiency of public management of cryptocurrency circulation in Ukraine requires a comprehensive approach that ensures strategic thinking, flexibility, education and cooperation with key market players.

References:

1. Derbentseva, V., Babenko, V., Khrustalevc, K., Obruchd, H., & Khrustalova, S. (2021). Comparative performance of machine learning ensemble algorithms for forecasting cryptocurrency prices. International Journal of Engineering. Vol. 34, 1, 140-148.

2. Baur, D. G., Hong, KiHoon, Lee, A. D. (2018). Bitcoin: Medium of exchange or speculative assets? Journal of International Financial Markets, Institutions and Money, Vol. 54, 177-189.

3. Hunter, G. W., & Kerr, C. (2019). Virtual Money Illusion and the Fundamental Value of Non-Fiat Anonymous Digital Payment Methods: Coining a (Bit of) Theory to Describe and Measure the Bitcoin Phenomenon. International Advances in Economic Research, 25 (2), 151-164.

4. Kuzheliev, M. O., Zherlitsyn, D. M., & Nechyporenko, A. V. (2019). Bioresources Price Trend and GDP Growth Adjustment. International Journal of Advanced Biotechnology and Research (IJABR), Vol. 10, Special Issue 1, 379-383.

5. Morina, F., Hysa, E., Ergun, U., Panait, M., & Voica, M. C. (2020). The Effect of Exchange Rate Volatility on Economic Growth: Case of the CEE Countries. Journal of Risk and Financial Management, 13 (8), 13, Article 177.

6. Perchuk, O. V., Makarchuk, I. M., & Yaremenko, L. M. (2019). The prospects of using cryptocurrency bitcoin as a financial innovation in the information economy of Ukraine. Financial and Credit Activity-Problems of Theory and Practice, 4 (31), 419-427.

7. Tasca, P., Hayes, A., & Liu, S. W. (2018). The evolution of the bitcoin economy: Extracting and analyzing the network of payment relationships. Journal of Risk Finance, 19 (2), 94-126.

8. Telnova, H., Kolodiziev, O., Kuzheliev, M., Krupka, I., & Boiko, N. (2020). Foreign direct investment in the eurozone countries: stochasticity of the financial influence factors. Financial and Credit Activity-Problems of Theory and Practice, 4 (35), 107-120.

9. Yuzvovich, L. I., Isakova, N. Y., & Mokeeva, N. N. (2019). Bitcoin financial bubbles: digitalization and modeling. A. Nazarov (Ed.). Proceedings of the 1st International Scientific Conference Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth, Vol. 81. pp. 3-68.

UNIVERSALIZATION OF CONCEPTUAL MODELING FOR CRISIS MANAGEMENT IN ROAD ENTERPRISES BASED ON OBJECT-ORIENTED APPROACH

Natalya Sokolova,
Ph.D. in Economics, Associate Professor,
National Transport University, Kyiv, Ukraine
nata_ns@ukr.net; ORCID: 0000-0003-0678-8882
Vadym Nevinhlovskyi,
Ph.D. in Engineering, Associate Professor,
National Transport University, Kyiv, Ukraine
nevinglovskiy@ukr.net; ORCID: 0000-0003-0113-1822
Maksim Ruzhenskyi,
Ph.D. in Economics, Associate Professor,
National Transport University, Kyiv, Ukraine
max.ruzhensky@gmail.com; ORCID: 0000-0002-8034-1790

Annotation. *The article is devoted to the problem of taking into account different types of similarities in the conceptual models of enterprises, which is advisable when creating computer expert systems, in particular, those intended for crisis management. This is necessary in order to exclude reworking of the conceptual model components from the very beginning. Models and theories of crisis management are the basis for its further conceptual modeling. To develop them, it is advisable to use the so-called object-oriented approach, which makes it possible not to develop certain parts of the conceptual model each time, but to reuse them without any changes. This reduces the labor intensity, shortens the time required to create a conceptual model and improves its quality.*

Keywords: *crisis, management, conceptual model, object-oriented approach, quality model.*

Statement of the problem in general terms, its relevance for the important scientific and practical tasks. Russia's armed aggression against Ukraine led to a severe crisis in most road industry enterprises [1] (Fig. 1).

Effective ways to overcome this crisis in the current period, as well as in the future, in peacetime, require carrying out scientific research on the further improvement of crisis management in enterprises. Crisis management is part of a complex system of general management in enterprises, therefore, it depends on its multiple aspects and itself affects them. Such aspects, for example, are the categories of development, competitiveness, potential, economic stability of the enterprise, etc.

Any scientific research aimed at solving various problems, in particular economic problems, first has to design a conceptual model (or conceptual prerequisites), which, in the further development of the research, will be detailed to a level suitable for practical application. The inconsistency of the conceptual model with the real needs of the crisis management in enterprises can nullify the efforts and funds spent on poorly designed

methods and computer tools that will never be useful in practical work. Therefore, the problem of improving the crisis management in road enterprises depends directly on the quality and validity of its conceptual model, which meets the requirements of the economy, knowledge and digitalization of the economy.

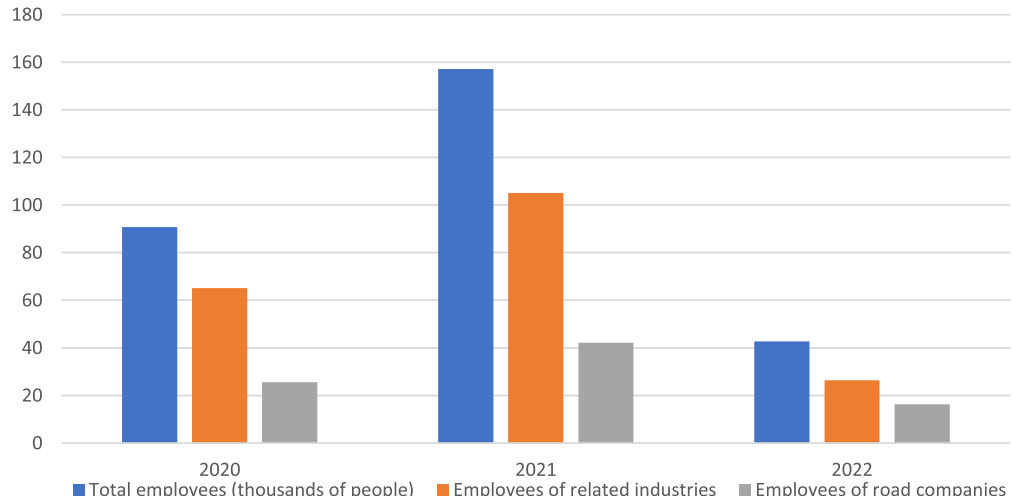

Fig. 1. Comparative histogram of the number of workers in the road industry in 2020-2022

The main content of the problem discussed in the article consists in clarifying the possibility of universalizing the development of conceptual models for crisis management in various types of enterprises by highlighting their similarities and differences, as well as the application of an object-oriented approach, so that it is not necessary to re-develop similar components of the conceptual model from scratch every time. This is important for economic science in relation to the enterprise as a whole, as well as for its anti-crisis management in particular.

The first two tasks in solving of the outlined problem are the analysis of existing models and theories of crisis management and the application of an object-oriented approach in conceptual modeling of crisis management.

Analysis of the recent research and publications. The concept of crisis, its essence, goals, principles and tools of crisis management in enterprises have been studied by many foreign and Ukrainian scholars.

The fundamental framework of the theory and practice of crisis management was laid down by well-known foreign scholars: S. Fink, I. Mitroff, T.C. Pauchant, P. Shrivastava, J. Burnett, T. Jacques, C. Alpaslan, S. Green, W.T. Coombs, K.M. Hearit, S. Holladay, W. Benoit; P. Buzzanell, E. Rogers, C.M. Pearson, J.A. Clair, A. Paraskevas, D. Pollard, S. Hotho, J.F. Preble, B. Robert, C. Lajtha, S. Sahin, S. Ulubeyli, A. Kazaza, P.J.H. Schoemaker, C.G. Wagner, J. Bundy, M.D. Pfarrer, K.D. Elsbach, N. Gillespie,

G. Dietz, S.D. Graffin, E.H. James, L.P. Wooten, K. Dushek and many others [2, 3].

In Ukraine, the development of scientific research on crisis management started in late nineties of the last century with the transition to market relations. The scientific works of I.O. Blank, L.S. Sytnyk, V.O. Vasylenko, L.O. Ligonenko, O.O. Tereshchenko, A.D. Cherniavskyi, A.V. Matviichuk, A.M. Shtangret and other scholars concluded that the content, main areas and problems of crisis management are very complex and multifaceted. The works of these researchers have further elborated the theory of the emergence and development of crisis situations, as well as the measures to lead enterprises out of crisis situations. Later, research on crisis management was carried out by S.T. Piletska, A.A. Oleshko, N.A. Antoniuk, O.V. Yurinets, O.Y. Sova [4], A.Y. Pohrebniak and many other Ukrainian researchers.

Based on the review of research primarily done by US scholars [5], we believe that models and theories of crisis management are the conceptual basis for all aspects of preparing an enterprise to a possible crisis, for its prevention, resolution and recovery or liquidation of an enterprise after a crisis. Below we consider the basic models and theories of crisis management presented in this review.

There are different approaches to the crisis management maturity model, from the most to least advanced (Fig. 2). Citation according to the source [5].

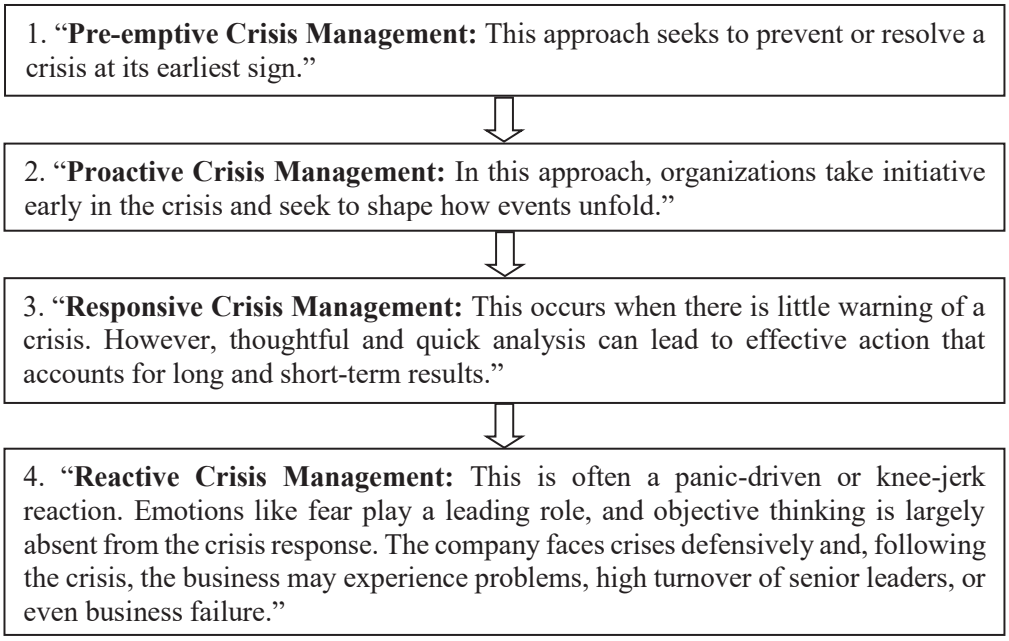

Fig. 2. The different approaches along a crisis management maturity model, from most to least advanced
Source: based on data [5]

Strategy planning in crisis management is carried out on the basis of scenarios or the

use of the company's potential.

The author of the review [5] A. Marker provides crisis management models that are based on the concept of their life cycle. They include:

– Steven Fink's four-stage crisis model consisting of the prodromal, acute, chronic, and resolution stages;

– A. Gonzalez-Herrero & C. Pratt's model with successive stages of birth, growth, maturity, and decline;

– the model by Ian Mitroff and colleagues contains five stages of crisis management and a portfolio model with a similar progression of the enterprise's life cycle: signal detection; probing and prevention; damage and containment; recovery; learning;

– John Burnett proposed a model of crisis management with three stages: identification, confrontation and reconfiguration, each consisting of two steps. This model also follows the life cycle of the enterprise;

– Tony Jacques' relational model, which has four primary elements: crisis preparedness, crisis prevention, crisis event management and post-crisis management – each containing clusters of activities and processes;

– the model by Can Alpaslan and colleagues focuses on stakeholder involvement and views the crisis management maturity continuum through crisis management behaviors: reactive, defensive, accommodative and proactive;

– the incident command system model originated in the real world and was later formalized as a model. The incident command system divides work into five broad areas: operations and logistics, a hierarchy of roles and responsibilities for key players that ensure a clear chain of command and communication. The model has spread both nationally and internationally and has since been adopted by many private sector organizations as well.

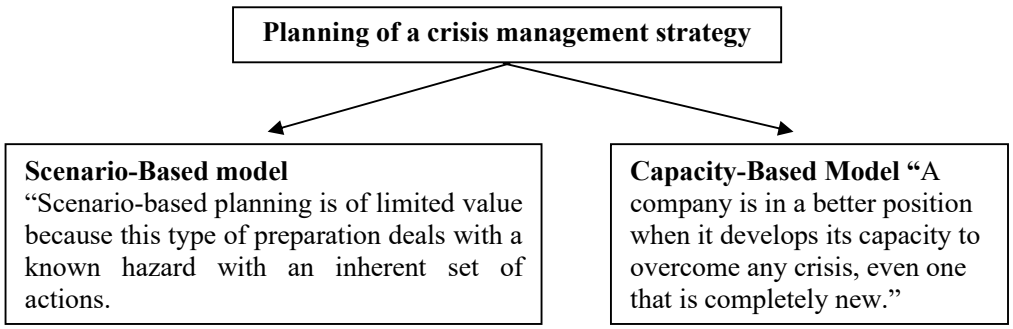

Fig. 3. Different approaches to the planning of a crisis management strategy
Source: based on data [5]

The most famous theories of crisis management according to [5] are:

– attribution theory and situational crisis theory;

– theory of apology;

– image restoration or repair theory;

– structural functional theory in crisis management;
– chaos theory and the butterfly effect in crisis management;
– stakeholder theory of crisis management;
– resilience theory and business continuity planning;
– contingency theory;
– diffusion of innovation theory;
– stability theory;
– human capital theory.

Based on the analysis of scientific sources, the following conclusions can be drawn:

– a crisis management model is a conceptual framework for all aspects of a crisis: preparation, prevention, resolution and recovery. By viewing events through a model, crisis managers gain the context they need, and can better apply best practices of crisis management;

– although the models have certain differences, there is also a certain similarity among them, which forms a prerequisite for the universalization of crisis management models.

Formulating article goals (setting the task). The purpose of the article is to put forward the idea of universalizing the conceptual modeling of crisis management based on the application of an object-oriented approach.

Presentation of the main research material. The crisis management models considered above are the basis of its further conceptual modeling. However, first we need to understand the difference between the terms «concept» and «conception», as there is a clear distinction between the two in scientific sources. Let us quote some definitions.

According to [6], «concept» and «conception» are two similar words that are created from the same Latin root concipere. Although these nouns are sometimes used interchangeably, they have different meanings. A concept basically refers to a general idea or understanding of something. Conception refers to how something is perceived, or the ability to form or understand thought (mental) concepts and abstractions. This is the key difference between «concept» and «conception». Concepts can be based on real phenomena and are a generalized idea of the meaning of something. A detailed interpretation of the concept was made by M. Poliuzhyn [7].

"A conceptual model is a representation of key elements of some target problem purposely excluding any design complexity. A conceptual model can be viewed as a part or phase of discourse about that target problem, usually early-on. In that sense a conceptual model is high-level" [8].

"A concept model, in contrast, is an aid in achieving precision in continuing discourse about some subject matter. It enables clear communication by allowing you to express statements (sentences) that can be readily understood and disambiguated. A concept model becomes ever more important the deeper you dig into the subject matter" [8].

"The form of a concept model never depends on the target. A concept model is always literally expressed by a set of definitions, each definition representing a concept. All connections between concepts are either verbal concepts (i.e., ones literally expressed

by verbs or verb phrases) or logical statements (e.g., specialization, the notion that one concept is a specialization of some other concept). No other kinds of connection are ever entertained." [8].

Thus, conceptualization is the definition of concepts, relations and management mechanisms necessary to describe the processes of problem-solving in a selected problem area, an abstract, simplified point of the view on the world, which is presented for certain purposes, or an abstract model of a certain phenomenon in the world, established through concepts related to this phenomenon. A conceptual model is a model represented by many concepts and relations among them, which defines the semantic structure of the subject area or its specific object.

The next topical concept of the article is the concept of the object-oriented approach, which we will consider according to [9]. In the object-oriented approach, the focus is on capturing the structure and behavior of information systems into small modules that combines both data and process. The main aim of object-oriented design is to improve the quality and productivity of system analysis and design by making it more usable. The characteristics of an object-oriented system are [9]:– objects − something that exists within problem domain and can be identified by data (attribute) or behavior. All tangible entities and some intangible entities are modeled as objects;

– attributes − describe information about the object;

– behavior − specifies what the object can do. It defines the operation performed on objects;

– class − encapsulates the data and its behavior. Objects with similar meaning and purpose grouped together as class;

– methods − determine the behavior of a class. They are nothing more than an action that an object can perform;

– message − a function or procedure call from one object to another. They are information sent to objects to trigger methods.

An object-oriented system comes with several useful features [9] which are:

– encapsulation − a process of information hiding or the combination of process and data into a single entity. Data of an object is hidden from the rest of the system and available only through the services of the class that allows improvement or modification of methods used by objects without affecting other parts of a system;

– abstraction − a process of taking or selecting necessary method and attributes to specify the object. It focuses on essential characteristics of an object relative to the perspective of a user;

– relationships − all the classes in the system are related to each other. The objects do not exist in isolation, they exist in relationship with other objects;

– inheritance − a feature that allows to create sub-classes from an existing class by inheriting the attributes and/or operations of existing classes;

– polymorphism and dynamic binding − ability to take on many different forms. It applies to both objects and operations. A polymorphic object is one whose true type hides within a super or parent class. In polymorphic operation, an operation may be carried out

differently by different classes of objects. It allows us to manipulate objects of different classes by knowing only their common properties. Polymorphism is an object-oriented programming concept that refers to the ability of a variable, function, or object to take multiple forms (one name − different forms). A polymorphic language allows developers to access objects of different types through the same interface.

It is appropriate to consider conceptual modeling in the object-oriented analysis according to [10]. To develop a conceptual model, first we analyze the requirements for the system that is being created. Requirement analysis is concerned with identifying concepts related to the requirements, and with creating a conceptual model of the problem domain. A conceptual model shows a static view of associations between concepts. A central distinction between object-oriented analysis and structured analysis is decomposition by concepts (objects) rather than decomposition by functions. Object-oriented requirement analysis is more concerned in identifying concepts related to the requirements and to create a conceptual model of the problem domain. This activity consists in how to identify objects or concepts and make them relate to each other and finally create a conceptual or domain diagram. Conceptual modelling helps us understand the problem further and develop a better awareness of our customer's business.

A concept may be considered in terms of its symbol, intension, and extension [10]:

- symbol – words or images representing a concept;
- intension – the definition of a concept;
- extension – the set of examples or instances to which the concept applies.

To unify the assessment of the quality of conceptual models, it is advisable to apply the research approach of Y. Argotti, C. Baron, Ph. Esteban [11]. The authors are based on the research of F. Deissenboeck, E. Juergens, K. Lochmann, S. Wagner at al. [12] regarding the integration of the quality model with «Definition – Assessment – Prediction» (DAP) and develop them (Fig. 4). Other examples can be that factors or quality characteristics can have different impact, or weight, in the overall system quality, or also, the question of "among the large number of existing quality models and factors, or quality characteristics, how to select and adapt to them to our system?" [11].

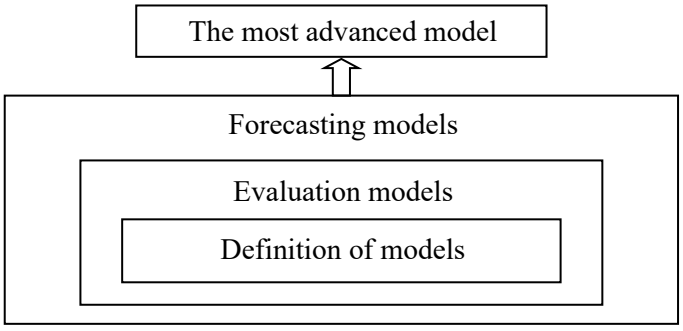

Fig. 4. The DAP classification introduced by F. Deissenboeck et al.
Source: based on data [12]

To overcome the shortcomings of the existing standards, the authors of the study [11] turned to qualimetry. The researchers propose a synthetized view on qualimetry, represented by what they call the "House of Qualimetry", that fosters its understanding, depicting quality models and measurement concepts. The authors consider it necessary to consolidate the concepts of quality model and measurement by proposing a unified quality model conception and a new measurement process. Finally, we review the interests, with respect to systems engineering, of a qualimetry approach reinforced with our contributions versus the traditional way of quantifying quality.

The authors apply the ideas of the object-oriented approach to designing the quality model. For this reason, they added a polymorphism attribute to the model. The essence of the approach is that the life cycle of an expert system for assessing the quality of a conceptual model should consist of the following successive stages: object-oriented analysis; object-oriented design; layout; implementation; integration testing.

It is clear that in the era of the digital economy and innovative approaches involving the knowledge economy, conceptual models, in terms of their design and use, should be implemented in the form of an intelligent expert enterprise management system with a crisis management subsystem, the core of which is computer software based on the application of the methodology of the object-oriented approach or other modern approaches. There is a need for normative standardization of approaches to crisis management based on deep theoretical and methodological research conducted at the state level.

By the way, Ukraine has joined the Recommendations of the Organization for Economic Cooperation and Development, the Council on Artificial Intelligence (Organisation for Economic Co-operation and Development, Recommendation of the Council on Artificial Intelligence, OECD/LEGAL/0449) [13]. In December 2020, the Cabinet of Ministers of Ukraine approved the Concept of the Development of Artificial Intelligence in Ukraine [14], European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103 (INL)) [15]. The development of an expert system based on an object-oriented approach will improve the modern paradigm of crisis management in enterprises, increase its quality, facilitate communications between developers, users and all interested parties, reduce the costs of developing and maintaining the system, etc.

Conclusions of this study and prospects for further research in this area. The analysis of available sources of information showed that the problem of anti-crisis management in enterprises remains largely unsolved, but it is relevant for countries all over the world, especially for Ukraine at the present time.

The modern paradigm of anti-crisis management is proactive. Proponents of the reactive paradigm are gradually losing their positions, but in practice the reactive approach prevails. This situation is explained by the absence of a specifically organized and continuously operating component within the enterprise.

Enterprises enjoy greater economic security, developing their potential, sufficient to overcome any crisis, even a completely new one. Businesses with planned crisis

management on the basis of a scenario model can specify response plans for known types of disasters, such as fires, but compared to a scenario-based model, a potential-based crisis management model emphasizes the formation of sufficient crisis management capabilities, such as communications, financial reserve plans and readiness to work remotely.

Anti-crisis management models are the basis for its further conceptual modeling. For their development, it is advisable to use the so-called object-oriented approach, which makes it possible to avoid developing certain parts of the conceptual model every time, but to reuse them without any changes. This provides a reduction in labor intensity, a reduction in the duration of creating a conceptual model, and also increases its quality.

In the era of the digital economy and the knowledge economy, conceptual models, in terms of their design and use, should be included in the intelligent expert management system of enterprises with the crisis management subsystem, the core of which is computer software based on the application of the object-oriented approach methodology or other modern approaches. There is a need for the regulatory standardization of approaches to anti-crisis management based on in-depth theoretical and methodological research conducted at the state level. All this will contribute to increasing the efficiency of enterprises and the economy as a whole, reducing losses caused by crises and the bankruptcy probability for enterprises.

References:

1. Nevinhlovskyi V.F., Zagornyak O.V., Sokolova N.M. (2022). Economic problems of entities managing the road industry during the state of martial law. DOI: 10.33744/2308-6645-2022-4-54-169-176

2. Bundy, J., Pfarrer, M.D., Short, C.E., & Coombs, W.T. (2017). Crises and Crisis Management: Integration, Interpretation, and Research Development. Journal of Management, 43(6), 1661-1692. URL: https://doi.org/10.1177/0149206316680030

3. Vašíčková, V. (2019). Crisis Management Process: a Literature Review and a Conceptual Integration. Acta Oeconomica Pragensia, 27(3–4), 61–77, URL: https://aop.vse.cz/pdfs/aop/2019/03/05.pdf

4. Sova, O.Y., Morozov Y.Y. (2020). Modern paradigm of anti-crisis management in enterprises. Scientific Notes of the V. I. Vernadsky Taurida National University. Series: Economics and Management, Vol. 31(70), No. 2(2), 43–47. DOI: https://doi.org/10.32838/2523-4803/70-2-45

5. Marker, A. (2020). Models and Theories to Improve Crisis Management. URL: https://www.smartsheet.com/content/crisis-management-model-theories

6. Hasa Difference Between Concept and Conception. URL: https://www.differencebetween.com/difference-between-concept-and-vs-conception/

7.Poliuzhyn, M. (2015). Notion, concept and its structure. Scientific Bulletin of the Lesia Ukrainka Eastern European National University, Chapter III: Theoretical foundations of Linguistic Studies, 4, 214–224. URL: https://evnuir.vnu.edu.ua/

bitstream/123456789/7847/1/43.pdf

8. Ross, R.G. (2019). Conceptual Model vs. Concept Model: Not the Same. Business Rules Journal, Vol. 20, No. 1, 6 p. URL: https://www.brcommunity.com/articles.php?id=b977

9. Object Oriented Approach. System Analysis and Design Tutorial. URL: https://www.tutorialspoint.com/system_analysis_and_design/system_analysis_and_design_object_oriented_approach.htm

10. Conceptual Modeling in Object-Oriented Analysis. URL: https://learn.saylor.org/mod/page/view.php?id=33011

11. Argotti, Y., Baron, C., Esteban, P. (2019). Quality quantification in Systems Engineering from the Qualimetry Eye. SysCon IEEE International Systems Conference (IEEE SysCon 2019), IEEE, Apr 2019, Orlando, United States. URL: https://hal.laas.fr/hal-02010891/file/ Quality quantification in System Engineering from the Qualimetry eye - Argotti et al.pdf

12. Deissenboeck, F., Juergens, E., Lochmann, K. & Wagner, S. (2009). Software quality models: purposes, usage scenarios and requirements. WoSQ'09. IEEE CS Press, 2009, 7 p. URL: https://www.researchgate.net/publication/224504045_Software_quality_models_Purposes_usage_scenarios_and_requirements

13. Organisation for Economic Co-operation and Development, Recommendation of the Council on Artificial Intelligence. URL: https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449

14. On Approving of the Concept of Artificial Intelligence Development in Ukraine: Resolution of the Cabinet of Ministers of Ukraine of 2 December 2020 No 1556-r. URL: https://www.kmu.gov.ua/npas/pro-shvalennya-koncepciyi-rozvitku-shtuchnogo-intelektu-v-ukrayini-s21220

15. European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103 (INL). URL: https://www.europarl.europa.eu/doceo/document/TA-8-2017-0051_EN.html

FINANCIAL INSTRUMENTS AS A SOURCE OF FACILITATING DIVERSIFICATION STRATEGY IMPLEMENTATION FOR ENTERPRISES

Dmytro Voronets,
Ph.D. in Economics,
Vadym Hetman Kyiv National Economic University
dmitry.ovm@gmail.com; ORCID: 0000-0002-1972-8574
Olga Garafonova,
Doctor of Economical Sciences, Professor,
Vadym Hetman Kyiv National Economic University
ogarafonova@ukr.net; ORCID: 0000-0002-4740-7057

Annotation. *This article focuses on the role of financial instruments as a crucial source for the successful implementation of the diversification strategy for enterprises. Diversification has become an essential tool in ensuring the stability and competitiveness of enterprises in a dynamic market environment. The article explores various financial instruments that can be utilized by enterprises to secure the required funding for new projects and the development of new business directions.*

Keywords: *financial instruments, investment activity, investment resource, diversification, enterprise, financing, strategic planning, risk, development.*

The urgency of research. Financial instruments serve as a crucial resource in ensuring the successful implementation of enterprise diversification strategies. They enable financial operations aimed at expanding the range of services and products, exploring new markets, and addressing competitiveness challenges.

In international economic relations, financial instruments play a significant role in attracting external investments and resources for diversification projects. They help ensure financial stability for enterprises and reduce the risks of financial losses. However, it is important to note that the selection of optimal financial instruments should be based on a careful analysis of the risks and opportunities associated with diversification strategies. Inappropriate use of financial instruments can lead to undesirable consequences and worsen the financial position of the enterprise.

Thus, well-implemented financial instruments represent a significant source of support and stimulation for the realization of enterprise diversification strategies, contributing to its sustainable development and enhanced market position.

Target setting involves identifying possible perspectives for using financial instruments during the implementation of enterprise diversification strategies in the modern economic development context.

Recent scientific research and analysis of financial instruments and their role in investment processes have been conducted by prominent scholars such as Ignatyuk V., Malakhova Y., Sukmanyuk V. [1], Rudenko O. [2]. The characteristics of financial

incentives within the context of state investment policy have been explored in the works of Lihonenko L. [3], Shevchuk I. [4], Hotsulyak L. [5], Tokmakova I. [6]. Researchers like Bryn P. [7], Tsogla O. [8], Margasova V., Garafonova O., Sakun O., Fedorenko A., Yankovoi R. [9] investigate the impact of financial instruments on diversification development in the context of global trends. Additionally, Bodie Z., Kane A., Marcus A. G. [10] study the role of financial instruments in stimulating investment activity and business diversification. Their research contributes to a comprehensive understanding of this issue and provides practical recommendations for effective utilization of financial instruments by enterprises.

Therefore, scholars worldwide are actively working on investigating financial instruments as a critical element for successful implementation of diversification strategies in enterprises, which ensures sustainable development and enhanced market positioning.

Uninvestigated aspects of general matters defining. Scientific research in this field helps identify effective instruments for enterprise operations, promoting their stable development and increased competitiveness in the market. Unexplored aspects in defining general issues are related to the lack of information about specific and practical financial instruments that support the successful realization of diversification strategies by enterprises.

The statement of basic materials and Conclusions. The implementation of diversification strategies is a crucial task for enterprises, especially in a dynamic market environment. Diversification enables expanding the range of products and services, reducing risks, and enhancing competitiveness. However, successful implementation of such strategies requires sufficient financial resources. Financial instruments play a pivotal role in providing the necessary means for diversification efforts. Offering loans, issuing stocks, bonds, leasing, venture capital, and other instruments allow enterprises to secure the required funds for expanding operations and exploring new directions. This list of financial instruments should be viewed as a range of possibilities that can assist enterprises in executing successful diversification strategies and achieving sustainable growth. The author has identified a list of ten financial instruments that can serve as sources for facilitating the realization of diversification strategies for enterprises:

1. Bank loans and credit: Providing financial support for expanding activities and venturing into new directions.
2. Equity capital: Utilizing internal resources of the enterprise to finance new projects and investments.
3. Stock issuance: Attracting funds through the issuance and sale of new shares on the capital market.
4. Bonds: Issuing corporate bonds to secure long-term financing.
5. Mortgage loans: Obtaining financing by pledging real estate or enterprise assets.
6. Leasing: Acquiring equipment and other assets through leasing agreements with the right to purchase.
7. Venture capital: Investing in startups and promising projects to generate profits.
8. Corporate bonds: Issuing bonds on the corporate debt market.
9. Derivative instruments: Utilizing futures, options, and other financial derivatives

to mitigate risks.

10. Foreign investor attraction: Attracting foreign investments to develop new ventures and diversify business activities.

Bank loans and credit are one of the most common financial instruments that enterprises can utilize to facilitate the realization of their diversification strategies. This instrument allows companies to obtain the necessary funds for expanding their activities, developing new products or services, and exploring new directions. The acquired loans can be used by enterprises to invest in new technologies, expand production capacities, launch marketing campaigns, or develop new markets. Credit resources help businesses secure the required amount of financing that may otherwise be unattainable through their limited internal financial resources.

One of the main advantages of bank loans is their flexibility. Enterprises can choose different types of loans based on their needs and repayment capabilities. Additionally, there are various loan conditions such as interest rates, terms, and repayment methods that can be negotiated according to the enterprises' capacities and requirements. However, the use of bank loans is also associated with risks. Enterprises must plan their solvency and ability to repay loans considering current and future financial constraints. Moreover, there is a risk of changes in loan conditions from the banks' side, which may impact the financial standing of the enterprise.

Overall, bank loans and credit are essential instruments for enterprises seeking to implement their diversification strategies, helping them secure the necessary financial resources for growth and the implementation of new business directions. Equity capital is another critical financial instrument for enterprises that can be used to support the implementation of diversification strategies. It represents the internal resources of the enterprise, such as profits, reserve funds, accumulated capital, and other assets. One of the main advantages of using equity capital is that it allows enterprises to avoid payments for credits or loans, reducing their financial expenses and risks associated with external obligations. Equity capital also provides enterprises with more flexibility and independence in decision-making since they are not dependent on external creditors or investors.

To utilize equity capital for financing new projects and investments, enterprises can employ various strategies. For instance, they can increase the size of reserve funds or accumulated profits, which can then be directed towards new projects. Enterprises can also conduct a restructuring of their equity capital by reallocating some assets or selling inefficient divisions to attract additional financial resources.

The use of equity capital allows enterprises to establish a stable financial foundation for developing new business directions, expanding product or service offerings, and effectively responding to changes in market conditions. It is important to strike the right balance between utilizing internal resources and attracting external sources of financing to ensure sustainable development and achieve set objectives.

Equity issuance is another effective financial instrument for enterprises aiming to implement a diversification strategy and facilitate business growth. This instrument involves the issuance of new company shares and their sale in the capital market, attracting

funds from investors and potential shareholders. The process of equity issuance begins with the company identifying the need for additional capital to develop new business directions or invest in existing or new projects. The enterprise determines the number of shares to be issued and the price at which they will be sold in the market.

During the equity issuance, the company may employ various methods of sale, such as an initial public offering (IPO), private placement of a share package, or issuing additional shares to existing shareholders (secondary offering). This process is typically conducted with the involvement of investment banks, which help attract potential investors and carry out a successful issuance. The funds raised from equity issuance can be used to finance new projects, expand the company's activities, acquire new enterprises or technologies, or repay debts or enhance the company's capitalization. One of the advantages of equity issuance is that the company raises funds without being obligated to pay interest or compensate creditors. Additionally, equity issuance allows the company to attract a broad range of investors, increasing its attractiveness in the market and promoting business development.

However, equity issuance also comes with certain risks, such as dilution of ownership structure, the possibility of losing control over the company if a significant portion of shares is sold, and the need to ensure a high level of transparency and trust from investors. Therefore, before conducting equity issuance, the enterprise should carefully analyze the risks and benefits of this financial instrument and adopt an appropriate strategic approach to its implementation. Bonds are another significant financial instrument that helps enterprises implement their diversification strategy and secure stable and long-term financing. Corporate bonds are debt securities that companies issue to attract capital from investors.

When a company decides to issue bonds, it sets a specific amount of debt that it commits to repay with interest over a defined period. Such bonds may have different maturity terms, for example, 5, 10, or 20 years, enabling the company to attract long-term financing for important projects and the development of new business directions. The advantages of bonds include the ability to raise funds at a lower interest rate compared to loans or bank credit. Additionally, bond issuance does not require the company to sell a share of its stocks, allowing it to retain control over the business.

The terms of bond issuance, such as interest rates, maturity period, and other conditions, are determined by the company based on an analysis of financial indicators, risks, and financing needs. Investors, in turn, consider bond issuance as a means of placing their funds to generate stable, long-term income. However, bond issuance is associated with certain risks, particularly the risk of insufficient solvency of the company to repay the debt and interest, which can lead to a decrease in investors' confidence. Therefore, the company must approach the bond issuance process with great responsibility and ensure timely and stable repayment of the debt and interest.

Mortgage loans are one of the important financial instruments that businesses can use to secure financing for their projects and investments. This type of credit is based on the collateral of real estate or other assets owned by the company. When a company needs additional funds for a new project or business expansion, it can approach banks or

other financial institutions to obtain a mortgage loan. In this case, the company pledges its real estate or other assets with sufficient market value to ensure the reliability of loan repayment.

One of the advantages of mortgage loans is that they provide businesses with access to additional financial resources on more favorable terms. Since the credit is secured by collateral, it reduces the risk for the creditor and allows for a lower interest rate on the loan. As a result, the company can obtain the necessary funds at lower interest costs, making its projects more efficient and profitable. It is also important to note that mortgage loans allow businesses to use the pledged real estate or assets even during the loan repayment process. This enables companies to continue effectively using their assets for business development, providing a more flexible approach to financing. However, it is worth mentioning that mortgage loans also carry certain risks for the company. In case of failure to fulfill obligations to the creditor, the company may lose the pledged real estate or assets. Therefore, before taking a mortgage loan, the company should carefully assess its solvency and ensure a reliable strategy for loan repayment.

Leasing is a popular financial instrument that allows businesses to acquire necessary equipment and other assets through a rental agreement with an option to purchase. This mechanism becomes an effective solution for enterprises that require specialized equipment for their activities but lack sufficient financial resources to purchase it outright. In a leasing agreement, the lessor, usually a financial company or specialized leasing intermediary, acquires the equipment using its own funds and provides it to the lessee (the enterprise) for rent. The lessee is obligated to make regular lease payments, similar to rent, throughout the leasing agreement. The agreement can have various terms, ranging from several months to several years.

During the leasing agreement, the enterprise gains access to the necessary assets, enabling it to develop and enhance production efficiency. In some cases, after the leasing term ends, the enterprise may have the option to purchase the equipment for a nominal amount or at a price that has already been partially compensated during the lease. Leasing is especially beneficial for enterprises that require frequent and flexible upgrades of their equipment. After the leasing term expires, the enterprise can renew the agreement for new equipment, allowing it to always have access to modern technologies and equipment without significant capital investments. Thus, leasing enables businesses to implement their diversification strategies, improve efficiency, and competitiveness necessary for sustainable development.

Venture capital is one of the financial instruments aimed at investing in startups and promising projects with high potential for profitability. This type of investment is used to finance innovative technologies and business ideas that have significant risk but may yield high returns in the future. Venture investors, such as venture capital funds, private investors, or corporate venture funds, invest their funds in startups at early stages of development when they typically do not yet generate profits or have a stable financial position. This makes venture capital investments quite risky but can lead to substantial capital growth if the startup successfully develops.

Venture capital is particularly important for innovative industries such as technology,

biotechnology, internet startups, etc., where there is high risk but also great potential to disrupt traditional markets and create new revolutionary products or services. After the investment, venture capital usually actively helps startups manage, develop, and find new opportunities. Investors often provide expert advice, support in developing business strategies, and help attract new investors for further funding rounds. Thus, venture capital serves as an essential source of funding for startups and promising projects, helping them realize their ideas and achieve success in the market, while also contributing to the development of innovative ideas and technologies.

Corporate bonds are a type of financial instrument used by companies to secure long-term financing, as opposed to short-term loans or bank loans. When issuing corporate bonds, a company promises to pay bondholders a certain interest income (coupon) over a specified period and return the value of the bonds at a certain point in the future (maturity). Issuing corporate bonds allows companies to raise significant amounts of money to finance their projects, expand their operations, invest in new technologies, or acquire assets. This provides companies with stable access to long-term capital, which can be crucial for strategic development and increased competitiveness.

Corporate bonds can be issued on both the domestic and international capital markets. To successfully raise funds through bond issuance, a company must have a sufficient credit rating, which provides investors with a high level of confidence in the company's ability to repay the bonds and interest on time. Corporate bonds have different characteristics, such as maturity terms, interest rate levels, interest payment rules, and can be either secured by company assets or unsecured. Investors who purchase corporate bonds receive a stable income stream from interest payments and may also receive the return of the principal amount in the future. Overall, the issuance of corporate bonds is an important financial instrument for companies, helping to ensure stable financing and implement diversification strategies, ensuring stability and success in the market.

Derivative instruments are a complex group of financial instruments based on the value of an underlying asset, such as stocks, currencies, commodities, bonds, etc. The main purpose of using derivatives is to reduce risks associated with fluctuations in the prices of underlying assets and protect the company's portfolio from unwanted financial risks.

Futures are one type of derivatives where parties agree to buy or sell an asset at a certain price on a specific future date. This allows a company to lock in the price of the asset and reduce the risk of further price fluctuations. For example, a company involved in importing goods can use a futures contract to hedge against currency exchange rate fluctuations, thereby avoiding adverse changes in the cost of the ordered goods.

Options are another type of derivatives where the option holder has the right but not the obligation to buy or sell an asset at a certain price on a specific future date. This provides the company with flexibility in managing risks. For instance, a company may purchase a call option on crude oil to secure the right to buy oil at a fixed price in the future if its price increases, thus mitigating the risk of unfavorable changes in the cost of its products.

In general, using derivative instruments allows companies to reduce risks associated

with asset price changes, ensure financial stability, and protect their business from adverse market conditions. However, using derivatives also comes with certain risks, and therefore, careful analysis and consultation with financial management experts are necessary before employing them.

Attracting foreign investors is one of the effective financial instruments for implementing a company's diversification strategy. Foreign investors can provide significant funding and expertise to develop new business directions, allowing the company to expand its capabilities and enter new markets. To attract foreign investors, a company must take several key steps. Firstly, it needs to analyze its potential competitive advantages and investment opportunities that would attract the attention of foreign investors. Strategic directions that are worth developing with the help of foreign capital should be identified.

Secondly, the company should actively promote its business and opportunities for foreign investors in international markets. This can be achieved through participation in exhibitions, conferences, presentations, and meetings with potential investors.

Thirdly, the company needs to create an attractive investment proposal that includes a clear diversification strategy, development plans, financial indicators, and expected results. Foreign investors typically invest in projects that have a clear and promising business model.

The most common forms of attracting foreign investors are Foreign Direct Investments (FDI) and investment projects on the basis of partnerships or joint ventures. In FDI, the foreign investor becomes the owner of a certain share of the company and participates in its management, while in joint ventures, a joint structure is created with the participation of foreign and local capital. It is essential to remember that attracting foreign investors also comes with risks, including political and economic risks. Therefore, a thorough analysis, investor selection, and favorable agreements that consider the interests of both parties should be carried out before starting cooperation with foreign investors.

Conclusions. Financial instruments are essential for enabling the implementation of a company's diversification strategy. These instruments provide companies with the opportunity to attract the necessary resources and financing for expanding their operations and introducing new directions. Based on the analysis of 10 different financial instruments, the following conclusions can be drawn:

Bank loans and credit:

1. Providing financial support for expanding activities and venturing into new directions.
2. Equity capital: Utilizing internal resources of the enterprise to finance new projects and investments.
3. Stock issuance: Attracting funds through the issuance and sale of new shares on the capital market.
4. Bonds: Issuing corporate bonds to secure long-term financing.
5. Mortgage loans: Obtaining financing by pledging real estate or enterprise assets.
6. Leasing: Acquiring equipment and other assets through leasing agreements with the right to purchase.

7. Venture capital: Investing in startups and promising projects to generate profits.
8. Corporate bonds: Issuing bonds on the corporate debt market.
9. Derivative instruments: Utilizing futures, options, and other financial derivatives to mitigate risks.
10. Foreign investor attraction: Attracting foreign investments to develop new ventures and diversify business activities.

The successful implementation of a company's diversification strategy depends on a thorough analysis and selection of optimal financial instruments, as well as consideration of risks and investor interests. The use of diverse financial instruments can help companies ensure stable growth and enhance their competitiveness in the market.

References:

1. Ignatiuk V.V., Malakhova Yu.A., Sukmanyuk V.M. Modern sources of financing investment needs of the enterprise. Priazovsky Economic Bulletin, 2020, No. 2 (19). [Electronic resource]. URL: http://pev.kpu.zp.ua/vypusk-2-19

2. Rudenko O.A. Features of regulating investment processes and studying investment potential in post-socialist countries. Economics and Management Organization, 2019, No. 1 (33), pp. 85-91.

3. Lihonenko L. O., Molodozhenia M. S. State and problems of implementing economic management in Ukrainian enterprises. Problems of Economics. - 2014. - No. 1. - pp. 65-71. - URL: http://nbuv.gov.ua/UJRN/Pekon_2014_1_9.

4. Shevchuk I. V. Influence of tax policy on investment processes in Ukraine. Bulletin of ZHNAEU, 2015, No. 1 (48), Vol. 2, pp. 160-170.

5. Hotsuliak L. V. Investment policy of developed countries in the context of the emergence of an innovative economy. Effective Economy, No. 9, 2014. [Electronic resource]: URL: http://www.economy.nayka.com.ua/?op=1&z=3330

6. Tokmakova I. V. Development of transport infrastructure potential in the conditions of expansion of international integration as a factor of economic growth of Ukraine [Electronic resource]. Visnyk ekonomiky transportu i promyslovosti. – 20XX.

7. Brin P.V., Perehodova L.O. Diversification of economic activity of enterprises. Bulletin of National Technical University "KhPI". Series: Actual Problems of Development of Ukrainian Society. 2013. 69 (1042). Pp. 172—175.

8. Tsogla O.O. Formation of competitive advantages of the enterprise through diversification of its activities. Actual Problems of Economics. 2010. No. 4. Pp. 109—115.

9. Margasova, V. G., Garafonova, O. I., Sakun, O. S., Fedorenko, A. Ye., & Yankovoy, R. V. (2021). FINANCIAL INSTRUMENTS OF STIMULATING INVESTMENT ACTIVITY: FOREIGN ASPECT. Financial and Credit Activity Problems of Theory and Practice, 4(35), 121–128.

10. Bodie Z., Kane A., Marcus A. J. Principles of Investments: Translation from English. 4th edition. Moscow: Williams, 2008. 984 p.

INNOVATIVE DEVELOPMENT OF DOMESTIC BUSINESS: A NEW VECTOR OF UKRAINE'S FOREIGN ECONOMIC STRATEGY

Roman Yankovoi,
Ph.D. in Economics, Associate Professor,
Higher Educational Institution «Academician Yuriy Bugay International Scientific and Technical University», Ukraine
javagaz@ukr.net; ORCID: 0000-0001-5307-0991

Annotation. *The article examines the innovative development of domestic business as a new vector of Ukraine's foreign economic strategy. Key aspects such as research and development, partnerships, culture of innovation, technology implementation, continuous improvement, financing of innovations and adaptation to market changes are presented. The advantages of international cooperation for joint innovation projects and export of Ukrainian innovative products to the world market have been investigated.*

Keywords: *innovation, domestic business, foreign economic strategy, globalisation, investment, high-tech solutions, export, international cooperation.*

Introduction. Ukraine has significant potential for innovative development, which can be a key factor in improving its foreign economic strategy. Innovative technologies and products are becoming an increasingly important catalyst for economic development, creating competitiveness and opening up new opportunities in international markets. The objective of the research is to study innovative approaches and technologies that could improve the country's foreign economic strategy, in particular in the context of export activities and cooperation with other countries.

The study of innovative business development and foreign trade strategy is a complex topic that may include various aspects of economics, business, technology, politics, etc. Ukrainian scholars and experts who have conducted research and published on the aspects of innovation and foreign trade include: T. Mylovanov - an economist and scholar who has worked on international trade and economic reforms. He is also known for his views on innovation in the Ukrainian economy; O. Talvin, an economist who has worked on financial stability and innovative development; I. Burkovskyi, a researcher at the Centre for Economic Strategy who has frequently commented and analysed the economic situation in Ukraine; M. Zhernakov, an economist who studies microeconomic aspects of the Ukrainian economy and its innovative development; Valentyna Zhovtyak, an economist and scholar who has frequently researched Ukraine's innovation potential and its foreign economic relations, especially with EU countries; O. Pochkun is a digital economy specialist who often considers the integration of new technologies into the business processes of domestic companies; Y. Honcharuk - a researcher who analyses strategies for the development of small and medium-sized businesses in Ukraine, in particular in the context of innovation and foreign trade; O. Minich is

an expert in the field of foreign economic policy who actively studies the impact of global trends on the innovative development of Ukraine; A. Dligach - a researcher who focuses on technological modernisation and innovative activity of Ukrainian enterprises; T. Vyshnevskyi - a scientist who is actively engaged in the analysis of economic reforms, their impact on innovative development and international economic relations of Ukraine.

These scientists and experts represent only a part of the academic community of Ukraine that studies the issues of innovation development and foreign economic strategy. There is a significant number of other specialists who make a significant contribution to the development within this field.

Research results. Innovative development of domestic business is the process of introducing new ideas, technologies, products or services that help businesses grow, develop and remain competitive in the market. Innovation can relate to various aspects of business, including processes, products, marketing, administration and technology. Here are some key aspects of innovative development of domestic business.

1. The state of the innovation sector in Ukraine. The state of the innovation sector in Ukraine, as in many other countries, is dynamic and depends on numerous factors, such as political stability, economic development, investment and global trends. Ukraine has become one of the key countries in Europe in terms of IT development. Cities such as Kyiv, Lviv, Kharkiv and others have become centres for the development of IT start-ups and outsourcing companies. This is driven by a highly skilled workforce, an eastern time zone that is convenient for cooperation with Western Europe and the US, and competitive service prices. Ukraine's innovation sector has produced a number of successful start-ups that have attracted international investment and entered the global market [1-2].

Despite its potential, Ukraine's innovation sector faces challenges that limit its development. These include insufficient investment in science and research, low commercialisation of scientific developments, bureaucratic complexity, low number of patent applications, unstable legal environment, and insufficient government support.

As a result of the study, we have systematised the areas for the development of the innovation sector in Ukraine:

− venture capital funding. Although the venture capital market in Ukraine is still developing, some venture capital funds and angel investors are actively looking for opportunities to invest in promising startups. This is a positive sign of growing confidence in the country's innovation potential.

− talent. Ukraine's higher education system continues to produce highly qualified specialists in technology, mathematics and natural sciences. Many young Ukrainians also support education abroad, while maintaining ties with their home country and facilitating the transfer of knowledge and skills.

− technical groups and communities. Ukraine has a vibrant community of developers, engineers and entrepreneurs that organises numerous events, workshops, hackathons and conferences to facilitate the exchange of ideas and best practices.

− start-up ecosystem. Ukraine's major cities, especially Kyiv, Lviv and Kharkiv, are becoming really attractive to young entrepreneurs thanks to the availability of coworking

spaces, accelerators and support from local organisations.

− foreign economic activity. With the signing of the Association Agreement with the European Union, Ukraine has received favourable conditions for cooperation with European partners in the field of technology and innovation.

− legislation. While some legislation is in place to support innovation, much work remains to be done to create an optimal legal environment for innovation.

− energy and green technologies. Given the global trend towards renewable energy sources, Ukraine also plans to increase the share of green energy in the overall energy mix. Investments in solar, wind and bioenergy, as well as energy efficiency projects, remain increasingly relevant.

− agTech. The agriculture sector has always been a growth area for Ukraine. Thanks to modern technologies such as IoT, drones, biotechnology and data analytics, Ukrainian farmers have the opportunity to optimise their production and make it competitive on the global market.

− biotechnology and medicine. Biotech and medical innovation start-ups are also finding their place in the market, developing new solutions for diagnostics, treatment and health maintenance.

− integration with the global market. A growing number of Ukrainian technology companies are going global and producing high quality products and services.

− support from the diaspora. The Ukrainian diaspora abroad actively supports the development of the innovation sector in Ukraine by offering mentorship, investment, and opportunities for cooperation [3-4].

To ensure the sustainable growth of the innovation sector, it is important to focus on long-term planning, attracting foreign capital, developing domestic technologies and training. despite the existing challenges, Ukraine has every chance to become a statistical leader in innovation in Europe due to its technical potential, talented specialists and strategic location.

2. The importance of innovation development for Ukraine's foreign economic strategy. Innovative development is becoming a strategic factor in determining the country's foreign economic strategy. Innovative products and services allow Ukrainian companies to gain a foothold in the international market, attract new investments, create an advantage in competition and help improve the country's image on the global arena. Innovations can become a driver of economic growth, help to gain competitive advantages in world markets and improve the quality of life of the nation. Here are some of the key implications of innovation development for Ukraine's foreign economic strategy:

− increased export potential: new technologies, goods and services can open new markets for Ukraine or increase the number of existing markets;

− attractiveness for foreign investment: innovative activities can make Ukraine more attractive to foreign investors looking for opportunities in areas with high technological potential;

− technology transfer: cooperation with foreign partners can help to introduce the

latest technologies and increase the competence of local companies;

− diversification of the economy: innovation can help Ukraine broaden its economic base by reducing its dependence on traditional industries;

− increasing competitiveness: innovations can enable Ukrainian companies to become more competitive abroad by offering unique solutions or higher quality goods/ services;

− support for sustainable development: innovations in the field of energy efficiency, ecology and sustainable development can contribute not only to increasing exports, but also to reducing the environmental impact of the economy [5-6].

In order to fulfil these benefits, Ukraine needs a clear strategy to support innovation, aimed at creating a favourable environment for R&D, technology commercialisation and cooperation with international partners.

3. Challenges and obstacles to innovation development. To succeed in innovation development, Ukraine needs to address a number of challenges:

a) Insufficient support from the government. The state should intensify support for the innovation sector by creating a favourable legal environment, investment incentives and promoting the commercialisation of scientific developments;

b) Insufficient investment. The government should attract investments from both domestic and external sources to stimulate scientific and technological progress and the development of innovative projects;

c) Development of education and research. Ukraine should intensify investments in education and research, promoting the creation of high-quality scientific personnel and research institutions;

d) Commercialisation of scientific developments. An important stage is the transformation of scientific developments into commercially successful products, which requires support from the state and the introduction of mechanisms to facilitate technology transfer between science and industry;

e) Promotion of patent activity. Ukraine needs to strengthen its patent activity to protect the intellectual property of domestic innovations and help them take their place in the global market [7] ;

4. Stimulating the innovation potential of domestic business.

a) Financial support. The government should provide financial support to innovative enterprises through grants, subsidies and tax incentives to attract investment and create incentives for innovation.

b) Promoting innovation clusters. The creation of innovation clusters will help to combine the potential of producers, researchers and investors to jointly introduce innovative ideas and products to international markets.

c) Attracting foreign partners. Partnerships with foreign companies and institutions will allow Ukrainian enterprises to gain access to new technologies, knowledge and resources, as well as to introduce their innovative developments in foreign markets.

d) Development of innovation infrastructure. An important aspect is the development of infrastructure for innovative advancement, such as technology parks, incubators

and research centres, which will stimulate knowledge exchange and facilitate the commercialisation of ideas [8].

5. Promotion of Ukrainian goods and services in foreign markets.

a) Marketing strategy. Ukrainian enterprises need to develop an effective marketing strategy that emphasises the innovative features of their products and services and their competitive advantage in international markets.

b) Participation in exhibitions and conferences. Active participation in international exhibitions and conferences will help to promote Ukrainian producers of innovative goods and services, attract new customers and partners.

c) Cooperation with trade delegations. Enterprises should actively cooperate with state trade delegations and diplomatic missions to get support in exploring foreign markets and attracting new customers [9-10].

The issue of determining the modern vectors of Ukraine's foreign economic strategy in the early 2020s is becoming relevant:

1. Development of export potential: promoting the growth of the export sector, expanding markets for Ukrainian goods and services, and diversifying export markets to reduce dependence on individual countries.

2. Investments and investment climate attractiveness: stimulating foreign direct investment, protecting investors, improving the business climate and unlocking the potential for attracting foreign investment.

3. Trade development: deepening trade ties with partners, learning and expanding free trade agreements, and participating in integration processes (e.g., the European Union, the World Trade Organisation, etc.).

4. Diversification of energy sources and energy resources: development of alternative energy sources, unlocking the potential of renewable energy, improving energy efficiency and reducing dependence on imports of certain energy resources.

5. Development of transport infrastructure: modernisation and development of transport infrastructure to improve connectivity and ease of trade and transport of goods.

6. Support for exporters and small enterprises: providing assistance to exporters, simplifying export procedures and supporting small and medium-sized businesses in export operations.

7. Innovations and digital technologies: support for the development of innovations and the introduction of digital technologies to increase the competitiveness of the Ukrainian economy.

8. Regional cooperation: strengthening cooperation with other countries and regional blocs to develop joint projects, reduce trade barriers and address common economic challenges [11-12].

Continuous development and improvement are key elements to ensure successful innovative development of domestic business and increase its competitiveness in international markets. The scientific novelty of the article lies in the originality of the study and general modern approaches to the topic. We propose several areas of improvement that can help Ukraine realise its potential and become an innovative leader in the world.

Development of innovation infrastructure. Ukraine needs to invest in the creation of innovative research centres, technology parks and incubators that facilitate interaction between business, science and education. Such infrastructure would create favourable conditions for the introduction of advanced technologies and ideas.

Support for innovative start-ups. The government should create special programmes and financial instruments to support innovative start-ups. Investing in promising startups can help grow successful technology companies and become a source of new ideas and solutions.

Ensure access to finance. Ukrainian companies need access to financial resources to invest in research, development and implementation of new technologies. The development of alternative sources of funding, such as venture capital and investment funds, can help facilitate this process.

Promoting an innovative educational environment. The development of innovative businesses starts with highly skilled and creative personnel. The government should ensure that the educational system is properly developed to foster the innovative abilities of students and researchers. It is also important to attract foreign experts and specialists to share knowledge and experience.

Engaging foreign partners. Collaboration with foreign partners and companies can help domestic businesses ensure technological transfer, implement best practices, and open new markets. Creating favourable conditions for foreign investors can lead to the attraction of significant capital and technological expertise.

Development of innovative industries. It is important to locate selective areas of innovative business development, such as information technology, green energy, biotechnology, medical technology, etc. Investing in this sector can help Ukraine gain a strong position in global markets and ensure the sustainability of economic development.

Innovative business development is a key factor for achieving success and competitiveness in today's environment of rapid technological progress. The areas that support innovative business development include:

1. Research and development of new products and technologies. Investing in research and development is a key success factor in an innovative business. Companies should stimulate their research departments and collaborate with universities and research centres to create new products and technologies that will meet market needs and improve the quality of life.

2. Digital technologies and the Internet of Things. Digital technologies are currently transforming the entire business sector. The use of artificial intelligence, data analytics, cloud technologies and the Internet can help companies optimise processes, increase productivity, reduce costs and take advantage of market opportunities.

3. Green economy. Companies should look for ways to reduce their environmental footprint by implementing green technologies, energy efficiency, waste recycling, and promoting the use of renewable energy sources.

4. Improving customer experience. Given the growing expectations of consumers, innovative approaches to improving customer experience can become a competitive

advantage. Personalisation, fast order processing, efficient service support and the use of social media to interact with customers can increase customer loyalty and satisfaction.

5. Developing talent and personnel. Innovative business development requires highly skilled employees with creative thinking. Companies should invest in talent development, creating favourable conditions for creativity, learning and personal growth of their employees.

6. Collaboration and partnership. Collaboration with other companies, start-ups, universities and research institutes can facilitate the exchange of knowledge, ideas and technologies. Partnerships can provide access to new markets and resources, and help create innovative solutions.

Taken together, these areas of improvement can contribute to the innovative development of domestic businesses and strengthen Ukraine's position on the international stage. Systemic measures to support the innovation environment, aimed at creating favourable conditions for the development and implementation of advanced technologies and ideas, should be a priority.

Conclusions. Innovative development of domestic business can become a key tool in improving Ukraine's foreign economic strategy. Accelerating the innovation potential of domestic companies, creating favourable conditions for the development of innovative ideas and products, and promoting Ukrainian goods and services on foreign markets are key areas that will help the country take its rightful place in the global economic space. By providing adequate support to the innovation sector, Ukraine will be able to fulfil its potential and strengthen its competitiveness in the international arena. However, in order to succeed, special attention needs to be paid to addressing a number of issues that currently hinder innovation development in the country.

First, the government should focus on creating a favourable legal and regulatory environment for innovative enterprises. Introducing a simplified procedure for registering intellectual property, protecting the rights of owners of innovative developments, and reducing bureaucratic obstacles are just some of the measures that will help speed up the process of commercialising innovations.

Second, investment in R&D and education is critical to ensuring innovative growth. The government should promote the development of research institutes, laboratories and technology parks, as well as encourage businesses to invest in research and development. Involvement of the business sector in cooperation with universities and research institutes will help to effectively use scientific potential to create innovative products and technologies.

Third, promoting Ukrainian innovative goods and services on foreign markets requires the development of international cooperation. Ukrainian enterprises should actively cooperate with foreign companies, participate in international exhibitions, conferences and business forums. It is also important to develop diplomatic relations and trade delegations to actively promote Ukrainian innovations on the global market.

However, to ensure the success of the innovative development of domestic business, it is important to ensure coordination of efforts between government agencies, business,

academic institutions and the public sector. Only through joint efforts will the country be able to become an innovation leader and attract investment and technology from abroad.

References:

1. Mylovanov, T. (2020). Innovative development and international trade: Ukraine on the way to global competition. Kyiv: Ekonomika Publishing House. pp. 14-67.
2. Tatvin, O. (2019). Digital transformation and foreign economic relations of Ukraine. Dnipro: University Publishing House. pp. 43-109.
3. Burkovskyi, I. (2018). Strategies of innovative development in the context of globalisation. Lviv: Academic World. pp. 92-134.
4. Zhovtiak, V. (2021). Ukraine and the EU: new horizons of innovative cooperation. Cherkasy: Central Publishing House. pp. 33-94.
5. Pochkun, O. (2020). Digital economy: challenges and opportunities for Ukraine. Kharkiv: Kharkiv National University Press. pp. 58-102.
6. Honcharuk, Y. (2021). Foreign Economic Strategy of Ukraine in the Context of Innovations. Ivano-Frankivsk: Prykarpattya Publishing House. pp. 40-85.
7. Minich, O. (2019). Global trends and innovation potential of Ukraine. Zaporizhzhia: ZNU Publishing House. pp. 24-80.
8. Kushniruk, V. (2020). Digitalisation in Ukrainian business: challenges and prospects. Zhytomyr: Technology Publishing House. pp. 111-155.
9. Savchenko, L. (2018). Modelling of innovation processes in foreign economic activity. Kryvyi Rih: KRU Publishing. pp. 46-79.
10. Petrenko, M. (2019). Implementation of technologies 4.0 in the export strategy of Ukraine. Poltava: Poltava Publishing House. pp. 20-65.
11. Yaroshenko, T. (2021). Modern approaches to the formation of an innovative economy in Ukraine. Vinnytsia: Vinnytsia National University. pp. 88-123.
12. Kornienko, O. (2018). The role of the state in stimulating innovation. The role of the state in stimulating innovation development of enterprises. Mykolaiv: MSU Publishing House. pp. 35-72.

PEDAGOGY AND PSYCHOLOGY

PROVIDING PROFESSIONAL AND PEDAGOGICAL CULTURE OF FUTURE ENGLISH TEACHERS IN THE CONTEXT OF EUROPEAN INTEGRATION

Natalia Drab,
Associate Professor, Department of Foreign Languages and Cross-Cultural Communication, Vadym Hetman Kyiv National Economic University
natalia_drab1972@ukr.net; ORCID: 0009-0005-0296-481X
Teiana Kostiuk,
Senior Lecturer, Department of Foreign Languages and Cross-Cultural Communication, Vadym Hetman Kyiv National Economic University
tatianakostiuk1983@gmail.com; ORCID: 0000-0001-9943-7285

Annotation. *The article presents the features of ensuring the professional and pedagogical culture of future English language teachers in the context of European integration. By professional and pedagogical culture we understand the integral quality of the teacher's personality, which is a prerequisite for effective pedagogical activity, a generalized indicator of professional competence and the goal of professional self-improvement. A modern future teacher must be comprehensively prepared for various aspects of the future work and demonstrate the results of learning - "knowledge, skills, ways of thinking, skills, views, values and other personal qualities.*

Modern education and upbringing of an active and independent creative personality, competitive in the conditions of the information society, requires from the future teacher not only interactive skills, but also the ability to independently acquire knowledge, thoughtfully build a schedule, navigate information and prepare oneself for the use of these technologies in future professional activities. This approach determines the organization of pedagogical practice of students, which contributes to the formation of motivational-emotional, cognitive, activity and regulatory structural-criterial components of the intellectual culture of the future teacher.

Educators assure that sensitivity to suggestions and the value of accepting one's own opinion dominate during education. They noted that in an educational institution it is very important to teach the material in an accessible way, as well as to encourage an increase in motivation for better assimilation of knowledge with words and support. They need such encouragement and motivation in writing papers of various research types, supervision and mentoring. Such support will contribute to the formation of the professional and pedagogical culture of future teachers of the English language and the possibility of applying the acquired skills, knowledge and skills in professional activities.

Keywords: *professional and pedagogical culture, future teachers of English, motives, international organizations, European integration.*

The State National Program "Education. Ukraine of the XXI Century" in the context of training a new generation of scientists and educators to reform the higher education

system is based on the principles of humanization, individualization, democratization and ethnicization of the educational process. The solution to this problem is due to the creative approach of teachers who have a sufficient level of professional and pedagogical culture.

The theoretical analysis of scientific works (S. Vitvitska, V. Hrynova, I. Ziaziun, O. Mudryk, N. Seheda, O. Rudnytska, Y. Smakovskyi, L. Pekhot, O. Khoruzha, etc.) shows that there are currently quite a few aspects of the problem of forming the professional and pedagogical culture of future English teachers, but there are no studies of the peculiarities of its implementation and realization in higher education institutions [1-5].

The purpose of the article is to substantiate the peculiarities of ensuring the professional and pedagogical culture of future English teachers in the context of European integration.

In the European Union, other standards have been adopted and are in effect. The prestige of education and high qualifications in Europe is traditionally very high. In Europe, only those graduates who intend to enter higher education institutions complete secondary education at a high level. This is approximately 15 to 25% of all secondary school students.

Today, higher education institutions in Ukraine enroll more than 70% of high school graduates, which is 7 times more than the normal distribution of intelligence allows. Today, our diplomas are not recognized in Europe, and our specialists cannot find a job in their specialty without additional retraining. And although they are superior to foreign specialists in many respects, in terms of development, erudition, and special training, the discrediting of the Ukrainian diploma continues. What foreign employers are most dissatisfied with in the training of our specialists is the low efficiency of knowledge. Efficiency is the ability to use the acquired knowledge and skills in practice. According to expert estimates, this is the parameter in which we are the worst off. In connection with Ukraine's declaration of its intention to join the European Union, the higher education system needs to be radically reformed.

A modern future teacher must be comprehensively prepared for various aspects of future work and demonstrate learning outcomes - "knowledge, skills, ways of thinking, abilities, attitudes, values and other personal qualities that can be identified, planned, evaluated and measured and that a person is able to demonstrate after completing an educational program (program learning outcomes) or individual educational components" [1, 3].

The teacher of the XXI century, as proclaimed in the documents of major international organizations, is a carrier of social change, and the potential of teachers is regulated by the principles that ensure high quality education and competitiveness in the global labor market.

It is necessary to find and implement the latest methods of ensuring new levels of quality of teacher training as a result of the process of integration of national education systems into the European and global educational space. The regulatory document of Ukraine - the National Doctrine of Education Development of Ukraine in the XXI century - emphasizes the training of teachers, promotion of their professional development as an

important condition for the modernization of education in the country [3, p. 12].

In modern conditions, education in Ukraine needs to take into account current global trends, including, according to V. Kremen, "the renewal of the educational sector: training of a person who is aware of his or her belonging to the Ukrainian people, modern European civilization, is oriented in the realities and prospects of socio-cultural development, ready to live and work in a changing world; formation of qualified competitive personnel capable of creative work, professional growth, mastering and implementing information and communication technologies, and other

Among other educational specialties, the professional activity of an English teacher plays a significant role and is determined by its importance for the development and formation of a student's personality. According to the regulatory and scientific basis of foreign language teacher training in Ukraine, the main principles are the teacher's graduated training, its variability, professional orientation, humanization of education, interdisciplinary connections, and individual creative approach to the student [2, 4].

The Encyclopedia of Modern Ukraine states that culture (from Latin cultura - cultivation, care, from colo - to grow, cultivate the land) is a manifestation of human life, which is expressed in behavioral patterns, means and products of activity, including ideas, ideals, norms and values. Culture reflects the peculiarities of human behavior, worldview, and consciousness in certain spheres of life, including social life. According to this, it should be assumed that, in particular, the culture of the teacher should be consistent with the requirements and needs of society, play a socially important role, and be the key to the formation and development of the worldview of future generations [3, 5].

Following A. Voloshchuk, we understand professional and pedagogical culture as an integral quality of a teacher's personality, which is a prerequisite for effective pedagogical activity, a generalized indicator of professional competence and the goal of professional self-improvement [1, p. 174].

Teachers' professional and pedagogical culture should also include their awareness of the principles of methodology. That is why it is worth noting that according to L. Kolosova, "the professional development of an English teacher is a process of qualitative change in the totality of scientific and methodological knowledge, skills, abilities in the field of methodological activity, which leads to the creative self-realization of the methodologist in professional activity and increase of the effectiveness of teachers' pedagogical work, as well as personal and business qualities, creativity, motivational sphere and value orientations aimed at the positive development of an English teacher" [2, 4].

A high level of professional and pedagogical culture characterizes a teacher by the following indicators:

- works professionally, in constant search of creative ways to solve educational and upbringing tasks;
- strives for self-improvement through self-education;
- achieves positive results in the educational process;
- his/her work is aimed at improving, refining, rather than creating new models of pedagogical practice;

- modifies his/her activity in accordance with professional requirements;
- self-realizes as a professional, not as a representative of pedagogical culture.

Thus, modern training and education of an active and independent creative personality, competitive in the conditions of the information society, requires from the future teacher not only interactive skills, but also the ability to independently acquire knowledge, thoughtfully build a schedule, navigate information and prepare themselves for the use of these technologies in future professional activities. This approach determines the organization of students' pedagogical practice, which contributes to the formation of motivational and emotional, cognitive, activity and regulatory structural and critical components of the intellectual culture of the future teacher [3, 4].

Modern education should organically incorporate creativity into the educational process, form a worldview based on multi-criteria solutions. It should ensure interdisciplinary organization of learning content, develop harmony in ways and levels of thinking, and graduates' readiness not only to design objects but also to engage in new activities. At the same time, purely "subject" (disciplinary) education and an elementary approach continue to prevail in higher education. The key problem is the alienation of students and teachers from the quality of learning outcomes, the lack of demand for this quality at each subsequent stage of general scientific and professional training in relation to the previous one. The outlined changes allow us to conclude that the modernization processes taking place in the higher education system require scientific understanding, systematic research and perspective modeling of the educational process in higher education institutions.

At the beginning of the pedagogical practice in the first semester of the academic year 2022-2023, a survey was conducted among students of academic groups 1FA and 1FB of the Department of English Philology of Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University to determine the level of socialization in the educational process and to identify the main characteristics and trends in students' perception of the proposed educational material on the topic of the study. The research methods used include the following: empirical (surveys, observations, interviews with students to determine the dynamics of the respondents' attitudes, multiple-choice tests on the Wordwall online platform to determine students' motivation and perception of the material, and methods of mathematical statistics to conduct statistical calculations).

The survey was conducted via the Telegram messenger, where respondents could interactively choose their answers and offer their own. This form of survey is quite comfortable, which allows us to evaluate the results of the survey. The survey involved 55 university students.

Among the most important motives (Fig. 1) were financial incentives (scholarships), differences from peers, the need for specialists, a diploma for employment, and a sense of duty to obtain higher education. None of the respondents mentioned the motive of pressure from their parents, which indicates that they chose their profession independently. A clear understanding of one's own position and the ability to defend it is an indicator of a holistic personality that will organize its internal qualities in relation to professional categories in the future.

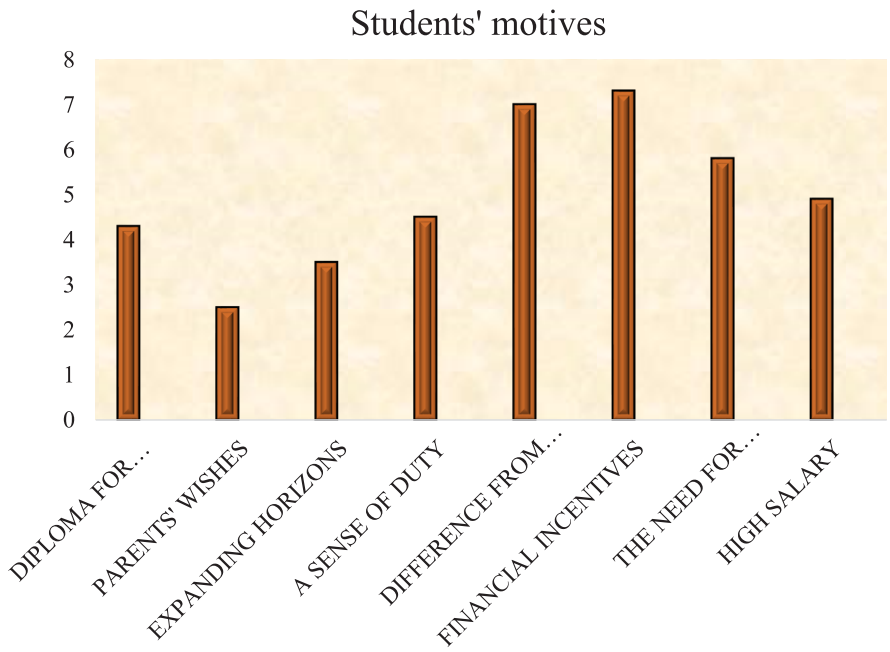

Fig. 1. Dominant motives of students to enter

In general, students are satisfied with their learning outcomes (91.7%), but there is still some reluctance to study, health problems, laziness, work, homework, and pressure from teachers prevent them from achieving better results, which is an obstacle to improving their English language skills to ensure an appropriate level of professional and pedagogical culture of future teachers.

External and internal factors influence attitudes toward learning, among other things. Moreover, its result is an important component of the formation of relationships in the group. The postulates of mutual learning, the formation of a friendly atmosphere during practical classes and extracurricular activities have a positive impact on student motivation, self-awareness, bias and attitude to performing assigned tasks and meeting requirements. It is worth noting that the study of the reasons for a particular student's learning outcome requires a better understanding of the conditions and ways to overcome them. That is why the next question was to ask what could be done to improve learning activities (Fig. 2).

Students say (Fig. 2) that responsiveness to suggestions and the value of listening to their own opinions dominate their learning process. They noted that it is very important for the educational institution to present the material in an accessible way, as well as to encourage motivation for better learning through words and support. They need such encouragement and motivation to write papers of various research types, as well as supervision and mentoring. In a certain ratio, the individual characteristics of each of them, better technical equipment of the department, and better technical support for the effective use of interactive implementations were noted. External conditions (in the

form of better financial situation and living standards, etc.) have also become an integral part of this educational process. Such support will contribute to the formation of the professional and pedagogical culture of future English teachers and the ability to apply the acquired skills, knowledge, and abilities in their professional activities.

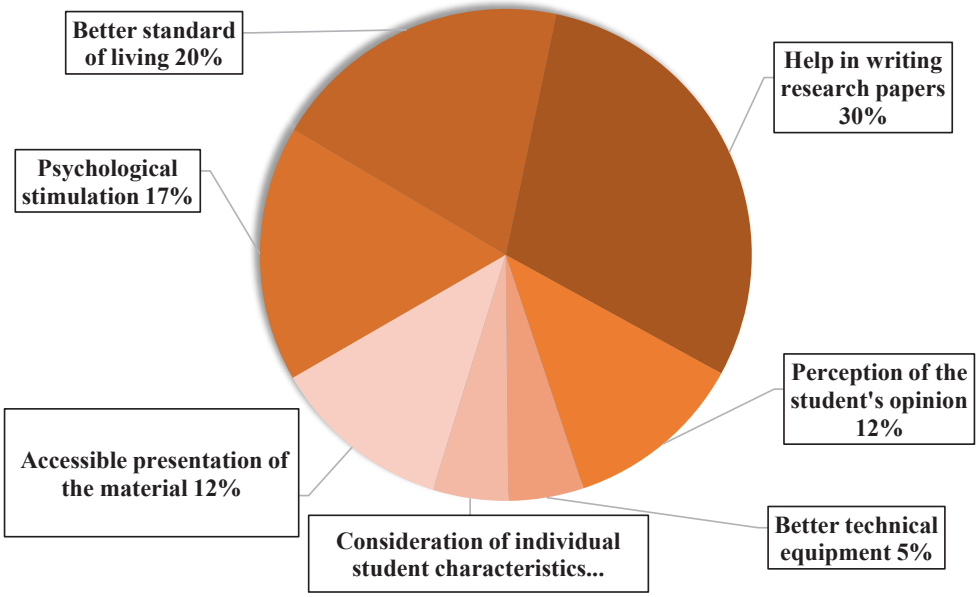

Fig. 2. Students' suggestions for improving the quality of life in higher education institutions

Students say (Fig. 2) that responsiveness to suggestions and the value of listening to their own opinions dominate their learning process. They noted that it is very important for the educational institution to present the material in an accessible way, as well as to encourage motivation for better learning through words and support. They need such encouragement and motivation to write papers of various research types, as well as supervision and mentoring. In a certain ratio, the individual characteristics of each of them, better technical equipment of the department, and better technical support for the effective use of interactive implementations were noted. External conditions (in the form of better financial situation and living standards, etc.) have also become an integral part of this educational process. Such support will contribute to the formation of the professional and pedagogical culture of future English teachers and the ability to apply the acquired skills, knowledge, and abilities in their professional activities.

Thus, the level of students' development is quite high, and all participants successfully interact with each other and jointly solve their tasks. In the realities of today's life, students have the opportunity to communicate only through social networks and messengers, which in turn excludes personal contact, but friendliness, politeness and willingness to help create a positive atmosphere. In my opinion, the members of the academic group should introduce more internal traditions and be more active in solving various issues. In addition, it would be more appropriate to use group and pair work more often during

classes. Drawing up the psychological and pedagogical characteristics of the academic group team allowed us to analyze the relationships between students, their common goals, motives, which in turn allowed us to select the best methods and techniques for working in groups and pairs.

Ukraine is an active participant in the integration of European countries in the field of education under the auspices of the Council of Europe and UNESCO. The first integration program for education development was developed and adopted by the Lisbon Convention in 1997. The general principle of this concept is to improve the quality of education. To do this, it was necessary to develop national standards, programs, criteria, and technologies for determining quality assurance in the countries that supported the Lisbon Convention, which was agreed upon in Bologna by European countries, including Ukraine. Implementation of the main provisions of the Bologna Declaration is realistic only if a productive system of national mobility, regulatory framework, organizational and economic mechanism, identification of funding sources and readiness for partnership are created. One of the main priorities that determines the trajectory of Ukrainian education is its transformation into an effective lever of cultural and economic development of the country; creation of an innovative environment in which the subjects of the educational process master the skills of independent acquisition of knowledge throughout life and its application in practice, become successful and competitive in the European and world markets.

One of the most important and constructive ideas in the strategy of raising the nation's intellectual potential is the idea of advanced education. The essence of this idea is to prepare people for the future in a timely manner. A forward-looking education system should be created on the basis of a combination of the latest general scientific knowledge, and one of its priority tasks should be to develop in people the qualities that allow them to successfully adapt, live and work in the conditions of the new century. These qualities include: systematic scientific thinking; ecological culture; information culture; creative activity; tolerance; and high morality. It is these human qualities that should ensure the survival and further sustainable development of civilization and should be the priority goals for the system of advanced education. The principles of practical implementation of the concept of advanced education should be explained in contrast to the current system of higher education. Modern higher education systems implement a concept that can be called supportive education.

The training of specialists is carried out mainly on the basis of today's requirements, without taking into account what awaits these specialists in the future. The system of supportive education clearly does not meet current and, especially, future requirements, as it does not provide full preparation of a person for new and rapidly changing conditions of existence. On the contrary, advanced education focuses on the future, on the conditions of life and professional activity that a graduate of a higher education institution will find after graduation, i.e. 4-7 years after entering the university. The pace of technological and scientific progress today is such that some knowledge becomes obsolete within 3-5 years, and it is unacceptable not to take this factor into account in a forward-looking education system.

That is why the system of advanced education should be radically different from the system of supportive education. The main focus should be on the development of a person's creative qualities, his or her ability to act independently in conditions of

uncertainty, as well as on the development of learning abilities and the acquisition of new knowledge.

Conclusions. It has been established that raising the level of students' communication culture through the introduction of interesting and logically structured classes is due to the proposed topics of monologues, as well as the selection of tasks to improve the professional and pedagogical culture and the efforts to form the appropriate English speech of students. For each lesson, we used active vocabulary and sentence construction in the context of selecting synonyms and associating them with different pictures or events. This method had a corresponding effect on the faster memorization of active vocabulary. Watching thematic videos and movies helped to build the correct use of various phrasal verbs and idioms instead of ordinary words, which contributed to the ability to deepen knowledge on the topic of «small talk» and added motivation to move in the same direction further.

In future prospects, we see the possibility of studying content technologies for the formation of the professional and pedagogical culture of future English teachers in the context of linguistic support of students' knowledge and skills in the distance format of organizing the educational process of a higher education institution.

References:

1. Voloshchuk, A.M. (2012). Osoblyvosti formuvannia profesiinoi kompetentnosti maibutnoho vchytelia inozemnoi movy pid chas pedahohichnoi praktyky v pochatkovii shkoli [Peculiarities of the formation of professional competence of the future foreign language teacher during pedagogical practice in primary school.]. Perspektyvy rannoho navchannia inozemnykh mov v Ukraini ta za kordonom: monohrafiia. Vyd-vo ZhDU imeni Ivana Franka, 172–181 [in Ukrainian].

2. Ierokhin, S.A., Nikitin, Yu.V., Nikitina, I.V. (2011). Kontseptsiia profesiinoi motyvatsii studentiv yak faktora konkurentnosti na rynku pratsi [The concept of professional motivation of students as a factor of competitiveness in the labor market]. Naukovyi yurydychnyi zhurnal. Khmelnytskyi: Vydavnytstvo Natsionalnoi akademii Derzhavnoi prykordonnoi sluzhby Ukrainy imeni B. Khmelnytskoho, № 1(1), II, 20–27 [in Ukrainian].

3. Ivanova, N. (2016). Motyvatsiia fakhivtsia do profesiinoi diialnosti: poniattia, zmist ta funktsii [Motivation of a specialist for professional activity: concept, content and functions]. Visnyk Kyivskoho natsionalnoho universytetu imeni Tarasa Shevchenka. Viiskovo-spetsialni nauky, 1, 21–24 [in Ukrainian].

4. Kolosova, L.M. (2021). Problemy upravlinnia profesiinym rozvytkom metodysta naukovo-metodychnoi ustanovy v teorii ta praktytsi [Problems of managing the professional development of a methodologist of a scientific and methodical institution in theory and practice]. Visnyk pisliadyplomnoi osvity, 19 – 25 [in Ukrainian].

5. Kucheriavyi, O.H. (2019). Fenomen profesiino-pedahohichnoi kultury: aspekt terminosystemy yii teorii u tsilisnomu vymiri [The phenomenon of professional and pedagogical culture: the aspect of the terminological system of its theory in a holistic dimension]. Visnyk natsionalnoho universytetu Chernihivskyi kolehium imeni T.H.Shevchenka. Chernihiv: NUUK, 1(157), 81–86 [in Ukrainian].

THE INFLUENCE OF DIGITAL TECHNOLOGIES ON THE DEVELOPMENT OF PRESCHOOL-AGED CHILDREN

Natalja Moński,
Mgr. in Psychology, Bc. in Humanities,
School psychologist at the Krnov Primary School,
Founder and Psychologist of the Development and Correction Centre
„FOR Kids“, Opava, Czech Republic
natalja@monski.cz; ORCID: 0009-0009-4568-7209

Annotation. *This research examines the influence of technology on the development of preschool children, influenced by the rapid technological progression of recent decades. Incorporating insights from experts and parents, we explore child-raising in the digital age and discuss potential tech-use limitations. The objective is to devise strategies to lessen the adverse impacts of digital technologies on children.*

Keywords: *preschool age, gadgets, impact, development, limiting, parenting, education.*

The preschool period refers to the age from 3 to 6 years, culminating in the start of formal schooling. In this period, the child learns new habits, skills, and social abilities. If we compare a child at the end of the toddler period and at the end of the preschool period, we see the tremendous progress the child has made in all areas of development. Physically the child has become very strong and grown up, he is fast, agile, can ride a bike, maybe even ski, can swim, likes to participate in sports games and competitions. His intellect and thinking have also increased: he speaks in long sentences, he “philosophises”, he is observant and absorbs new information like a sponge, he has a sense of humour. However, their thinking is still pre-logical and egocentric, tied to a subjective impression and the current context. Overcoming these barriers is crucial for school entry. Gradually, he learns to control his emotions, he knows them much better, he begins to respect social rules, the negativity that until recently drove his parents to strength disappears. Play is his favourite activity, he no longer needs his parents so much, he rather seeks out peers with whom he cooperates, invents game scenarios, tries out different roles. Such crucial prosocial traits like cooperation and compassion are developer. When the child plays alone, the partners become toys with whom and for whom the child speaks and is thus immersed in the world of his imagination. Piaget [1] characterizes the thinking of preschool children as intuitive, featuring egocentrism, phenomenism, and magic.

Looking retrospectively at the development of a preschool-aged child, it may seem that this process can be easily undertaken without any digital aids. Indeed, until recently, that was true. However, modern times have introduced many technological innovations into our lives, which appear in children’s lives at a very early age, often during toddlerhood.

Parents are divided into two categories regarding children’s use of digital devices. One group sees nothing wrong with it, encouraging technological literacy. The lifestyle

of these parents, who often spend their free time with a tablet or computer, sets an example for the child to imitate. In most of these families, early mastery of technology is seen as a success and a sign of intelligence. The other group of parents strictly prohibits or significantly limits the use of digital devices, at least until school age.

Nicolas Kardaras in his book "Glow Kids", [2] shows the fakt that the risks of digital addiction are primarily recognized by technical designers, engineers, and programmers themselves. He cites Steve Jobs as an example, who limits using gadgets by his children. Silicon Valley residents predominantly choose Waldorf schools for their children, which do not use modern technology in their education system.

Let's analyse at what areas of child development excessive use of digital devices can influence.

Impact on Vision. Experts agree that in recent years there has been a general increase in vision problems among people, the explanation is an overall increase in eye strain as we constantly look at our digital devices, whether at work or in leisure time. The most common eye disease in children and adults according to statistics is myopia, which manifests as poor distance vision. Dochekal [4] states, that a few years ago, the Australian Ministry of Health stated that screens are causing an epidemic of myopia and children under two years should not be exposed to electronics at all, and older children a maximum of one hour a day. In the modern world, every fourth person suffers from it. And the situation is worsening every year. Experts speak of the number "two billion" - that's how many myopic people there were on earth in 2010. Projections are pessimistic, by 2020 an increase of half a billion people is expected and by 2050 about five billion people will be myopic.

In addition to genetic factors, the causes of myopia include spending too much time at the computer, tablet. Because a parent cannot directly observe a deterioration in vision, like a cough or a runny nose, they should know at least the alarming signs: stumbling or bumping into furniture, more frequently reluctance to read, avoiding other children, increasing problems at dusk and in darkness, squinting when looking into the distance, watches TV shows by sitting very close, looks at a book with almost their nose on the pages, blinking too frequently, change in color and shape of the pupil, clouding of the eyeball, different pupil sizes.

To prevent the aforementioned problems in children, experts recommend the following steps: limit screen time for preschool and younger school-aged children to a maximum of 15 minutes at a stretch, max an hour per day, every 15 minutes of looking at a monitor, focus on a distant object for 10 seconds, children should not read books or look at a phone, tablet while in moving vehicles. It is not recommended to look at the screen in bright sunlight or conversely in the dark. Do not work with a phone/book while lying on your back, it is best always to sit with the device placed opposite the eyes. Reduce monitor brightness so much that it doesn't appear as a light source when compared with the background. Spend time outdoors regularly, as walks result in better blood circulation in the eyes. Prefer larger screens over smaller displays. It ensures a longer distance from the eyes and perception of larger pixels, which results in less strain

on the eye muscles. Always sit directly opposite the center of the screen, not from the side.

The Impact on Hearing. Czech otolaryngologist Aleš Hahn [3] explains the dangers associated with using headphones, which are popular not only among adults, but also children. Headphone manufacturers constantly outdo each other in inventing new designs and shapes. First came the large headphones, then smaller ones, followed by so-called earbuds, micro headphones into the ear, with the most modern ones being wireless. The author explains the difference in their functioning: acoustic energy is compressed, which can lead to damage to the hair cells in the inner ear. According to him, large headphones are more suitable.

The Impact on Sleep. Blue light, short, high-energy wavelengths of sunlight (380–500 nm), which colors the sky blue, is not only present in nature. Powered screens also emit it. If we watch TV (tablet, phone) right before sleep or if popular LED bulbs are lit in the room, we will have trouble falling asleep. Only 90 minutes after the blue light source is turned off does the body start to release melatonin, a sleep hormone, which is mainly produced at night and responds to biological rhythms, guarantees quality sleep and the regeneration of all cells in the organism. In young children, the connection between excessive exposure to artificial blue light and disturbed circadian rhythms has been long-term scientifically monitored. Slussareff [4] confirms that daily touchscreen use in children is associated with shorter, less quality sleep and later onset of sleep. According to the authors, the following four phenomena most likely play a role:

1. Electronic media can directly reduce the time children have for sleep. This leads to later sleep onset and shortening of nighttime sleep duration.
2. The content of the media consumed can psychologically and physically excite the child, generally leading to a poorer ability to fall asleep.
3. The blue light that screens emit may suppress the production of melatonin, which affects the quality of sleep.
4. Certain genetic traits may also be important, such as emotional lability or hyperactivity, highly related to the family environment.

Influence on Body Posture and Obesity. The basis of a child's healthy development from birth is movement. However, in recent decades, due to primarily scientific-technological development and changes in lifestyle, the amount of movement has significantly decreased, even though the genetic endowment of the individual, and therefore their need for movement, remains the same. When we assess the influence of digital technologies on children, we cannot overlook the fact that sitting at a computer or in front of a TV is time spent without movement. In addition, a child with a phone or tablet often sits with a bowed head, leading to strain on the spine. Experts have found that the larger the angle of the head tilt, the stronger the strain on the spine. If the head is not tilted, it exerts a constant force on the spine, thus not straining it. At a forward tilt of 15 degrees, the strain on the spine is about 12 kg, 30 degrees – up to 18 kg, 45 degrees – up to 22 kg, and at a forward tilt of 60 degrees, we strain the spine with a weight of up to 27 kg. Most people look into their mobiles with a 60 degree forward head tilt. In

children with poor posture, a higher incidence of headaches, cervical and lumbar spine pain, and overall long-term health problems are recorded. The solution is regular special physiotherapeutic exercises. Prevention involves regular, varied movement, and limiting the time spent in front of the TV or with a smartphone in hand.

The second problem resulting from excessive screen time is childhood obesity, which in 80 % of cases occurs already in preschool age, as stated by the Czech project Caterpillar [5], which deals with monitoring overweight children. Part of the child population compensates for increased mental demands with increased food intake, especially in the evening hours. Absolute or relative overeating has become a reality. The result is a positive energy balance, for which we have no prepared metabolic mechanisms capable of adaptation.

The prevalence of childhood obesity in the Czech Republic has dramatically increased over the last 30 years, with a twofold increase in overweight generally and a quadrupling in the child population. Currently, every 4th child is overweight, every 7th is obese, and 4 out of 100 children suffer from morbid obesity. According to research from the Caterpillar project from 2009–2013, 13.91 % of preschool-aged children were overweight, and 7.86 % were obese.

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Influence on Psychological Development.

Gadgets and the Child's Brain. With the help of magnetic resonance imaging, neurologists have found that the circuits of the frontal lobes, which control attention, grow fastest between the child's 3rd and 6th years of life, with a second rapid increase occurring between 11-12 years. That's why many experts consider this developmental period to be very important. In other words - the cells that are involved in the most frequent activities remain active in the brain, the less used ones disappear. Activity that a child often engages in transforms their brain in a certain way; the positive influence of music, sports, and reading on a child's intellectual development has already been demonstrated. How a child's brain changes under the influence of digital technologies is still a matter of study and research. Some experts associate excessive use of technologies with a rising number of occurrences of ADHD, autism spectrum disorders, epilepsy, while others observe positive effects and praise the educational function of media. Individual studies that would clearly show us the ways and extent of transformation of the child's brain under the influence of digital technologies do not yet exist. But according to Stránský [6], there is already a reliable study proving the negative impact of the use of digital technologies on the development of adolescent brains: in this Facebook generation, a sharp decrease in connections between the left and right hemispheres has been observed long-term, up to their complete disappearance, "tertiary brain centers, which integrate and process information, are used less and less". As a result, a sharp deterioration in the oral expression of modern adolescents is recorded, they use short sentences in speech, with which they are used to chatting. These young individuals know how to find information well, but they are not able to operate with it. And so there is a "devolution of the human brain, the loss of previously acquired abilities". Therefore, most experts rather lean towards limiting the time spent by the child at screens in favor of sports, playing, reading, and creating.

In 2018 at the Pediatric Academic Societies Meeting, Hutton [8] described the results of his experiment, in which he set out to explore the impact of various story formats (audio, illustrated, animated) on the engagement of brain networks supporting language, visual perception, and learning in preschool-aged children, and to evaluate the most suitable way of perceiving fairy tales for this age category.

Using functional magnetic resonance imaging, he observed the processes occurring in a child's brain during: • listening to an audio recording of a fairy tale • watching an animated fairy tale on a screen • listening to audio while looking at an illustrated book He monitored the centers of speech, visual perception, imagination, and secondary (passive) state of consciousness, a calm state of mind, when, colloquially speaking, "things in the head settle down".

While children perceived the fairy tale, the device monitored the activity of these brain centers and also their connectivity, connections. It was found that while listening to the audio recording, speech centers were most activated, but connectivity was low, indicating that the child barely understood the overall meaning of the fairy tale.

During the viewing of the animated fairy tale, high activity of auditory and visual centers was monitored, but low connectivity and a decrease in activity in the speech center. Hutton explains that the animated format is the most complex for children's perception; all the energy of the brain goes into processing the continuous audiovisual content.

While listening to a book with the support of an illustration, the activity of speech centers was slightly lower than when listening to an audiobook. In this case, the child focuses not only on words but also uses pictures as guides for better understanding of the story. Importantly, when the child looked at a picture book, the devices recorded an increased level of connection in all areas of the brain studied in this experiment. According to Hutton, an illustrated book is "Just Right". Studies conducted show that the illustrated format provides visual support to the speech center, stimulates imagination, and develops self-reflection in young children. Hutton explains that during looking at pictures, the child's brain works at full speed, busy connecting verbal and visual stimuli and enlivening it in their imagination.

In conclusion, Hutton recommends all parents start reading to their children as early as possible, from birth if possible, and devote regular time to this activity, especially emphasizing it in the pre-school age, while also limiting the time the child spends at screens.

The concept of computer or internet addiction is often presented in the media and has already made its way into everyday language. Internet addiction as such is not yet listed as an official mental disorder. For diagnostic purposes, the designation R 63.8 - Other compulsive and impulsive disorders is used. Other types of persistent maladaptive behavior that are not secondary to a recognized psychiatric syndrome, and where it seems that the person repeatedly fails in attempts to resist the urge to behave in this way. There is a prodromal period of tension with a sense of relief at the time of the act. The causes of emerging addictions in children in disrupted family relationships and lifestyle issues. If a child tends to escape into the virtual world, something in the family is not functioning well, whether it is unclear boundaries, unenforced rules, lack of a close relationship within the family, or a lack of quality alternatives for spending free time.

The most common symptoms of internet addiction in children are associated with behaviors where the child: demands fairy tales, computer games right after waking up, loses interest in other activities, immediately seeks out a computer or other device in their free time, tries to offer a computer activity when meeting with friends, responds briefly to questions, avoiding lengthy discussions, begins to cheat in an effort to get to the computer at all costs, reacts stormily, hysterically to prohibitions and limits on computer time, tries to move to the computer or TV during meals.

Renowned Czech psychologists Pavel Říčan and Draha Pithartová [7] point out in

their article another danger in the form of violent content in fairy tales and children's shows. The authors maintain that the most violence is found in shows for the youngest viewers! The violence here just has a slightly 'softer' form: fights, spankings, chases, insults, threats, etc. However, when we consider the age of the viewers, this does not mean it is less harmful. Watching violence is particularly dangerous for children primarily because it tempts them to imitate, weakens their ability for compassion, and can provoke destructive and cruel behavior, or conversely, fear and anxiety.

Research Results. In 2021, as part of my work on my diploma thesis, I conducted a research study aimed at determining the circumstances under which Czech children of preschool age watch cartoons and the level of parents' awareness about potential negative influences. The research aimed to highlight the specific knowledge gaps parents may have in ensuring prevention or correction of the consequences of the negative impact of animated fairy tales and digital technologies in general.

The research aimed to answer the following questions:

1. At what age do children start watching animated fairy tales and how much time do they spend on them during preschool age?
2. What are the child's preferences when choosing cartoons?
3. What are the parents' preferences when choosing suitable cartoons?
4. How well informed are parents about the basic rules of safe screen time (screen size, time limits, pedagogical approaches) and whether they deal with this problem at all.
5. Do parents realize that watching fairy tales can affect the psychological development of children? Do they observe any signs of this influence on their children?

Thanks to the responses from the participants, we got the following results:

- Czech children start watching animated fairy tales relatively early:
  - 47.14 % of respondents reported the age of 2 years. 42.86 % of parents indicated the age of 0-1.5 years. 10 % stated the age of 3-4 years. The data indicates that
  - 73.2 % watch fairy tales daily, 15.5% watch 2-3 times per week, 5.6% once a week, and only 4.2% a few times a month.

Approximately half of the children are able to turn on a cartoon by hemselves.

- When it comes to children's preferences, almost every child had a different favorite animated fairy tale, and the answers were almost never repeated. However, the fairy tales mentioned more frequently were Paw Patrol, Masha and the Bear, Pat and Mat, The Smurfs, Frozen, Cars, and Winnie the Pooh, Lego Ninjago, Harry Potter, Angry Birds.
- To the list of fairy tales from which parents were to choose, I intentionally added both suitable and unsuitable fairy tales for preschool age. I was pleased that Krteček (the Little Mole) came first among parents, with 91.7 % of parents choosing it for their child. In second place, along with Pat and Mat and Bugs, was Peppa Pig. Most parents would have no problem letting their children watch Masha and the Bear, Finding Nemo, Mickey Mouse, The Lion King, and Tom and Jerry. Fortunately, Winx, Pokémon, and The Simpsons ended up in the last places.
- 30.6 % of parents admitted that they haven't seen all the fairy tales their child

watches, so they are not familiar with the content.

- 42.86 % of parents did not know about any unsuitable fairy tales or did not deal with this issue.
- As for the impact of fairy tales on children, it cannot be said that fairy tales only serve for amusement and do not influence children's behavior. 70.8 % of parents reported that they have observed their child imitating the behavior and speech of favorite fairy tale characters. A fairly large number of parents confirmed that the child occasionally reacts negatively to turning off the fairy tale (with aggression, tantrums, crying). This behavior could be a symptom of a developing addiction to digital technologies, just like demanding a fairy tale immediately after waking up.
- I asked parents to express their opinion on what dangers, in their view, could be inherent in daily 2hour TV viewing. It turned out that most parents are aware of the threat of addiction (72.86 % of respondents), followed by the impact on children's behavior (68.57 % of respondents). To a lesser extent, parents consider the impact on the development of cognitive functions (34.29 %) and the effect on children's sleep (40 %). Only a small number of parents, let's say below 10 %, think that there is a danger of eye damage and overweight. Interestingly, 12.86 % of respondents even believe that there is no threat at all.

I assess the parents' awareness of the basic rules for safe viewing of animated tales as superficial. From their answers, I infer that most parents are aware that watching fairy tales for too long is not good for the child, and when there is explicit blood and foul language in the fairy tale, they will not allow such a fairy tale for their children. However, there is a lack of deeper understanding of the child's process of perceiving the fairy tale and its subsequent influence. Nevertheless, about half of the parents intuitively do the right thing when they rather turn on the big television for the child than give them a mobile phone, when they discuss the fairy tale with the child afterwards.

Based on all these recommendations from experts in various fields and my own professional experiences working with children, I have summarized the basic rules for using digital technologies by preschool children:

1. If a child is already spending time on the internet, it's better to use a television or computer, essentially the largest screen possible. The image on a small phone screen is much more harmful to the eyes.
2. A computer game should contain levels of difficulty, and progression to the next level should not be allowed without first completing the prior one. The game should have an end; endless games are a direct path to digital addiction.
3. If it is possible to play the game without sound, turn off the sound. Monotonous music in games contributes to lulling conscious attention and responses.
4. It is best to avoid using digital technologies with preschool children if: The child has a diagnosis of mental retardation or developmental delay. The child has a verbal and nonverbal communication disorder. The child has ADHD. The child stutters. The child has enuresis. The child does not speak in sentences and cannot express their needs verbally. The child does not understand spoken language. The child is unable to listen

to a book being read, appropriate for their age. The child is unable to play a story and cannot bring the game to a logical conclusion.

5. Turn off digital devices no later than 60 minutes before going to bed. External artificial blue light can negatively affect a child's sleep.

6. Limit background TV listening (it interferes with children's spontaneous play and affects attention).

7. When you use headphones, choose classic big ones, not earbuds.

8. If you can't be actively involved with your child, you shouldn't try to entertain him at all costs, for example with cartoon, the child should try to entertain himself, in this way he learns to work with his own emotions and will.

9. A child should not relate watching a screen to eating or sitting on the potty.

References:

1. Piaget J., a Inhelderova B. (2010). Child Psychology. Prague: Portal. [in Czech].

2. Kardaras N. (2016). Glow Kids: How Screen Addiction Is Hijacking Our Kids – and How to Break the Trance. New York: St. Martin's Press. [in English].

3. Docekal D., Muller J., Harris A, Heger L. (2019). The child online: a guide for parents and teachers who want to understand the digital world of the young generation. Prague: Mlada fronta. [in Czech].

4. Screens in Childhood: effects on sleep, learning and attention. Principles for healthy uses. Paediatrics for practice. 20(1), 19-23. URL: https://www.pediatriepropraxi.cz/pdfs/ped/2019/01/04.pdf

5. Caterpillar. Caterpillar aims to find overweight children. URL: http://caterpillar.sdetmiprotiobezite.cz/?page_id=358

6. The impact of technology and social networks negatively affects the brain. URL: https://narodni.cz/publikovane-texty/o-mozku/vliv-technologii-a-socialnich-siti-negativne-ovlivnuje-mozek/

7. Taming the screen. URL: file:///C:/Users/Admin/Downloads/83-06-krotime-obrazovku-pdf.pdf

8. Associations Between Screen-Based Media Use and Brain White Matter Integrity in Preschool-Aged Children. JAMA Pediatrics. 174(1). URL: https://jamanetwork.com/journals/jamapediatrics/fullarticle/2754101

THE STUDENT CLUB AS A SUBJECT OF THE ORGANIZATION OF CULTURAL AND LEISURE ACTIVITIES

Oleksandr Tadlia,
Head of International Projects,
Research Institute of Social and Economic Development, Ukraine
tadlya@ukr.net; ORCID: 0000-0002-2576-8599

Annotation. *The article provides an overview of publications that examine conceptual approaches to the organization of cultural and leisure activities in the system of higher education institutions. The essence of the concept of "culture", "club", "student club" was considered and supplemented. The stages of the process of forming a model of a student club and the expediency of further scientific research in the direction of cultural and leisure activities are considered, namely, the theoretical justification of practical recommendations regarding the construction of a system of leisure organization in the conditions of a student club is substantiated.*

Keywords: *organization, club, socio-cultural sphere, leisure time, cultural and leisure activities, student leisure time, youth leisure time.*

Formulation of the problem. The relevance of the problem of the development of cultural and recreational activities in the system of higher educational institutions is determined by: the need to fundamentally improve the quality of professional training and education of young specialists; more effective participation of student youth in various socio-cultural spheres of Ukrainian society; the role of free time in the education of student youth, transforming it along with study time into a means of development that makes high demands on knowledge, skills and abilities; objective possibilities of student clubs in the real practice of educational work.

The following scientific works are devoted to the solution of problematic issues of the functioning and development of the processes of organizing cultural and leisure activities in the system of higher educational institutions: S. Pishun (2005) analyzes the formation of the leisure culture of students of higher educational institutions in the conditions of the work of the student club; D. Derby (2006) focuses on research on student involvement in community college clubs and organizations; J. Foubert, L. Urbanski (2006) emphasize the psychosocial development of first- and senior-year students with the help of clubs and organizations of higher education institutions; V. Tyuska (2014) formulates creative self-realization of students in the process of group activity; A. Hawkins (2015) in her doctoral dissertation focuses on the impact of student clubs and organizations on student retention and persistence at urban colleges; L. Pittaway, J. Gazzard, A. Shore and T. Williamson, T. (2015) note that student clubs are a powerful experience for entrepreneurship education; O. Kuzu (2021) analyzes student clubs in universities: content analysis of diversity; J. Simpson, C. Bista, (2023) study of minority student participation and experiences in community college cultural clubs and organizations. Noting the importance of the scientific research of these scientists,

it should be emphasized that the specified problem requires further research, which allows to supplement the very nature of practical work, to highlight and form separate stages and forms of activity in the cultural and leisure sphere. Therefore, the identified unresolved problems allow us to formulate the purpose of our work.

The purpose of the research is to determine the possibilities and main directions of the work of the student club as a subject of the organization of cultural and leisure activities.

Presenting main material. Determining the theoretical and methodological foundations of the study of the problem of the activity of student clubs in the organization of youth leisure in modern Ukraine, we consider it appropriate to pay attention to a number of terms and concepts that directly relate to cultural and leisure activities.

Taking into account that in individual studies of scientists, the concepts of "club activity", "club organizations", "club institution" have a certain discrepancy or are identified, therefore, as part of the theoretical analysis of the cultural and leisure activities of Student clubs, as a subject of research, we plan to: 1) establish the essence concepts of "culture", "activity", "club", "student club activity"; 2) the study of the common and distinctive features of the mentioned terms and the determination of their place in the dialectical development of student clubs that carry out their activities in the system of higher educational institutions.

The study of the role and place of student clubs in the system of higher education institutions is possible thanks to the process of becoming a science of culture - the task of which is to reveal concepts, socio-cultural technologies, create a favorable cultural and leisure environment and the need to implement the mechanism of step-by-step formation in extracurricular work. Many stable ideas are formed on the basis of the understanding of culture as a high level of people's mastery of norms, standards of activity that have developed in one or another sphere of social practice. In this sense, we talk about language culture, communication culture, consumption culture, leisure culture, professional or corporate culture, etc. The term "culture" is used in connection with the applied aspects of cultural activity of people. In this case, cultural activity is considered as a part or section of any instrumental and applied activity: or as a direction in economic and business practice: the sphere of culture, socio-cultural service, element of international relations - we are talking about cultural exchange between countries, an aspect of political practice of state construction - cultural policy, cultural institutions, etc., or as an object of legal regulation, legal protection of intellectual property in the field of legal culture, etc.

So, the term "culture" can be characterized as follows: it is a way and result of life activities of many generations, a consistent development of society, a form of kinship and a set of spiritual symbols, signs, standards, aspects of the artificial environment, which do not contradict, but in a certain way subordinate and complement each other. In other words, everything that exists in a person as a carrier and subject of activity appears in the form of culture, and turns out to be as multifaceted, diverse, functionally rich as the person himself - the creator and ideological embodiment of this culture. .

Cultural and leisure activity, as an extremely complex object of research, is characterized by its structure and, accordingly, the system of social relations. Based on the above, in our work we characterize "activity" as a specific way of relating a person to the surrounding world, which is the driving force and condition for social progress and as a condition for successful adaptation of a person to life in the conditions of the information society. Activity forms and changes the conditions of existence of people, social groups, ensures the transformation, preservation and development of society. That is, through activity, a person is included in the system of social relations, which depend on his place in the social hierarchy, on the formation of certain life conditions and individual circumstances, which turns it into a social and sociocultural activity.

Thus, the category "activity" is considered both as a worldview explanatory principle and as a methodological substantiation of a number of conceptual positions in which human activity is the subject of research. As we have already noted, "activity" includes a goal, a means, a result, and the very process of activity, and accordingly, its awareness is an integral characteristic [1].

The influence of cultural and leisure activities is determined by its meaningful content, and spending daily time coincides with the active consumption of cultural achievements, one of the means of productive direction of social relations is club associations, which are designed to satisfy personal, professional, spiritual needs and interests of the individual. Despite the rather long history of the existence of student clubs as a subject of cultural and leisure activities and the study of various issues of the functioning of club associations, the concept of "student club" is interpreted in different ways, which requires categorical and conceptual clarification.

In the "Etymological Dictionary of the Ukrainian Language" (1985) it is noted that the word "club" is "a public, cultural and educational institution, its premises"; borrowed from English through Polish and German (Klub); English club (English clubbe), which, in turn, has an Icelandic origin from the word "klubba" - related to the verb "klubba" - a stick, stick, companionship"; the meaning "companionship" arose due to the figurative use of the word "stick", according to English custom, a stick that was carried around the homes of welcome guests" [2, p. 466].

Therefore, taking into account the English origin of the concepts "club", "student club", the study of their essence should begin precisely with English-language reference books.

At the same time, in addition to the above, our attention is drawn to the "Oxford English Dictionary", the first (10-volume) edition for 1884-1928, which interprets the term "club" as: 1) an association or union of a certain mass of people; 2) association for the promotion of any business with the aim of its activation; 3) a place of meeting or gathering of people in a pub and a similar establishment for informal communication; 4) a group of people gathering together; 5) a society of persons united on the basis of mutual sympathies or shared interests, passions, inclinations; 6) an organization of people created to join forces to support some entity; 7) an association of persons, organized mainly for a public purpose and having a building (or part of it), specially

adapted exclusively for meetings and activities of its members; 8) a building or premises for the activities of such an organization; 9) an organization created to support the activities, mainly political, of some parties (for example, Jacobin clubs in France); 10) the modern name of ancient organizations (for example, ancient Greek geters or ancient Roman colleges)" [3].

Following the example of English clubs, organizations of this type began to emerge in the world and in continental Europe. In France, the first clubs - people's assemblies - appeared a few years before the beginning of the French Revolution in 1782.

In the French edition "Grand dictionnaire encyclopedigue larousse" (1972), the word "club" is defined as: an association, an association in which economic and political issues are discussed; associations, groups in which people gather for communication, reading, entertainment, etc.; society, the membership of which is limited by social origin, place of residence or interests; associations, societies whose members gather for a specific purpose (leisure, sports, tourism, etc.) [4].

The Encyclopedia Americana (1973) defines a club as an association of people who share common interests and meet periodically for cooperation or entertainment. Depending on the purpose, clubs are divided into social clubs, which emphasize communication and relaxation in a pleasant company, and political or professional clubs, in which people gather to satisfy common interests [5]. That is, in the English language definitions of club prevail, which emphasize the common purpose, the interests of the members of the association, as well as the closedness of clubs to those who are not members of the club.

Clubs similar to the French ones were created in Germany, Italy and Spain. A similar characterization of the term "club" is given in Meyer's German encyclopedic dictionary "Mejers Enzyklopadisches Lexikon" (1980), where "club" is considered as a closed, exclusive (exclusive) association created by social groups or interest groups for the realization of a certain goal, most often - for joint pursuit of sports, literature, science and politics [6].

Therefore, the analysis of encyclopedic publications allows us to reveal the concept of "club" mainly as an association, gathering, union, organization, society. The analysis of the definitions of clubs is convincing in the diversity of club organizations with characteristic features: association for the purpose of intensification, satisfaction of common interests, organization of meaningful leisure time, which in turn is of fundamental importance for understanding the cultural and leisure essence. the object of our research.

At different times, theorists and practitioners of the club business tried to find out what a club is: an institution (a building or premises for the activities of such an organization) or a society (an association of a certain mass of people), a social and cultural institute (an association of individuals organized mainly with a public purpose) or a social group (a group of people gathering together).

In the writings of the Soviet period, the concepts of "club" and "club establishment" were equated, which was due to the administrative and command management methods

that absorbed the club network and led to the subject-object model of leisure organization. This scientific position is also shared by the "Dictionary of Foreign Words" edited by O. Melnychuk (1974), the club is interpreted as: "A public institution that unites groups of people of a certain social status, profession for the purpose of leisure. time, as well as communication related to political, scientific, artistic, sports and other interests" [7].

In the "Encyclopedia of Modern Ukraine" (2013), the term "club" is an analogue of the terms "house of culture" and "cultural and educational institution", i.e. "... a cultural institution of the club type, created for the organization of leisure time, the development of amateur creativity, the holding of educational and educational activities among the population, formation of public opinion" [8]. Summarizing the above, we state that the problem of club activity is comprehensively considered both in the pedagogical and in the literature in the field of "Culturology".

Yes, in the "Great Ukrainian Encyclopedia". Thematic register of slogans from the field of "Culturology" (2022) Club, 1) public organization that unites people connected by common interests; 2) a cultural and educational institution that organizes the leisure time of the population [9].

Thus, in Ukrainian encyclopedic guides, the term "club" means: a public organization that unites people of a certain social circle or profession for joint recreation, entertainment, physical education and sports.

Ukrainian scientists consider the term "club" as a unique social institution, which is characterized by the possibility of combining two opposite tendencies of social life - social-group and personal; collective and individual. The author's concept is close to the research of I. Petrova (2000), where the "club" is defined as a socio-cultural dominant, one of the compensatory-catalyzing phenomena of society, which reflects the socio-psychological state of society and shapes it. The activity of the club appears as a specific reaction of society to the problems of the social system affecting spiritual values, views, interests, and behavior of the individual [10, p. 9]. L. Polishchuk (2008), which interprets the concept of "club" as a multifunctional leisure, cultural and educational organization or institution, the main task of which is to meet the needs of the population in meaningful leisure activities, promoting self-education. and creative realization of personality. The author believes that the concept of "club-type institution" is more complete, since such institutions, in addition to clubs, can include houses and palaces of culture, centers of folk art, leisure centers, sports and entertainment complexes, family clubs, museum clubs, library clubs etc." [11].

Thus, in Ukrainian-language publications and regulatory legal acts, "club" appears most often. is identified with club-type institutions and is considered as a cultural and educational organization. Special emphasis is placed on the political, educational and educational tasks of the club.

At the same time, we draw attention to the fact that in many works of Ukrainian and foreign scientists, it is appropriate to consider the club as a multifunctional association, the main task of which is integration, ensuring the needs of visitors in meaningful leisure. in the name of common goals, interests, communication, self-education and cultural

creative realization of the individual.

Also, as a category and object of analysis, it is considered in a wide scientific range, which serves as a theoretical and methodological basis for substantiating the essence of our research.

The activities of student clubs are considered in modern studies by D. Derby (2006), Student involvement in clubs and organizations: a research study in a community college [12]; J. Foubert, L. Urbanski (2006), the influence of participation in clubs and organizations on the psychosocial development of first-year and senior college students [13]; A. Hawkins (2015), Engagement Matters: The Impact of Involvement in Student Clubs and Organizations on Student Retention and Persistence at City Colleges [14]; L. Pittaway, J. Gazzard, A. Shore, T. Williamson (2015), Student Clubs: Entrepreneurship Learning Experience [15]; O. Kuzu (2021), Student clubs in universities: content analysis of diversity [16]; J.Simpson, K. Bista (2023), investigating the involvement and experience of minority students in cultural clubs and organizations in community colleges [17], as a certain social system that functions in their free time and is aimed at a target audience of student youth, through their involvement to cultural and leisure practice, extracurricular process.

The analysis of Ukrainian language dictionaries gives reason to claim that scientists most often consider the concept of "student clubs" as: "public associations that organize cultural leisure for students of one or more universities, contribute to the expansion of their horizons, the development of creative abilities both in the chosen specialty and in various arts, sports, etc." Modern researchers try to combine the historical definitions of the concept of "club" and consider "student club" from several main positions: as "student society", "student organization", "student society".

According to the definition of S. Honcharenko (1997), "student clubs are public associations that organize the cultural leisure of students of one or more higher educational institutions, contribute to the expansion of their worldview, the development of creative abilities both in the chosen specialty and in various types of art , sports, etc. The student club unites, as a rule, several groups, sections or collectives - sports, tourist, music, etc." [18, p. 166]. S. Pishun (2005) notes that a student club is a pedagogically organized process, a voluntary leisure association of students whose interpersonal relationships are mediated by the socially valuable and personally meaningful content of collective leisure activities [19]. The research of V. Tyuska (2014) shows that the pedagogical student club is a creative laboratory where students master non-standard approaches to the educational process, study innovative technologies, increase the level of pedagogical culture and readiness for creative self-activity [20].

Thus, the analysis of the definitions of the term "student club" by modern researchers is convincing in the variety of organizational associations reflected in the terminological polysemy. In modern cultural and leisure practice, the use of the term "student club" has significantly expanded: one can cite many examples of innovative, communicative, creative associations called student clubs. Despite such a multivariate concept, it is possible to characterize the features inherent in all types of student clubs,

including voluntary participation in leisure associations, satisfaction of recreation needs, personally meaningful fulfillment, development of creative abilities, and the existence of a club regulatory framework. documents

In our opinion, the activity of a student club, which functions in the system of a higher educational institution, is an organizational process, according to the concept of extracurricular work, endowed with personally significant content and functions of cultural and leisure activities, has a free and voluntary, collective character, a certain determination and depends on socio-cultural, political development of society, its moral, ethical and spiritual values.

A student club is a complete socio-cultural association of students, which has a special organizational structure in the conditions of a higher educational institution, performs specific functions in the field of cultural and leisure activities and promotes socialization and inculturation through the assimilation of certain cultural cultures. meaning by students.

Thus, thanks to the conducted research, we detailed and clarified the essence of existing concepts and terms and substantiated new concepts and terms used in the field of club activities. The obtained results substantiate the need for further research, which will contribute to the formation of methodological foundations for the study of cultural and leisure activities of student groups in the modern worldview context.

In modern institutions of higher education, student youth are a product of social development, where they are directly included in the system of social relations through educational, educational, scientific, sports, cultural and leisure activities, in particular, participation in clubs and public organizations, which in turn, can form a versatile worldview, a system of views and the ability for analytical, creative self-realization in further professional activity.

The task of organizing youth leisure activities in the context of student clubs is integration, communication, process management, and personality development. The content of the organization of youth leisure in the conditions of the activity of the student club in many studies coincides, including: goal setting; administrative management; distribution of tasks between participants; consistency of their actions and control over the implementation of decisions; creative activity; evaluation stimulation.

In the context of our research, the organization of youth leisure was understood as a two-way process, where the indirect influence of the head (manager) of the club association with student youth, their freedom in choosing directions and forms of leisure and ways of filling its content are organically combined. At the same time, we followed the opinion of scientists who substantiated the necessity and expediency of organizing youth leisure by the fact that it is the result of constructively overcoming the existing contradiction between the desire of students to independently satisfy their interests in their free time and their lack of experience, knowledge, abilities and skills for their full implementation in cultural and leisure activities. The specificity of the organization of youth leisure is determined by the features of its object - student youth, the nature of their leisure communication with the leader (manager) of the club association, the

content and means of influence (forms, methods, techniques).

The essence of the organization of youth leisure consists in replacing the personal position of students in the field of leisure from a passive one that requires direct managerial activity to an active one, which is a consequence of the development of their self-management and self-governance in this area through indirect influence.

The specificity of the organization of youth leisure in the system of a higher education institution is that, by involving students in the assimilation of socio-cultural values, as well as active recreation, they should not undermine independence, initiative, individuality in leisure time, but promote activity, creativity and innovativeness in the development of individual abilities.

Thus, the organization of youth leisure activities in the context of student clubs is manifested in: coordination of the actions of its participants; interaction based on a common goal and tasks; in demonstrating competence when solving club tasks.

From the standpoint of a systemic approach, the focus of club activity is closely related to the reflection of many important processes taking place in the modern socio-cultural space. Student youth also perceive culture as a means of spiritual, intellectual, moral, emotional and aesthetic enrichment in the process of their artistic and creative activity. Therefore, culture is perceived not only as a model of free artistic and creative activity of students, but also as a certain force of spiritual formation and development, a universal mechanism of adaptation to life in society.

According to the content and form of the organization, the student club objectively appears as a collegial activity of its members. An important role in ensuring the effective activity of the student club is played by the very fact of communication. The analysis of scientific sources and personal practical activity as the head of a student club allowed us to come to the conclusion that effective communication arises as a result and as a form of conscious reflection of the mission of the student association to achieve the goal, club tasks and joint activities. Which has a system-forming function and ensures the integrity of the creative process and the dynamic development of the student club association.

Therefore, the involvement of student youth in creative interaction with club activities is the basis on which moral and ethical imperatives are formed, the norms and traditions of national culture are assimilated, which regulate mutual relations, coordinate actions and deeds in the socio-cultural sphere

On the basis of the above, it can be concluded that in the process of cultural and leisure activities of the student club, there is an accumulation of both social and individual experience, the presence of which is a necessary component of the development of the club association as a whole. We include the following components of subjective experience: valuable experience, organizational experience, operational adaptation, orientation to a certain level of success, assessment of one's own capabilities; experience of cooperation.

An important feature of ensuring positive interaction is the production by students of new ideas, new creative plans to create an active atmosphere of creativity with the projection of positive success in the activities of the student club.

Thus, the effectiveness of favorable interpersonal relations in the student club depends on a positive psychological climate, as well as on high value-orientational unity, which is manifested in joint activities.

In the study, we relied on new positions regarding the provision of productive connections in student club associations with the aim of activating activities, meaningful content, interpersonal contacts, and realization of cultural leisure. At the same time, in order to ensure the productive functioning of student clubs, it is necessary to use a scientifically based cultural and leisure program, which will become an optimal and productive means for real practical actions. From this, it becomes clear the importance of creating creative connections of club organizations, in which the content of activities becomes a powerful force in their spiritual, emotional, and intellectual development.

The central figure in the organization of youth leisure in the conditions of the activity of the student club is its leader - whose figure embodies the important qualities of an organizer, manager, psychologist, coach, teacher, which generally determine the success of management activities or the characteristics of the best leadership. The ability to organize and direct the efforts of student club members to solve tasks of varying complexity, while determining the creative capabilities of each student and objectively evaluating the results of both individual activity and the activity of the student club as a whole, is of particular importance to the manager.

The following personality traits of a team leader are the ability to have emotional and volitional influence. This quality is the basis for mobilizing, uniting, uniting and directing students to achieve club goals.

In the practice of managing a student club, the issue of leadership and management is considered mainly from the point of view of managing the organization, although the awareness of leadership by some members of the club and the external balance of its manifestation is enhanced adequately to the overall growth of the creative potential of the student association. That is when leadership is a kind of generator of activity and independence of all participants. In our opinion, the head of the student club is a leader-organizer, ensuring the maximum inclusion of all participants in the common fund of activities.

Conclusions. We believe that the organization of youth leisure in the context of student clubs is a multifaceted process, the key positions of which are the following system-forming characteristics: activity, productive interaction; collegiality in decision-making; orientation to the direction of functioning; orientation to positive performance; providing effective feedback; orientation to the value guidelines of culture as the foundation of the spiritual development of the individual.

The scientific novelty of the study consists in: determining the place of the student club in the development of activities in free time; in determining the main forms, methods and directions of work of the student club in the formation of socio-cultural knowledge and skills; in the analysis of motives for job satisfaction, interests and needs in various types of club activities; in consideration of cultural and educational work as a component of the organization of students' leisure time; in the analysis of cultural mass and leisure

activities of the student club as one of the leading forms of manifestation of student activity and socio-cultural creativity.

The practical significance of the research results is that the developed conditions for stimulating student activity by means of cultural and leisure activities of student clubs contribute to the education of future specialists of graduates of higher educational institutions.

References:

1. Tadlia O. M. (2015). Activities of the student club: conceptual and categorical apparatus / O. M. Tadlya // Ukrainian culture: past, present, ways of development. Culturology. Vol. 21(2). P. 150-157. Access mode: http://nbuv.gov.ua/UJRN/ukrk_2015_21(2)__33.

2. Etymological dictionary of the Ukrainian language (1985).: In 7 vols. Vol. 2: D - Koptsi / Ed. col.: O. S. Melnychuk (chief editor), V. T. Kolomiets, O. B. Tkachenko. Academy of Sciences of the Ukrainian SSR Institute of Linguistics named after O. O. Potebny. K.: Naukova dumka, 1985. 572 p.

3. The Oxford English Dictionary. London, 1884–1928. Vol. 2. P. 533-535

4. Grand dictionnaire encyclopedigue larousse. Librairie larosse. Paris. T.3: Christiania a docte. 1972. P. 2325.

5. The Encyclopedia Americana. (1973). P. 123-125

6. Mejers Enzyklopädisches Lexikon (1980).: in 25 Bander. Mannheim. Wien. Zürich : Band 13: j-Kn. P.796.

7. Dictionary of foreign words (1974), edited by O. S. Melnychuk. 1st edition, Kyiv: Main Editorial Office of the Ukrainian Soviet Encyclopedia (URE), 776 p.

8. Encyclopedia of Modern Ukraine (2004) [Electronic resource] / Ed.: I. M. Dzyuba, A. I. Zhukovsky, M. G. Zheleznyak [and others]; National Academy of Sciences of Ukraine, National Academy of Sciences. K.: Institute of Encyclopedic Research of the National Academy of Sciences of Ukraine. Access mode: https://esu.com.ua/article-36504

9. Great Ukrainian Encyclopedia (2022). Thematic register of slogans from the field of "Culturology": in 2 parts / Compilers: A. V. Aristova, N. A. Havrylyshina, I. V. Shlichta; in general ed. d. i. n., prof. Kyridon A. M. Kyiv: State Scientific Institution "Encyclopedic Publishing House". Part 1. 264 p.

10. Petrova I. V. (2000). Organization of cultural and leisure activities of clubs in the countries of Western Europe and the USA: autoref. thesis ... candidate ped. Sciences: Kyiv. national University of Culture and Arts. K., 20 p.

11. Polishchuk. L. O. (2012). Directions of social and cultural activity in clubs of Ukraine // Actual problems of history, theory and practice of artistic culture: Collection of scientific works / Ministry of Culture of Ukraine, National. Acad. manager personnel of culture and arts. K.: Millennium. Vol. 29. P. 306-312.

12. Derby, D.C. (2006). Student involvement in clubs and organizations: An

exploratory study at a community college. Journal of Applied Research in the Community College, 14(1), 39-45.

13. Foubert, John D., & Lauren A. Urbanski. (2006). Effects of involvement in clubs and organizations on the psychosocial development of first-year and senior college students. NASPA journal 43.1,166-182.

14. Hawkins A. (2015). Involvement matters: The impact of involvement in student clubs and organizations on student retention and persistence at urban community colleges (Doctoral dissertation).

15. Pittaway, L.A., Gazzard, J., Shore, A., & Williamson, T. (2015). Student clubs: experiences in entrepreneurial learning. Entrepreneurship & Regional Development, 27(3-4), 127-153.

16. Kuzu, O. H. (2021). Student clubs at universities: A content analysis on diversity. Eğitimde Nitel Araştırmalar Dergisi, (27), 52-73.

17. Simpson, J., & Bista, K. (2023). Examining Minority Students Involvements and Experiences in Cultural Clubs and Organizations at Community Colleges. Community College Journal of Research and Practice, 47(2), 79-89.

18. Honcharenko S. (1997). Ukrainian pedagogical dictionary / S. Honcharenko. Kyiv: Libra. 376 p.

19. Pishun S.G. (2005). Formation of leisure culture of students of higher educational institutions in the working conditions of the student club: dissertation. ... candidate ped. Sciences: Sumy, 254

20. Tyuska, V. B. (2014). Creative self-realization of students in the process of club activities. Updating the content, forms and methods of teaching and upbringing in educational institutions, 9: 152-156.

TOPOLOGY AS A DIDACTIC TOOL FOR THE DEVELOPMENT OF STUDENTS' MATHEMATICAL THINKING

Natalia Shapovalova,
Ph.D. in Physico-Mathematical Sciences, Associate Professor,
Mykhailo Dragomanov National Pedagogical University of Ukraine
n.v.shapovalova@udu.edu.ua; ORCID: 0009-0000-7084-1460
Larisa Panchenko,
Ph.D. in Pedagogy, Associate Professor,
Mykhailo Dragomanov National Pedagogical University of Ukraine
larpan97@gmail.com; ORCID ID: 0009-0001-8156-286X

Annotation. *The article is aimed at revealing main methodical aspects of teaching topology for students of mathematical specialties of pedagogical universities.*

The article emphasizes the special importance of topology as a didactic tool for the development of the mathematical worldview of students of mathematical specialties at universities.

Topology is a section of mathematics studying the properties of figures (or spaces) which they preserve in continuous deformations such as stretching, compression or bending. Continuous deformation takes place when there is no ruptures (that is integrity of a figure is not broken) or patching. Topological problems are solved through methods that are radically different from methods of geometry.

The studying of topology plays an important role due to broad theoretic and practical application of topological regularities in such branches of science as physics, astronomy, anthology, cybernetics, geology, architecture, geography, cosmology, genetics etc. Topology is particularly useful in improving students' intellectual and cognitive abilities and developing their mathematical skills.

Keywords: *topology, differential geometry, competence, interdisciplinary ties, studying process, teaching, scientific approach, physics.*

Problem statement. In the conditions of the development of new technologies, the demand for people with non-standard thinking, who know how to set and solve new tasks has increased sharply. This determines the importance of conducting methodological work to acquaint students with new methods of non-standard thinking, aimed at the development of logical mathematical thinking of a new generation.

Therefore, the concept of a person-oriented approach to learning is gaining more and more popularity at the moment, which involves the maximum possible individualization of the process, ensuring the possibility of realizing the requests and gifts of the student's personality. Another no less important milestone in the process of learning and development of new methodological approaches to its organization is encouraging students to constantly develop and improve their knowledge, skills and expand the field of interests. After all, self-development in the future often leads to the emergence of new, creative ways of solving problems.

Such an apparatus of cognition and expansion of the space of thinking is topology,

which, like no other science, contributes to the development of students' intellectual abilities. The course of topology has not yet gained clear recognition, but observing the development of the science, it is safe to say that it will flourish in the near future. The secret of topology's success is hidden in its versatility and ability to manifest itself in almost all milestones of human activity and science.

This article is devoted to the study of the role of topology as a didactic tool for the development of students' mathematical thinking in the process of learning the educational discipline "Differential Geometry and Topology" as a mandatory part of the cycle of professional training of students of mathematical specialties of universities and the disclosure of the main methodological aspects of this process.

Analysis of recent research and publications. Questions of the theory and methodology of teaching topology were developed in the works of A. N. Kolmogorov, A. D. Alexandrov, L. S. Pontryagin, V. G. Boltyanskyi, V. A. Yefremovich, N. Burbaki, J. Shvarts, A. L. Werner, V. I. Ryzhik, B. E. Kantor, S. A. Frangulova, S. P. Novikova, A. S. Mishchenko, Yu. P. Solovyov, A. T. Fomenko, M. I. Kovantsova, O. A. Borysenko, S. G. Kononova, A. V. Prasolova, V. L. Tykhmokhovych, V. I. Glizburg, M. E. Sangalova, N. V. Timofeeva, and others.

The purpose of the article. The purpose of the article is to reveal the main methodological aspects of teaching topology as a didactic tool for the development of mathematical thinking of students of mathematical specialties at universities. For this purpose, the purpose, content and main provisions of the topology are first considered. Then the peculiarities of topology are analyzed and modern approaches and methods of its learning are proposed.

Topology is studied in the course of the educational discipline "Differential geometry and topology" which is a mandatory part of the cycle of professional training of students of mathematical specialties of universities.

The subject of study of the educational discipline "Differential Geometry and Topology" is geometric images, primarily curves and surfaces, as well as families of curves and surfaces in Euclidean space by methods of mathematical analysis, metric and topological spaces, mapping of topological spaces, topological manifolds, polyhedra.

The organization of the educational course "Differential Geometry and Topology" involves the active use of interdisciplinary connections with such disciplines as "Mathematical Analysis", "Analytic Geometry", "Linear Algebra", "Elementary Mathematics", "Differential Equations", "Theory of Invariants" , "Physics", as well as when studying separate sections of general and special courses in physics, mathematics, computer science and astronomy, etc.

The purpose of teaching the educational discipline "Differential geometry and topology" is to teach students techniques and methods of solving differential geometry and topology problems, to develop the ability to use methods of mathematical analysis, to study the basic facts of differential geometry and topology, and to be able to apply these geometric and topological facts as in solving solving geometric and topological problems, as well as problems of an applied nature, researching their connection with

problems and methods of differential and integral calculus, with a school geometry course.

According to the requirements of the educational and professional program, students must know topology:

Basic concepts. Metric, metric space; open and closed sets in metric space; interiority, closure and limit of a subset; convergent sequences in metric space; topology; topological space; topological environment; comparison of topologies; discrete topology; antidiscrete topology; metric-induced topology; subspaces of the topological space; closed sets in topological space; convergent sequences in topological space; axioms of separability; Hausdorff topological spaces; axioms of countability; topology base; separable topological spaces; metric outer topological spaces; normal topological spaces. Display of topological spaces; continuity of mapping of topological spaces at a point and "as a whole"; homeomorphism; topological properties; connectivity; compactness; components of topological space, linear connectivity; topological dimensionality, Hausdorffness; inherited topological properties. Locally Euclidean topological space; dimensionality of the topological space; n-dimensional topological manifold; edge of multispecies; Möbius sheet; torus; Klein's bottle; model surfaces; pens, tubes, films; multispecies orientation; spheres with handles; spheres with holes; spheres with films; triangulation; cellular divisions of surfaces; Euler characteristic of the manifold; regular polyhedra; surface sweeps.

Basic formulas and theorems. Properties of open and closed sets in metric space. Properties of interiority, closure and limit of a set. Theorem on the structure of a topological subspace. Theorems on the structure of the boundary and interior of a set of topological space. Properties of Hausdorff spaces. Criterion of metrization of topological space. Criterion of continuity of mappings of topological spaces "as a whole". Properties and signs of continuous mappings. Properties of homeomorphisms. Connectivity criterion. Connectivity component properties. Properties of compact topological spaces. Criterion of compactness in Euclidean spaces. Criterion of homeomorphism. Theorem on topological classification of one-dimensional manifolds. Theorem on topological classification of two-dimensional manifolds. Euler's formula. Theorem on the classification of topologically regular polyhedra.

Students should be able to:

Check the fulfillment of the axioms of topological and metric spaces. Metrize the basic set in different ways, check the equivalence of metrics. Topologize sets in different ways, compare topologies. Investigate the convergence of sequences in topological and metric spaces. Classify points by their position relative to a fixed set. Check the continuity of the display at the point. Check the continuity of the display "as a whole". To prove homeomorphism (non-homeomorphism) of topological spaces. Calculate the topological dimension of subsets of the topological space. Investigate topological spaces and their subspaces for compactness, connectivity, linear connectivity, Hausdorffness. Determine the topological dimension of a manifold. Calculate the Euler characteristic of a manifold. Establish topological equivalence (non-equivalence) of one-dimensional

and two-dimensional manifolds.

These knowledge and skills ensure the formation of the following *competencies:*

− basic ideas about the variety of geometric objects, understanding the meaning of the unity of geometry as a science, its place in the modern world and the system of sciences;

− mastery of methods of description, identification, classification and definition of geometric objects;

− the ability to apply basic analytical, geometric methods and methods of mathematical analysis, in particular differential and integral calculus, to the creation, analysis and research of mathematical models of real objects, processes and phenomena;

− the ability to apply modern information technologies to solve theoretical, practical and applied problems;

− basic ideas about the history of the development of differential geometry;

− ability to analyze educational and methodical literature on the discipline;

− ability to apply acquired theoretical knowledge in solving practical problems;

− the ability to use previously acquired knowledge when studying new theoretical material and solving practical problems;

− the ability to conduct deductive justifications of the correctness of solving problems and to look for logical errors in incorrect deductive reasoning;

− the ability to find invariant quantities, invariant elements and invariant properties and apply them in further research;

− the ability to use mathematical and logical symbols in practice.

Topology has great opportunities for the development of the cognitive activity of the future teacher of mathematics through the development of such methods of mental activity as analysis, synthesis, abstraction, comparison, generalization, analogy, intuition, etc. Taking into account the specialization and individual development of students in accordance with their abilities and capabilities, the content of the "Differential Geometry and Topology" course, in addition to theoretical material with mandatory and additional parts, task material that will ensure solid assimilation of basic knowledge, should also contain motivational material (system problematic and heuristic problems and questions, creative and research questions, problems of interdisciplinary content, historical materials for studying relevant course topics, etc.).

At the first lectures, it is necessary to explain the general purpose of topology as a separate module of the course, to clarify the structure of this module as a whole system. Attention should be paid to the dialectical nature of the module as a whole. It is necessary to draw the attention of students to a wide range of applied and practical problems that are solved by the methods and means of topology.

Topology studies those properties of geometric objects that are preserved under continuous transformations. Topology is a branch of mathematics that deals with the study of properties of shapes (or spaces) that are preserved under continuous deformations, such as, for example, stretching, compression, or bending. Continuous deformation is a deformation of a shape in which there are no breaks (that is, the integrity of the shape is

not violated) or gluing (that is, identification of its points).

The subject of studying topology as an educational discipline is metric and topological spaces, mapping of topological spaces, topological manifolds, polyhedra. Topology as an educational discipline consists of three content modules: "Topological and metric spaces", "Mapping of topological spaces", "Topological manifolds".

The main approach in the process of studying topology is a scientific approach.

In the process of studying topology, students learn to check the fulfillment of the axioms of topological and metric spaces, to metricize the basic set in different ways, to check the equivalence of metrics, to topologize sets in different ways, to compare topologies, to investigate the convergence of sequences in topological and metric spaces, to classify points according to their position relative to a fixed set , check the continuity of the mapping at a point, check the continuity of the mapping "as a whole", prove the homeomorphism (non-homeomorphism) of topological spaces, calculate the topological dimension of subsets of the topological space, examine topological spaces and their subspaces for compactness, connectivity, linear connectivity, Hausdorffness, determine the topological dimension of a manifold, calculate the Euler characteristic of a manifold, establish the topological equivalence (inequivalence) of one-dimensional and two-dimensional manifolds.

The study of topology plays an important role in connection with a wide range of theoretical and applied applications of topological properties in such sciences as anthology, raceology, cybernetics, computer science, cartography, geology, pottery, architecture, geography, cosmology, biology, natural science, genetics, bacteriology, mathematics, physics, mining, astronomy, etc.

In the process of teaching topology students, you can successfully use historical examples, introduce them to the main stages of development of topology and the main historical problems and tasks. It is important to introduce students to the concept of topological dimension, which plays a central role in the development of many theories.

For the first time, the famous mathematician Leonard Euler encountered a purely topological problem, solving the so-called problem "about the seven Königsberg bridges". Analogous to the problem about the seven Königsberg bridges are the problems about the ability to draw some geometric figure in a continuous movement (without taking the pencil off the paper) so that the tip of the pencil does not pass a second time along any of the already drawn lines. It turns out that the question of the possibility of solving such problems is determined not by the complexity, not by the dimensions of the figure itself, but by the mathematical dependencies that topology investigates.

Topological problems are solved by methods fundamentally different from those of geometry. Topology studies the conditions under which some shapes can be transformed into others in a smooth, continuous motion.

Studying topology contributes to the development of not only topological, but also intellectual, physical, mathematical skills and abilities of students, is a necessary element for self-improvement, self-education of students, development of erudition, abstract thinking, enrichment of knowledge in different areas of science at the same

time, intellectual growth.

Taking into account the experience of teaching geometry and topology at a pedagogical university, we believe that topology should be studied as a separate academic discipline for at least one semester with one lecture and one practical lesson per week. Because solving topology problems causes significant difficulties for students, as they have their own specifics and require relevant knowledge and skills not only in topology, but also in geometry, mathematical analysis.

As an option, you can consider the possibility of studying the topic of topology as a special course not only for mathematicians, but also for physicists (due to the strong connections of topology with certain problems of physics, such as the question of clarifying the nature of the gravitational field, space, time).

Students and pupils should especially pay attention to the theoretical and applied applications of topological properties, which are manifested and applied in the various above-mentioned sciences. To do this, you need to correctly create presentations, choose tasks and examples of their application.

Conclusions. A system of purposefully designed problems, questions and tasks is an important condition for the development of cognitive motivation in the educational process and an effective means of developing productive heuristic thinking. Solving topological problems, students not only actively master the content of the module, but also acquire the ability to use analogy, generalization, and think independently and creatively. Along with tasks of a reproductive nature, associated with cognitive difficulties, to overcome which new knowledge or intellectual efforts are required. Such tasks form the basis of problem-based learning, the pedagogical conditions for success of which are: creation of cognitive difficulties corresponding to the intellectual abilities of students; provision of a set of knowledge on the subject content of the problem situation; formation of operational skills for solving problematic problems. The development of non-standard thinking will be facilitated by tasks that require creative mastery of educational material.

Diversification of methodical possibilities is provided thanks to the use of multimedia teaching tools, namely, the display of presentations and dynamic drawings. In particular, dynamic topological models provide a higher and clearer level of educational and cognitive activity of students. Drawings of this type serve as a substitute for textbook fragments and are especially useful for self-training. However, this requires the development of appropriate educational and methodological support, which necessitates further research in this direction.

Enrichment of the student's topological culture takes place in the closest connection with the use of the apparatus of mathematical analysis, provides specific knowledge sufficient for teaching topology and qualified group classes.

Topology is of special importance as a didactic tool for the development of the mathematical worldview of university students of mathematical specialties.

The study of topological properties of figures in the course "Differential Geometry and Topology" provides wide opportunities for their practical application, increases the

competence of future teachers of mathematics and physics and stimulates their own search for new topological, mathematical, geometric and physical ideas and theories.

References:

1. Aleksandrov A.D., Netsvetaev N.Yu. Geometry: textbook. allowance M.: Nauka, 1990. 672 p.

2. Atanasyan L.S., Bazylev V.T. Geometry. Part 2. M.: Prosveschenie, 1987. 352 p.

3. Borysenko O.A. Differential geometry and topology. Kh.: Osnova, 1995. 304 p.

4. Werner A.L., Kantor B.E., Frangulov S.A. Geometry: a textbook for students of physics and mathematics faculties of pedagogical institutes. Part 2. / St. Petersburg: "Special literature", 1997. 320 p.

5. Werner A.L., Kantor B.E. Elements of topology and differential. M.: Prosveschenie, 1985. 112 p.

6. Kovantsov N.I. Differential geometry, topology, tensor analysis: collection of problems / N.Y. Kovantsov [and others]. K.: Higher School, 1989. 398 p.

7. Myshchenko A.S., Fomenko A.T. Course of differential geometry. M.: Factorial Press Publishing House, 2000. 448 p.

8. Myshchenko A.S., Fomenko A.T. A short course in differential geometry and topology. M.: FIZMATLYT, 2004. 304 p.

9. Novikov P.S., Fomenko A.T. Elements of differential geometry and topology. M.: Nauka, 1987. 432 p.

10. Shapovalova N.V., Panchenko L.L. The role of studying topology to increase the competence of future teachers of mathematics and physics // Problems of education: Nauk. coll. / Institute of Innovative Technologies and Educational Content of the Ministry of Education and Culture of Ukraine, K., 2015. Issue No. 80. Part 2. P. 285-290.

11. Shapovalova N.V., Panchenko L.L. A systematic approach to teaching topology to future teachers of mathematics and physics // Scientific developments, advanced technologies, innovations [a collection of scientific works and theses of scientific reports based on the materials of the II International Scientific and Practical Conference]. Budapest-Prague-Kyiv, K.: NDIER. 2015. P. 168-173. URL: http://sried.in.ua/05.2015.pdf

GENDER CHARACTERISTICS OF THE PROFESSIONAL ACTIVITY OF A FEMALE MILITARY OFFICER

Mykola Zhuravlov,
Adjunet of National Defence University
of Ukraine named after Ivan Cherniakhovskyi,
nikolajzuravlev688@gmail.com; ORCID: 0000-0002-5660-1660
Tetiana Sydorenko,
Ph.D. in Economics, Assistant Professor,
State University of Trade and Economy, Kyiv, Ukraine
sydorenko_tanya@ukr.net; ORCID: 0000-0003-2904-0826

Annotation. *The article substantiates the authority of professional activity regarding the specifics of the gender difference of female servicemen. It is noted that the involvement of women in the ranks of the Armed Forces is due to: a sense of social security; material and medical support; availability of permanent income; guaranteed leave; the possibility of arranging a personal life; the possibility of career growth; the possibility of obtaining housing; a sense of duty to the Motherland.*

According to the order, women in other specialties are not subject to mandatory military registration. However, they can always join the military register at their own will.

It is noted that female servicemen, based on the list of prescribed documents provided in the Instructions, have the opportunity to be released from professional responsibilities if they need to treat a sick child who needs outside care.

Keywords: *gender specifics, social protection, female serviceman, the Statute of the Internal Service of the Armed Forces of Ukraine, dismissal from official responsibilities, instructions.*

Introduction. The priority task of development under martial law conditions in Ukraine is the approximation of modern standards to the criteria for ensuring social life on the model of developed countries in strengthening social guarantees and in defining gender rights and responsibilities of citizens. The direction of the State's strategic course toward full membership of Ukraine in cooperation with the countries of the European Union and the North Atlantic Treaty Organization is constitutionally determined. The constitutional security of the state guarantees the safety and defense of citizens, their dignity, the inviolability of life, and the honor of families, which is the highest social value in Ukraine [9].

The national security of Ukraine is aimed at protecting the territorial integrity and sovereignty of Ukraine in ensuring its information and economic security, which are important factors in regulating the stability of the state and the entire Ukrainian people. The military obligation of citizens is determined by their participation in the defense of the Motherland. That is why, during martial law, to prepare them for defense, not only men but also women, who are fit for service due to their health and age, are registered for military service. The moral and psychological state of conscripts must also be appropriate, which directly affects the quality of performance and the timeliness of the

implementation of organizational and mobilization tasks in wartime and peacetime.

At the same time, military personnel are guided by the Constitution of Ukraine, the statutes of the Armed Forces, and the laws of Ukraine on military issues and regulatory legal acts in the performance of their responsibilities. Military service is usually performed by both men and women. Each of them is guided by the right to work, which he chooses according to his own choice, except for some organizational and mobilization measures. There is a need to define and specify the gender specifics of the professional activity of female servicemen about the issue of regulating their release from responsibilities.

The purpose of the article is to substantiate the powers of professional activity concerning the specifics of the gender difference of female servicemen.

Gender policy issues reflect the social opportunities of each gender in determining family roles, access to power, education, professional support, and reproductive behavior, which is one of the basic indicators of the quality of life in society and the formation of social institutions. The state creates equal opportunities for citizens to exercise their rights to work, promotes vocational training and retraining of personnel following social needs, and guarantees free choice of professional activity.

The social orientation of the system of economic and socio-political priorities of Ukraine is now gaining weight in the context of defining national interests in the protection and security of the rights and freedoms of every citizen. In this sense, we define gender identity as an individual's awareness of his gender, namely the feeling of his female or male dominance in the sociometric dimension. The equality of rights and freedoms of women and men is stipulated by the Constitution of Ukraine [9].

The professional orientation of women regarding the choice of military activity is based on the priorities of service mainly for economic reasons - it is material support that attracts them. The significance of self-realization in the conditions of service is quite significant, which allows them to obtain a specialty for the implementation of further professional activities after leaving the army. The involvement of women in the ranks of the Armed Forces is also determined by:

- a sense of social security;
- material and medical support;
- availability of permanent income;
- guaranteed leave;
- the possibility of arranging a personal life;
- the possibility of increasing career growth;
- the possibility of obtaining housing;
- a sense of responsibility to the Motherland.

Taking into account the general prerogatives of serving in the sphere of defense of the country, it is men who have a significant advantage, which refutes the gender demand for women's service in the armed forces. However, objective reality interprets the new priorities of women in military uniform, which provides them with the possibility of self-realization in all spheres of military activity. Currently, the Armed Forces of Ukraine are mostly staffed by daughters, wives, and relatives of military personnel. Their presence significantly optimizes the moral and psychological atmosphere in military teams, increases the culture of relations between genders, and forces the command to be more restrained and attentive [1].

The use of forced labor by women during military service is prohibited.

According to the new standards for admission to military registration, in 2023, the procedure for involving women in the service ensures the availability of only pharmaceutical and medical specialties. At the same time, women with medical and pharmaceutical education (who received it before December 30, 2022) who were not included in the military registration, have the opportunity to be employed in the service until 2026.

Military registration is subject to only those women who meet the following requirements, according to the order of the Ministry of Defense №. 313 (from October 11, 2021), with almost a hundred professions and specialties:

- age category from 18 to 60 years;
- absence of contraindications regarding the state of psychosomatic health;
- professional security according to the military accounting specialty.

Later, it was supplemented by Order №35 (from February 7, 2022), and the list of specialties was slightly shortened.

According to order № 31311 of the Ministry of Defense (from October 1, 2021), military registration for women is provided, which obliges them to join the service in 14 specialties (Table 1).

Mandatory military registration according to the order, women are not subject to other specialties. However, they can always join the military register at their own will.

At the same time, female servicemen have not insured persons following the Law: expenses for their social and material support are regulated according to the account of the state budget of Ukraine.

The grounds regarding the procedure for a female servicewoman for providing social benefits or exemption from professional responsibilities to care for a sick child are based on clinical indications for the period of treatment.

According to paragraph 5 of Article 11 of the Law of Ukraine (as of December 20, 1991, №. 2011) "On Social and Legal Protection of Servicemen and Their Family Members" (with relevant amendments), female servicemen have the opportunity to use all the benefits provided for by the legislation on their social protection, protection of motherhood and childhood [8].

Article 64 of the Fundamentals of the Legislation of Ukraine "On Health Care" (from November 19, 1992, under № 2801) refers to the impossibility of hospitalization

due to the lack of clinical indications for the treatment of a sick child in a hospital, in the context of which a caregiver or other family member providing care, may be released from professional responsibilities with the payment of financial assistance from social insurance funds by the established procedure [6].

Table 1

List of professions and specialties of military accounting for women, approved by the Ministry of Defense

№ п/п	List of specialties
1	2
1	chemistry, chemical technologies, engineering, biology
2	telecommunications and radio engineering
3	software engineering, computer science, information systems and technologies, computer engineering, systems analysis, cyber security, micro- and nanosystem engineering, automation, and computer-integrated technologies
4	metrology and information and measurement technology
5	Sciences of Earth, geography, physics, and Astronomy
1	2
7	provision of militaries, weapons, and military equipment, technologies of light industry
8	physical therapy, occupational therapy, medical and psychological rehabilitation, public health, physical rehabilitation, industrial pharmacy, sanitation, and expertise
9	stomatology, medicine, nursing, pharmacy, technologies of medical diagnosis and treatment
10	biomedical engineering, biotechnology, and bioengineering
11	veterinary medicine, veterinary hygiene
12	accounting and taxation, marketing, management, entrepreneurship, economics, finance, banking, and insurance
13	publishing, and printing
14	psychology, social work, social security

Article 35 of the Law of Ukraine "On mandatory state social insurance in connection with temporary loss of working capacity and expenses caused by birth and burial" guarantees insurance payments under the conditions of assisting by the need for temporary incapacity for work in relation to the need to care for a sick child [3].

A female military serviceman also has the right to receive one-time payments of material assistance for solving certain complex social and household issues. She is governed by the right to receive material compensation for the need to release her from her professional responsibilities to care for a sick child, according to a doctor's opinion, but for no more than 14 calendar days. The basis for this is a letter of incapacity for work intended for financial assistance in connection with temporary incapacity for work and issued in the prescribed manner, according to clinical indications.

The procedure (Table 2) regarding the conditions for issuing, extending, and recording documents confirming the temporary incapacity of citizens, approved by the order of the

Ministry of Health of Ukraine (from November 13, 2001, under № 455), registered in the Ministry of Justice of Ukraine (from December 4, 2001, under No. 1005/6196).

Table 2

Instructions for release from professional responsibilities regarding temporary incapacity for work and care for a sick child

№ p/p	Characteristics
1	2
Subparagraph 1.3.1 of paragraph 1.3 of the Instructions	it is established that the certificate of incapacity for work is issued to citizens of Ukraine, foreigners, and stateless persons, according to the place of residence and the terms of the employment agreement (contract) at enterprises, institutions, and organizations regardless of the forms of ownership and management or natural persons, including in international diplomatic missions of consular institutions
Paragraphs 3.2, 3.3, 3.4 Instructions	to care for an adult family member and a sick child older than 14 years, during treatment in an outpatient clinic, a sick leave certificate is issued for a period of up to three days. As an exception, depending on the severity of the course of the disease and living conditions, this period can be extended by the decision of the LKK, and in its absence - by the chief physician, but not more than 7 calendar days
	to care for a sick child under the age of 14, a certificate of incapacity for work is issued for the period during which the child needs care, but not more than 14 calendar days, and for the care of a child injured as a result of the accident at the Chornobyl NPP - for the entire period of his illness, including sanatorium-resort treatment
Paragraphs 3.8, 3.9, 3.10 Instructions	in the case of inpatient treatment of children under the age of 6, one of the working family members or another working person who cares for the child is issued a certificate of incapacity for work for the entire period of stay in the inpatient facility together with the child
	after the child is discharged from the hospital during the acute period of the disease, the sick leave is issued or extended until the child recovers, but within the established period, taking into account the days of the sick leave that was issued for the care of the child before hospital treatment
	in the case of inpatient treatment of seriously ill children aged 6-14 years, a certificate of incapacity for work is issued to one of the working family members or another working person who supervises the child, for the period when, according to the conclusion of the LKK, the child needs individual care

Conclusions. Thus, the temporary incapacity for work of a female serviceman who was released from professional responsibilities is included in the total continuous length of military service. They have the right to receive financial assistance during the time they are released from their professional responsibilities in caring for the child due to illness, during which the child needs care according to the doctor's opinion, but only for 14 calendar days and for the entire time of her stay in the hospital together with a sick child.

In addition, should be noted that female servicemen, based on the list of documents provided in the Instructions, have the opportunity to be excused from professional

responsibilities if necessary to treat a sick child who needs outside care.

Based on a doctor's certificate regarding exemption from professional responsibilities following the care of a sick child by female servicemen of a military unit and the list of documents provided for by the order of the Ministry of Health of Ukraine regarding the register of the procedure established by the Ministry of Justice of Ukraine, for the continuation of treatment, as well as the beginning, duration, and return to service after her recovery, temporary incapacity for work is declared in the order of the military unit.

References:

1. Bogutskiy P.P., Kryvenko O.V., Kryvenko A.O. Law of Ukraine "On social and legal protection of military personnel and members of their families". Scientific and practical commentary, 2014. p.13-18.

2. Law of Ukraine "On Military Responsibilities and Military Service" dated March 25, 1992, № 2232-12.

3. Law of Ukraine "On mandatory state social insurance in connection with temporary disability and expenses caused by birth and burial" dated July 10, 2003, № 1096-IV.

4. Law of Ukraine "On the Armed Forces of Ukraine" dated 06.12.91 № 1934-XII.

5. Law of Ukraine "On the Defense of Ukraine" dated 06.12.91 № 1932-XII.

6. Law of Ukraine "On Health Protection" dated November 19, 1992, № 2801

7. Law of Ukraine "On pension provision of persons discharged from military service and certain other persons" dated 04.09.92 № 2262-12.

8. Law of Ukraine "On social and legal protection of military personnel and members of their families" dated 12.20.91 № 2011-12.

9. The Constitution of Ukraine, was adopted at the fifth session of the Verkhovna Rada of Ukraine on June 28, 1996. K.: Prosvita, 1996. 80 p.

10. Order of the Ministry of Health of Ukraine dated 11/13/2001 № 455 registered in the Ministry of Justice of Ukraine on 12/04/2001 under № 1005/6196.

11. Statute of the internal service of the Armed Forces of Ukraine. p.256-257 approval by the Laws of Ukraine dated March 24, 1999, № 548-XIV; 551- XIV; 550-XIV; 549- XIV.

PHILOSOPHY AND THEOLOGY

MANIFESTATION OF SOCIALLY DESTRUCTIVE VIEWPOINTS OF PROTESTANT CHURCHES IN THE CONTEXT OF RUSSIA'S WAR CRIMES AGAINST UKRAINE

Ihor Lutsan,
Ph.D. in Historical Sciences, Senior Research Associate,
Assistant of the Department of Philosophy and Cultural Studies
Yuriy Fedkovych Chernivtsi National University, Ukraine
i.lutsan@chnu.edu.ua; ORCID: 0000-0002-2341-069X
Oleksandr Marchuk,
Ph.D. in Philosophy, Senior Research Associate,
Assistant of the Department of Philosophy and Cultural Studies
Yuriy Fedkovych Chernivtsi National University, Ukraine
o.marchuk@chnu.edu.ua; ORCID: 0000-0001-9759-3540

Annotation. *The main focus of this research article is on manifestations of socially destructive viewpoints in the conditions of the Russia-Ukraine war, which may have potentially devastating consequences that could undermine social bonds, particularly in the context often take on a destructive character and can be aimed at destabilizing social connections, including inertia in finding effective mechanisms of protection and mutual support. The material has been processed within the framework of the project "Social Functionality of Religion in Conditions of Extreme Peril: Ideological-Theoretical and Practical Dimensions" under the state registration number: 0121U109446.*

Keywords: *Protestantism, the social activity of the Church, destructive manifestations, pacifism, war.*

Introduction. Since the first days of the bloody war characterized by cynical invasion, military crimes, and constant acts (torture of civilians and prisoners, rape of minors, air strikes on civilian infrastructure of cities and towns, use of prohibited weapons, abduction of children, activists, representatives of local governments, journalists, volunteers, etc.), of Russia's aggression against Ukraine − thousands of lives have been lost, both faithful and unwavering defenders of their Homeland, as well as innocent civilians, including children. Hundreds of thousands of people have lost their homes, some villages and cities remain under occupation, and a large number of individuals have been forcibly displaced abroad. Consequently, providing assistance to the military, organizing and delivering social services to individuals and groups in need to ensure their comprehensive development, and subsequently, facilitating spiritually-guided social and psychological rehabilitation for servicemen, demobilized veterans, and their families, as well as those who have become victims of the war, are critically important and sought-after endeavors today.

What remains exceptionally noteworthy is the active engagement of various religious denominations within Ukraine, including Orthodox, Roman Catholic, Greek Catholic, and notably, Protestant churches, in recognizing the grave peril posed by the Kremlin's war crimes. Their commitment to preserving Ukrainian statehood knows no bounds, as they employ every possible and effective means to defend their Homeland. Nevertheless, it is with regret that we must acknowledge the presence of socially destructive trends within certain denominations, trends that all too often take a damaging turn, threatening to destabilize social ties and more. Therefore, the primary objective of our scientific inquiry is to delineate the manifestations of socially destructive stance within Ukraine's Protestant churches in the midst of the cynical aggression perpetrated by the Russian Federation.

Problem and methodology. In these extremely difficult realities of war, the religious component is observed to play far from the last role. Indeed, today the role of the Church and religious organizations, which were and remain one of the authoritative segments of Ukrainian society, is becoming more apparent. Their influence on human consciousness, which is indeed of great theoretical and practical importance, is actualized in society as a kind of effective driver of communication and thus of great interest in direct and active participation in social life, in the formation of a legal Ukrainian state and the development of civil society. That is why today quite significant changes are taking place in the church-religious domain of Ukrainian society, which often manifest themselves in both constructive and, unfortunately, destructive forms and are closely intertwined with religious beliefs and political attitudes.

Today, the study of issues related to models of social activity of religious organizations is essential for a wide range of researchers in history, theology, religious studies, political science, etc., and therefore is in demand. Some of the publications only touch on these issues, being primarily concerned with solving other research problems, while others quite consistently outline the essential features, effectiveness, and areas of socially significant initiatives of religious communities, their faithful, and leaders. A wealth of source material pertinent to the issue under scrutiny can be found within the official statements and decisions of the various churches. Nonetheless, the underpinning theoretical framework for this study draws from the works of preeminent Ukrainian and international experts, encompassing theologians, scholars of religious studies, philosophers, historians, psychologists, and journalists along with volunteers, namely S. Schie, S. Guentert, T. Wehner, J. Oostlander, M. Olchman, P. Dzhordan, O. Brodetskyi, Ye. Buha, O. Barsukova [2], V. Verkhohliad [3], I. Horokholinska [4], V. Yelenskyi, O. Kolesnyk, A. Kolodnyi, V. Kuryliak, V. Liubashchenko, H. Mierienkov [6], V. Taranenko [8], A. Olenchyk, O. Sahan, L. Fylypovych, V. Khromets, M. Cherenkov [10, 11], Yu. Chornomorets, A. Yurash, V. Shcherbakov, P. Yarotskyi among others.

The examination of socially destructive manifestations within Protestant churches amid the complex realities of war has employed fundamental methodological tools such as induction, deduction, analysis, synthesis, analogy, and idealization, among others. Thus, from a methodological standpoint, key theological approaches and religious

studies principles of research play a fundamental role. The scientific novelty of our study lies in its endeavor to identify and scrutinize precisely the destructive factors in the social activism of Protestantism in Ukraine within the context of warfare.

This research is part of a series of planned studies which conceptually correlate with the scientific, theoretical and practical tasks being addressed by a team of young scientists from Yurii Fedkovych Chernivtsi National University in the context of the research project "Social Functionality of Religion in the Context of Large-scale Threats: Ideological, Theoretical and Practical Dimensions".

Results. Social activity as a key type of functional activity of religious organizations. When discussing social activism, it is important to recognize that the prolonged armed conflict, which escalated in 2022 following a full-scale invasion by an aggressor country, has led to a significant upsurge in the activities of numerous Protestant churches, as well as other established denominations within Ukraine, including Orthodoxy and Catholicism. These activities have expanded not only in scope but also in terms of methods employed. Indeed, their functional space, like that of the vast majority of other churches and religious organizations in Ukraine, in addition to fulfilling their main tasks (worship and other purely religious practices), is not limited solely to teaching the Faith. As it can be seen, various socially significant projects play an important role in their activities, which is undoubtedly a solid platform for social transformations. In this regard, it is pertinent to recall the assertion of H. Mierienkov, a Ukrainian researcher, who aptly remarks: «[…] without a willingness to give to charity, a convincing sermon is impossible in modern society. [...] After gaining freedom of religion, especially when the era of mass evangelization passed, society could look at the church only if it pursued social activity aimed at something more than the number of baptisms" [6, p. 25]. In this regard, the well-known Ukrainian Protestant theologian M. Cherenkov rightly emphasizes the importance of social service, in particular, the participation of churches in addressing acute social and moral issues of society, stressing that this is "the main direction and way of evangelical churches' socialization, overcoming their marginality and subculturality, going beyond narrow church and denominational service and entering civil society and world Christianity" [10, p. 406]. Therefore, social activity in all its multidimensionality is nothing other than the core of church life and a key type of functional activity of religious organizations.

Therefore, in this context, there is no need to argue that one of the most important aspects of the productive activity of any denomination for the benefit of its state is, first of all, a clear and unquestioning awareness of its responsibility to society, conscious fulfillment of its duties to fellow citizens, solidarity and a balanced position, especially in the face of large-scale threats and disasters. Therefore, there are indeed grounds to speak of completely new approaches of Protestant churches, especially the – UP, SDA and ECB, regarding the perception of reality and the need for reassessment the events of today. Moreover, such dynamics of social processes in Protestant communities indicate that "most churches are developing in a progressive direction, searching for a balance between innovative effects and unavoidable risks of modernization" [11, p. 220].

However, we must acknowledge the unfortunate presence of socially destructive trends within select Protestant denominations, trends that frequently assume a deleterious form and have the potential to disrupt social ties, including impeding the development of effective protective and supportive mechanisms, such as assistance and mutual aid.

Destructive models of social activity: essential characteristics, manifestations, and peculiarities. Before we move on to highlighting certain destructive formats of positioning themselves in the social sphere by Protestant churches in the complex realities of war, it seems appropriate to briefly describe destructiveness in some other forms of expression.

When defining destructiveness as a component of social activity, it is important to understand that it can be disruptive and aimed at destabilizing social ties. However, this characteristic is most often applied to totalitarian sects, neo-religious formations, and various types of cults, whose destructive activities are generally of great concern to society. Destructive religious organizations, according to many religious scholars, cult experts, psychologists, and other specialists in this field, are distinguished not by their beliefs but by their methods of activity. Thus, on the one hand, this can often manifest itself in adherents as a defensive and pessimistic attitude towards any kind of activity, challenges, and large-scale threats, and on the other hand, it can pose a real threat to human rights and freedom of citizens. On this basis, experts identify a number of signs of such destructive behavior of religious groups. For example, here are some of them: "[...] harming the health of citizens or threatening their lives; using methods in religious practice that harm the mental or physical health of citizens (hypnosis, bombing, coding, etc.); destruction of family and social ties of citizens; religious practice that violates current legislation or encourages citizens to commit illegal or antisocial acts; pseudo-religious practice aimed at mandatory, rather than discretionary, collection of material means and values from citizens in favor of the organization or its leadership; [...] incitement of inter-religious hatred that degrades the human dignity of believers of other religions and confessions; religious practice that may lead to destabilization of civil society, undermining national security; [...] use of the status of a religious organization to cover other, non-religious, activities" [3, p. 192] etc.

In the context of the above, let us turn to the considerations of the famous Ukrainian religious scholar I. Horokholinska. In particular, the researcher, analyzing approaches to understanding religiosity, highlights aspects of the harmfulness for an individual of focusing on a particular doctrine or personality as an unquestionable and undoubted authority. She adds that such an approach, in turn, determines an individual's life, depriving them of their own reflection on norms and goals: "The destructiveness of such worldview positions is obvious, as is its connection with religious fanaticism and fundamentalism. Within religious communities where the focus is on a charismatic leader or punishment through marginalization for deviating from sanctified norms, it is not humanistic religiosity and sincere responsible observance of religious precepts that flourish, but fear of punishment or persecution; not love, humility, and forgiveness, but hatred, slavish obedience, and contempt for the 'other.' Such religiosity has a pronounced

sectarian character, not in the sense of 'separation' from a particular religious group, but in the sense of isolation, closeness, imaginary exclusivity, and illusory completeness of piety. This kind of religiosity provokes anti-religious speeches by intellectuals, public figures, etc. It is this kind of religiosity that determines high expectations for secularization in multicultural, multinational societies, because where there is no striving for understanding, there is no peace and security, justice and prosperity" [4, p. 109].

As already noted, today the social activity of a significant number of Protestant churches has indeed substantially expanded in terms of areas, forms, and methods. However, the opposite is also happening, when denominations choose completely different approaches that are incompatible with the public's demands, the state's interests, and present-day challenges in general. This may indicate either an uncertain position of the denomination or its backwardness and weakness manifested, first, in the devaluation of countering war crimes and the genocide of the Ukrainian nation by the Muscovites; second, in a pessimistic attitude towards restrictive measures that directly affected religious life; third, in inertia in finding effective mechanisms for protecting and supporting one part of society by another, as a process of assistance and mutual aid, etc.

Unfortunately, not all churches and religious organizations understand the importance of social service and, in particular, charity, volunteerism, missionary work, and chaplaincy as a direct manifestation of the Church's virtues. For example, Jehovah's Witnesses, although they do not reject individual acts of charity, when it comes to large-scale charitable activities of the church in the society, they do not see the need for it, but focus more on preaching. That's why it is deeply engrained in their minds that "Whatever the intentions of the donors, charity will not solve all problems. [...] By eliminating the causes of human suffering, God will accomplish what is beyond human power. This is why Jehovah's Witnesses do not create charities. However, following Jesus Christ, they donate their money and time to proclaim the 'good news about God's kingdom' (Matthew 24:14; Luke 4:43)" [12]. The position of this religious organization on war is also well known. By the way, according to historical evidence, Jehovah's Witnesses have never participated in either civil or interstate wars, and during hostilities they have steadfastly maintained neutrality. This "conscientious" position is evidence, first of all, that the use of weapons is allegedly contrary to the Law of God. However, there is another significant reason why they categorically refuse to take up arms and go to war: "Since the Witnesses organization includes people from different nations, in a war they would have to fight against their brothers. This would contradict Jesus' command to have love one to another (John 13:35)" [13].

Along with this, a recent publication on the official website of Jehovah's Witnesses titled "Religion and War in Ukraine: What Does the Bible Say?" has caught our attention. The authors selectively reference biblical quotes to argue that any involvement in war or its justification is a great sin before God. However, they do not provide any quotes from Christian Sacred Scriptures that, on the contrary, testify to the duty to protect one's own family and loved ones from attackers and aggressors, emphasizing sacrificial love for others, and so on. Here we will cite several biblical references where God commanded

the Israelites to initiate wars against other nations (1 Sam. 15:3; Josh. 4:13), prescribed the death penalty for wickedness (Ex. 21:12, 15; 22:19; Lev. 20:11), and others. From this, one can infer that God does not prohibit killing altogether but specifically refers to intentional killing. Thus, the Hebrew words in the book of Exodus "You shall not murder!" (20:13) literally mean "do not commit deliberate murder of another person with malice."

Moreover, the publication also focuses on such questions as "Should Christians participate in war?", "What awaits religions that support violence?", "The role of religion in wars," and so on. We were particularly interested in the opening paragraphs of this publication, in which Jehovah's Witnesses present a series of striking headlines from mass media about the stance of religious leaders on the war in Ukraine. In doing so, they make no distinction between Russia, the aggressor, and Ukraine, the victim, placing both sides on the same level of culpability. Notably, they mention Patriarch of Moscow and All Russia Kirill, who continues to consciously support the Kremlin's invasion of Ukraine, and His Beatitude Metropolitan of Kyiv and All Ukraine Epiphanius, who, sympathizing with his compatriots, openly supports and blesses the struggle against Russian occupiers, fully understanding that it is precisely in this way that Ukrainians can safeguard their loved ones, securing freedom for future generations, and ensuring a just peace and independence for their Homeland. In their publication, the authors presented the following headlines: "Head of the Russian Orthodox Church, Patriarch Kirill, did not condemn the Russian aggression... The propaganda systematically conducted by the Church is used by Putin to justify the war" (EUobserver, March 7, 2022), "Patriarch Kirill... effectively supported Russia's invasion of Ukraine, referring to the conflict as a battle against sin" (AP News, March 8, 2022), "The leader of the Ukrainian Orthodox Church, Kyiv Patriarch Epiphanius, on Monday blessed his compatriots 'to fight against Russian occupiers'... He also said that killing Russian military is not a sin" (Jerusalem Post, March 16, 2022), culminating these resounding titles with a few questions: "What are your thoughts? Should those who call themselves followers of Jesus Christ encourage their faithful to take part in the war? What does the Bible say about it?" [7]. It is evident that these narratives are not only destructive in a socio-political sense but also in an inter-religious and communicative sense, as they stand against those religious denominations that actively support the Ukrainian Armed Forces, and more.

But is such a position of Jehovah's Witnesses really perceived positively by the society today, and under what conditions does a person going to war not violate the 6th Commandment, "Thou shalt not kill"? In addressing such existential questions, we would like to cite the eloquent words of Jesus Christ, who affirmatively emphasized that "Greater love hath no man than this, that a man lay down his life for his friends" (John 15:13). Indeed, a person who consciously goes to defend their Homeland, family, relatives and friends from invaders, sacrificing the most valuable thing − their life, shows, without exaggeration, the greatest manifestation of love for their neighbor. In addition, we confidently assert that defending against the enemy by killing him is not a sin, and that defending one's land is the immediate duty of every conscious citizen

of any country. Therefore, this position of Jehovah's Witnesses and a number of other Protestant denominations on the war is perceived by today's society quite negatively; it is, in our opinion, erroneous and has no logical justification either in secular law, since religious beliefs do not exempt a person from the obligation to defend the state, or in the law of God, since sacrifice and love for the sake of God and neighbor are the highest good. And this, along with other reasons, gives us grounds to state that their approach to solving the problem of war − neutrality − threatens the security not only of individuals, cities or villages, but also the security of the whole state or even interstate relations.

Religious beliefs and military mobilization: legal aspects. Today a significant number of Protestant churches keep to the doctrine which does not allow the use of weapons. This is about, in particular, Jehovah's Witnesses with their categorical refusal to take part in hostilities. In sddition, these also include Reformed Adventists, Seventh-day Adventists, Evangelical Christians (and churches equated to them according to their registered charters), Evangelical Baptists, Penitents, Charismatic Christian churches, the Society for Krishna Consciousness, etc. Meanwhile, we have already pointed out that some of them have partially violated this principle. Therefore, this may indicate not a violation of the Commandments of God, but rather a clear and balanced position, responsibility to the society and awareness of the importance of protecting our country.

If, however, participation in hostilities contradicts religious beliefs, there are a number of other well-known ways to help one's country, including charity, volunteering, chaplaincy, etc., but not withdrawing oneself from reality or avoiding responsibility. In the context of the above, there is a provision of the Constitution of Ukraine, Article 35: "No one shall be exempt from his/her duties to the State or refuse to abide by laws on religious grounds. If the performance of military duty contradicts the religious beliefs of a citizen, the performance of this duty shall be replaced by alternative (non-military) service" [5]. However, this norm is, as it is known, valid in peacetime, and therefore it is de jure impossible to replace military service with an alternative service during wartime. However, we came across one recent case of 2023, when a SDA church member was acquitted by a court of a charge of evading military service during mobilization. According to the verdict of the Kremenets District Court of Ternopil Oblast, "[...] a man who was appointed to military service but refused because of his religious beliefs was acquitted. He presented the court with proof of his water baptism, which took place in 2002, confirming his affiliation with the Seventh-day Adventist Church. [...] The defense used Cabinet of Ministers Resolution No. 2066, which includes the Seventh-day Adventist Church in the list of religious organizations whose beliefs do not allow the use of weapons" [14]. The court concluded that the defendant did not evade mobilization, but "[...] used his right to freedom of conscience and religion, as well as the right guaranteed by the Constitution of Ukraine to undergo alternative service" [14]. There is another relevant case, but with diametrically opposite verdict, as the conscript was found guilty of evading military service and sentenced to a year's imprisonment. Examining the case of a person who refused to fight because he considers it a gross violation of God's Commandments, the Ivano-Frankivsk City Court drew attention to several important nuances, namely: "[...]

in the military ID card of the accused, a military specialty is indicated: turner, mechanic, painter, master; in the draft documents of the accused military specialty 851 is indicated, which provides for the repair and storage of armored, engineering, airfield engineering, airborne equipment [...] So, in fact, the mobilization of a conscript is carried out in a specialty that involves the repair of equipment, and not direct damage to the enemy's manpower. [...] There are a significant number of professions and positions in the AFU that are not related to direct participation in hostilities and whose occupation does not contradict the commandment 'do not kill.' [...] the accused refused to be mobilized on religious grounds, because killing people is a sin. However, the Bible does not deny that when you are killed, you must defend yourself" [8].

A number of legal issues may arise here. That is why, the comments of A. Novak, an attorney for the Miller Law Firm, are worthy of attention: "If a person wrote a statement and confirmed that he belongs to religious organizations that prohibit the use of weapons, he can only be appointed to a non-combat position . He can be a cook, driver, engineer, etc. Theoretically, if a person, for example, a reformed Adventist, wrote such a statement and attached the relevant documents, but the military commissar insists on assigning him to a mortar crew, he can write a complaint, or file a lawsuit, referring to Article 35. But I have not seen such cases in practice, and I doubt that this can be done in military enlistment offices" [2]. At the same time, it is important to understand that pacifism or other anti-violence ideologies are not religious beliefs, and therefore cannot exempt one from military duty. Similarly, denial of war and unwillingness to take an active part in the defense of the state shall not exempt anyone from their duty of protecting their Homeland. "[...] the defense of the state is the duty of citizens. A person can be prosecuted for avoiding mobilization, regardless of ideological beliefs" [2] the lawyer adds. That is why the position of Jehovah's Witnesses and a number of other Protestant denominations, which show destructiveness, passivity and neutrality at a crucial time for every Ukrainian, makes no excuse at all, but on the opposite, is fraught with the danger of creating conflict situations.

To summarize the above, here are some thoughts of the already mentioned M. Cherenkov, a Protestant philosopher, Vice-President of the Spiritual Renaissance Foundation. The researcher draws attention to the importance, responsibility, awareness and clear position of every citizen of Ukraine on participation in the defense of their land from the occupation and war crimes of the Kremlin. In particular, he notes: "We believe that God gives us peace, but today in our country there is a war and blood is being shed. The time has come for the churches to reframe their attitude to issues of war and peace. It is necessary to support those who are already doing something and to awaken those who are standing on the sidelines" [9]. According to him, "[…] the worst sin under such conditions is indifference. In addition, it is important to remember three points concerning the activity of the Church in such times: 1) evangelical theology does not justify inaction; 2) the position of the Church is sympathetic and active; and 3) the field of war is the field for forgiveness" [9]. The same opinion is shared by O. Bloshchuk, the pastor of the Skelya Church of Evangelical Christians. He emphasizes

that such problems arise due to the norms of church pacifism. As a result, "[…] churches move away from an active position, being in an information vacuum and elevating the past to the rank of dogma. […] after all the events, the churches should adopt answers to the urgent questions of believers. Currently, the 'theology of total pacifism' no longer provides the necessary answer" [9]. That is why, he is certain, it is necessary to change the existing theology, otherwise the churches simply will not be able to move forward. So, based on these considerations, we see again that the tragic events of the war have significantly impacted the self-awareness of the Ukrainian people, and many have more than once had the opportunity to see what the ideology of the "Russian world" really is, imposed by Russia for years to justify its aggressive plans. But sadly, not everyone has come to these conclusions.

Conclusions. Today, the active engagement of denominations in addressing the most urgent social and moral issues of the society, focusing on social ministry, active public, Christian-patriotic, and socially responsible position are powerful messages, main directions and ways of socialization of the Church, which lead it beyond the narrow confessional ministry into the active public life, thus bringing Christian values to different spheres of life. In contrast, degradation, passivity, and manifestations of socially destructive trends within select Protestant denominations, trends that frequently assume a deleterious form and have the potential to disrupt social ties, including inertia in finding effective defense and support mechanisms, including processes of assistance and mutual aid. Being aware of the complexity of problems associated with the Russia's armed aggression against Ukraine, it is important to realize that today each of us − Protestant, Orthodox or Catholic − is called to protect the borders of our Homeland, steadfastly defend its territorial integrity by all means possible and be able to rise to any challenge for the sake of tranquility, just peace, free will and the victory of the long-suffering Ukrainian people. Therefore, it is our firm conviction that with courageous soldiers, balanced and wise decisions and joint efforts of the state and the Church, Ukraine will definitely prevail, because every day, every hour it fights for the right to be a sovereign, united and strong state.

References:

1. Bible. Books of the Holy Scriptures of the Old and New Testaments: in the Ukrainian translation with parallel passages / Translation by Patriarch Filaret (Denysenko)] Kyiv: Publication of the Kyiv Patriarchate of the Ukrainian Orthodox Church of the Kyiv Patriarchate, 2004. 1407 p. URL: https://parafia.org.ua/biblioteka/svyate-pysmo/bibliya-upts-kp/

2. Barsukova O. Believers and mobilization: is it possible to avoid mobilization because of religion or to undergo alternative service during war? The official website of Ukrainian Truth - online news about Ukraine. URL: https://life.pravda.com.ua/society/2022/11/22/251442/

3. Verhogliad V. Neo-cults: object of activity or subject of interaction of the SBU

bodies? Law forum. 2011. № 1. P. 190–193. URL: https://dspace.univd.edu.ua/items/bfe35f06-0ac7-4b64-b6f6-24172f6a3086

4. Horokholinska I. The demarcation of the secular/postsecular in modern religiosity: philosophical and theological discourse. Dissertation for obtaining sciences dr. Philos. N. 09.00.11 - religious studies, 09.00.14 – theology Kyiv: National Pedagogical University named after M.P. Drahomanova, 2019. 510 p. URL: https://enpuir.npu.edu.ua/handle/123456789/39753

5. Constitution of Ukraine. Official website of the Parliament of Ukraine: Legislation of Ukraine. URL: https://zakon.rada.gov.ua/laws/show/254%D0%BA/96-%D0%B2%D1%80#Text

6. Merenkov G. Charitable activity of Next Protestant Church in Ukraine: Trends of development. Academic notes of TNU named after V.I. Vernadskyi. Series: Historical sciences. 2019. № 3. P. 22–28. URL: http://www.hist.vernadskyjournals.in.ua/journals/2019/3_2019/6.pdf

7. Religion and war in Ukraine. What does the Bible say? The official website of Jehovah's Witnesses. URL: https://www.jw.org/uk/%D0%B1%D1%96%D0%B1%D0%BB%D1%96%D0%BE%D1%82%D0%B5%D0%BA%D0%B0/%D0%B4%D0%BE%D0%B1%D1%96%D1%80%D0%BA%D0%B8/%D1%80%D1%96%D0%B7%D0%BD%D0%B5/%D1%80%D0%B5%D0%BB%D1%96%D0%B3%D1%96%D1%8F-%D1%96-%D0%B2%D1%96%D0%B9%D0%BD%D0%B0-%D0%B2-%D1%83%D0%BA%D1%80%D0%B0%D1%97%D0%BD%D1%96

8. Taranenko V. The court came up with a way to involve Ukrainians with religious beliefs in the war. The website of the Glavkom information agency. URL: https://glavcom.ua/country/criminal/sud-pridumav-jak-zadijati-na-vijni-ukrajintsiv-iz-relihijnimi-perekonannjami-919536.html

9. The Church in conditions of war: Christian answers to current issues. Part 1. Religious Information Service of Ukraine "RISU". URL: https://risu.ua/cerkva-v-umovah-viyni-hristiyanski-vidpovidi-na-aktualni-pitannya-chastina-1_n70851

10. Cherenkov M. European Reformation and Ukrainian Evangelical Protestantism: Genetic-typological kinship and national-identification dimensions of modernity. Kyiv: Spiritual Revival, 2008. 566 p.

11. Cherenkov M. Prospects for the Development of Evangelical Protestantism in the Ukrainian Society. Ukrainian religious studies. 2008. №48. P. 215-229. URL: http://dspace.nbuv.gov.ua/bitstream/handle/123456789/40142/2008_48_15.pdf?sequence=1

12. Will charity solve humanity's problems? Online library of the "Watchtower" Society. URL: https://wol.jw.org/uk/wol/d/r15/lp-k/102008167

13. Readers ask why do Jehovah's Witnesses not participate in wars? Online library of the "Watchtower" Society. URL: https://wol.jw.org/uk/wol/d/r15/lp-k/2008487

Yakobchuk A. Seventh-day Adventist Exempted From Mobilization Because of Religious Beliefs: Court Ruling. The official website of the Christian newspaper Slovo pro Slovo. URL: https://slovoproslovo.info/adventist-somogo-dnya-zvilneniy-vid-mobilizatsii-cherez-religiyni-perekonannya-rishennya-sudu/

TECHNICAL SCIENCES

DEFECTS IN THE ROAD SURFACE OF BRIDGES, WHICH AFFECT THE NATURE OF THE MOVEMENT OF MOTOR VEHICLES

Oleksandr Davydenko,
Candidate of Technical Sciences, Associate Professor,
National Transport University, Ukraine
oleksandr.davydenko@ntu.edu.ua; ORCID: 0000-0003-0176-3256
Oleksandr Razboinikov,
Candidate of Technical Sciences, Assistant Lecturer,
National Transport University, Ukraine
razboynikov.olexandr@ntu.edu.ua; ORCID: 0000-0003-3024-0999
Arsen Klochan,
Assistant Lecturer,
National Transport University, Ukraine
a.klochan@ntu.edu.ua; ORCID: 0000-0002-4225-9382

Annotation. *The article conducts a study to identify typical pavement defects and their geometric parameters that affect the nature of vehicle traffic and lead to excessive dynamic loads on road bridges not provided for by the design.*

Various research methods are used, including measurement of vehicle movement parameters, vehicle movement theory, diagnostics of bridge deck defects, and analysis of the impact of defects on automotive equipment. Accordingly, the results obtained in the article are based on the combination and analysis of information from specialists in road construction and automotive engineering. The results obtained can be used in mathematical modeling of the movement of vehicles over road bridges with defects and damage to the road surface.

Keywords: *bridge, road surface, dynamic loads, defect, motor vehicles, typical pavement defects.*

Introduction. The movement of a vehicle is determined by the combination of forces acting on it. Within certain limits, the driver can control the traction (during acceleration), braking (during braking), and transverse (during changing direction) forces on the wheels of the vehicle. However, there are forces that do not depend on the driver's will (e.g., aerodynamic, dynamic forces acting between the vehicle wheel and a road surface defect, etc.).

Road surface defects lead to both forced oscillations of the vehicle and free oscillations that occur after they are overcome. Depending on the degree of road surface evenness, the level of vehicle oscillations (comfort); energy consumption for oscillations (efficiency); average speed (efficiency of use) and overhaul mileage (reliability) change [17]. At the same time, fluctuations in the sprung and unsprung masses of a

vehicle will be accompanied by dynamic loads on the pavement both during and after overcoming its defect. This should be taken into account not only when studying the operational properties of a vehicle, but also when determining the dynamic load on the road surface, in particular, bridges. Given that the assurance of the reliability of road bridges is a strategically important task, all research in this area is relevant. To conduct such studies, it is necessary to identify typical pavement defects and their geometric parameters that affect the nature of vehicle traffic and lead to dynamic loads on the bridge.

A highway bridge is a building structure consisting of seven groups of elements according to DSTU 9181:2022 "Guidelines for assessment and forecasting of the technical condition of highway bridges". Only three groups of elements – foundations, piers, and spans – are crucial and affect the bearing capacity. The bridge deck, in turn, consists of the following elements: roadway pavement, waterproofing, safety barriers, curbstones, surface drainage system from the bridge roadway, sidewalks and their pavement, railings, and expansion joints. In general, the bridge deck has several main tasks:

1. Protection of the bridge bearing elements from road traffic and aggressive environment during operation.

2. Ensuring smooth and safe movement of vehicles and pedestrians.

Accordingly, in case of defects and damage to the bridge deck elements, the main tasks are not met, which in turn significantly affects the reliability, durability and reduction of traffic safety. In case of violation of the longitudinal and transverse profiles on the approaches to the bridge and the structure itself, the smoothness of traffic disappears and additional dynamic loads appear in the bridge abutment and on the structure as a whole [4]. The combination of defects in the bridge deck elements, i.e., its technical condition, directly affects the deterioration of the bridge bearing elements due to the increase in dynamic impacts created by the vehicle suspension elements and the wheel itself when overcoming defects.

Objective of the study. The purpose of the study is to determine typical pavement defects and their geometric parameters that affect the nature of vehicle traffic and lead to dynamic loads on the bridge.

The following tasks were set and achieved in the course of the research:

1. To review the literature on the classification of defects in roads and highway bridges, as well as their impact on vehicle traffic and the formation of the most common deformations.

2. To conduct a study on the classification of defects and damage to bridge deck elements that affect the nature of vehicle traffic and lead to dynamic loads on the bridge.

3. To analyze the movement of a vehicle while overcoming defects and damage to the roadway of road bridges.

Literature review. Paper [22] proposes the use of YOLO (You Only Look Once) neural networks and high- and low-resolution images to detect defects in the span structures and piers of reinforced concrete bridges. The approach proposed in this paper

can be used for rapid real-time detection of bridge defects. The following types of defects are considered in this paper: concrete surface cracking, reinforcement exposure, and corrosion.

Paper [24] addresses the issue of defect recognition using visual inspection methods and deep learning neural networks by identifying the bounding box of each defect. The proposed approach cannot be used to obtain the geometric properties of each individual defect. This paper also considers defects in reinforced concrete structures of bridge spans and piers, namely: cracks, splitting, exposed reinforcement, patching, and abrasion areas. These defects reduce the structural capacity and durability of concrete, as well as the overall safety and serviceability of concrete structures.

Paper [7] is devoted to the scientometric and systematic analysis of modern research related to the assessment of defects in reinforced concrete bridges using non-destructive testing methods. The paper considers surface and subsurface anomalies in reinforced concrete bridges as defects.

Paper [12] presents the results of a systematic review of automated approaches and tools, including computer vision methods, for detecting road defects and anomalies, as well as their impact on road safety. Among the main types of defects considered in this paper are the following: potholes, cracks, delamination, cracking, shrinkage and swelling of road layers, and others. The researchers consider the problem of defects and damage to the bridge deck from the point of view of road and pedestrian safety and provide the following classification (Fig. 1).

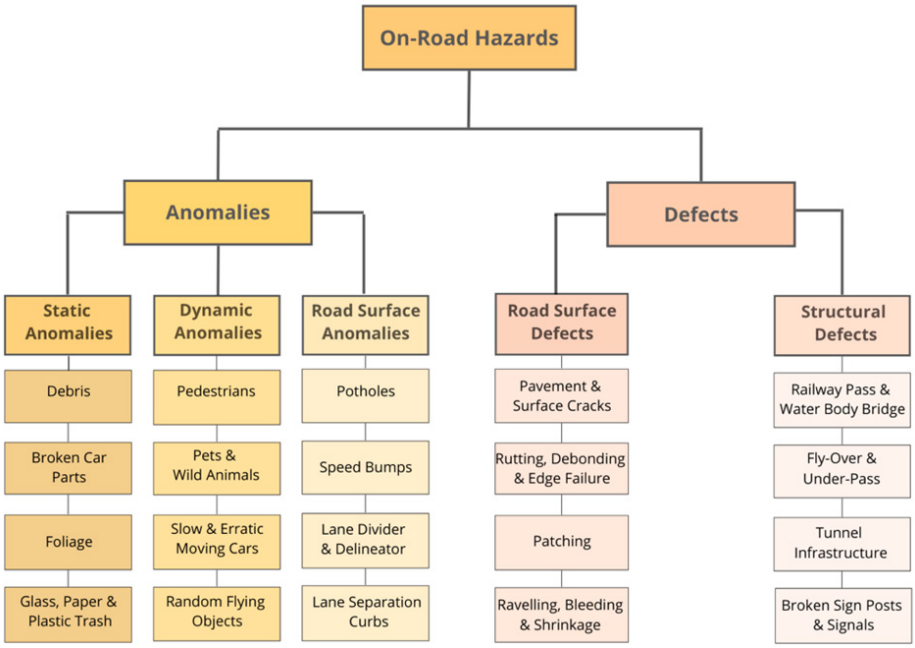


Fig. 1. Types and sub-types of on-road hazard categories in the context of anomaly and defect detection using computer vision [12]

Paper [14] discusses the peculiarities of road structures in the area of bridge and bridge approach junction, as well as the main types of defects in the pavement of bridges and bridge approaches. The author considers the following defects in the pavement of bridges and bridge approaches: approach soil settlement, asphalt concrete pavement cracks, soil erosion, water leakage. These types of defects reduce the reliability and durability of asphalt pavement at bridge crossings and can cause the emergence of the "key effect" hazard.

Article [15] discusses the issue of designing the pavement structure considering the specifics of oversized and heavy transportation. A special aspect in addressing this issue is to consider the strength and bearing capacity of bridges and road structures and the selection of appropriate specialized rolling stock. The paper considers the following types of pavement defects: grid cracks, potholes, longitudinal cracks, transverse cracks, block cracks, cement concrete slab breaks, peeling, chipping, sinking, crumbling, and others.

In [3], the authors determine the cost of 1 m2 of each type of bridge repair, which can be used in the financial and economic module of the Analytical Expert Bridge Management System. The study proposes an expert distribution of defects depending on their impact on the technical condition of structures or the structure as a whole:

1. Unacceptable.
2. Limitedly permissible.
3. Acceptable.

Note that this expert distribution of defects applies to all seven groups of bridge elements.

In their scientific work [3], the authors consider the adequacy of the existing methodology for assessing the levelness of roads at bridge crossings and note that defects in artificial highway structures significantly affect the comfort and safety of traffic. In their conclusions, they note that the existing methodology for assessing the smoothness of roads does not provide for the allocation of areas where artificial structures are located, since the assessment of the smoothness of the pavement is performed on a kilometer-by-kilometer basis, so bridge crossings are left unattended.

The Road Disease Manual developed with the support of USAID [22] considers the following factors that cause the most common deformations and destruction of road structures: operational, climatic, construction and design factors, as well as the impact of the vehicle on the formation of the most common deformations and destruction of road structures. It is noted that the most significant impact of these factors is the vertical impact of the vehicle, untimely repairs, and shortcomings in the design and construction of the road structure. The paper identifies the following types of deformation and destruction of road pavements: formation of potholes, loss of strength, subsidence, crack network, peeling, crumbling, edge destruction, individual cracks, rutting, potholes. Bridge crossings are not considered separately in the manual.

The main part. Road surface defects are characterized by the shape of the profile (harmonic, parabolic, rectangular, etc.), its dimensions (length, height), and its location.

From the point of view of the theory of vehicle movement, road surface irregularities are usually classified depending on their impact on the vehicle. There are macro-profile bumps (wavelength – 100 m and more), micro-profile bumps (wavelength – 10 cm to 100 m) and pavement roughness (wavelength – less than 10 cm) [2]. It is noted that the former and the latter have almost no effect on the process of vehicle oscillation (macro-profile irregularities significantly affect only the operation of the engine and transmission (Fig. 2a), and roughness is absorbed by the tires (Fig. 2b) [2]) [17].

(a) (b)

Fig. 2. Characteristics of the car's overcoming the macro-profile bump (a) and absorption of the bump by its pneumatic tire (b) [21]

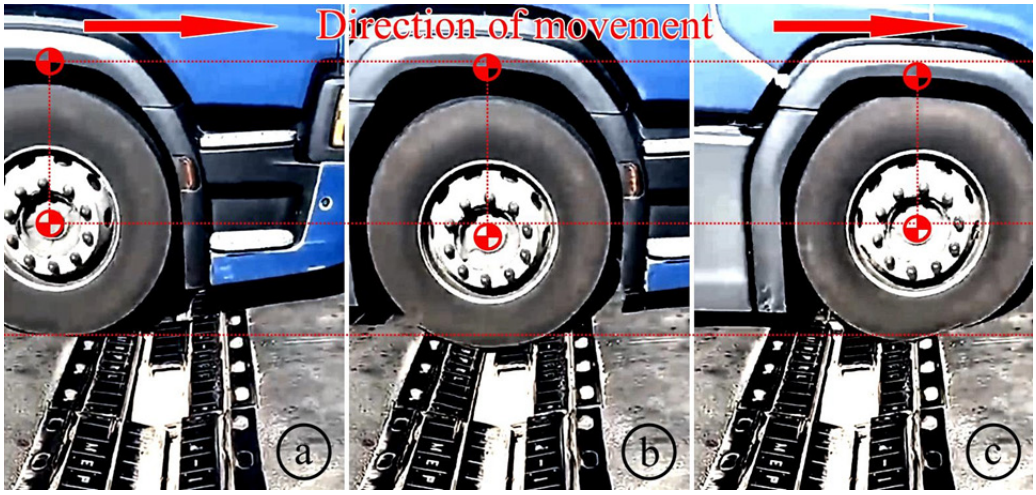
Professor A.P. Soltus emphasizes [20], that the microprofile of the bearing surface is one of the most significant factors that leads to the emergence of dynamic reactions in the contact of the wheel with the bearing surface. In addition, the microprofile directly affects the process of oscillation of the vehicle [21]. Thus, Figure 2 shows the nature of the change in the position of the center of the wheel (unsprung mass) of the vehicle and its characteristic point on the body (sprung mass). The positions of these points before the beginning of overcoming the pavement defect of the bridge crossing expansion joint are shown in Fig. 3a. The change in the position of these points during the overcoming of the negative (Fig. 3b) and positive (Fig. 3c) angles of attack [17] of the pavement defect is also shown.

Fig. 3c shows a significant decrease in the distance between the suspended and unsprung masses of the vehicle, as well as an increase in the deformation of its tire. This indicates an increase in the dynamic forces acting both in its suspension and in the contact patch between the car wheel and the road surface of the bridge crossing. Taking into account that these phenomena most significantly affect the nature of vehicle movement, which leads to dynamic loads on the bridge crossing, we further consider the irregularities of the microprofile.

The microprofile consists of bumps (bump spacing ranges from 0.1 m to 100 m [2]). In this case, irregularities up to 1 cm in height with a length not exceeding the length of the tire's footprint are usually called roughness. The minimum length of a micro-profile bump is taken from 0.2 m to 0.4 m. Y. M. Pevzner notes that the most intense fluctuations of the unsprung masses of the vehicle and fluctuations in the dynamic reactions between the wheel and the road are observed on bumps with a wavelength of 1 m to 2 m when driving at average

operating speeds. With an increase in vehicle weight and bump height, the normal reactions of the uneven bearing surface increase [17]. At the same time, an increase in the angle of attack of a road bump leads to a decrease in the coefficient of stability of the vehicle against skidding [20].

Fig. 3. Influence of micro-profile irregularities on the vehicle's movement pattern



In view of the above, it can be concluded that the main influence on the nature of vehicle traffic, which leads to additional dynamic loads on the bridge, is exerted by road surface defects, which, by their geometric parameters, belong to the microprofile, i.e., the length of the roadway defects is larger than the tire imprint.

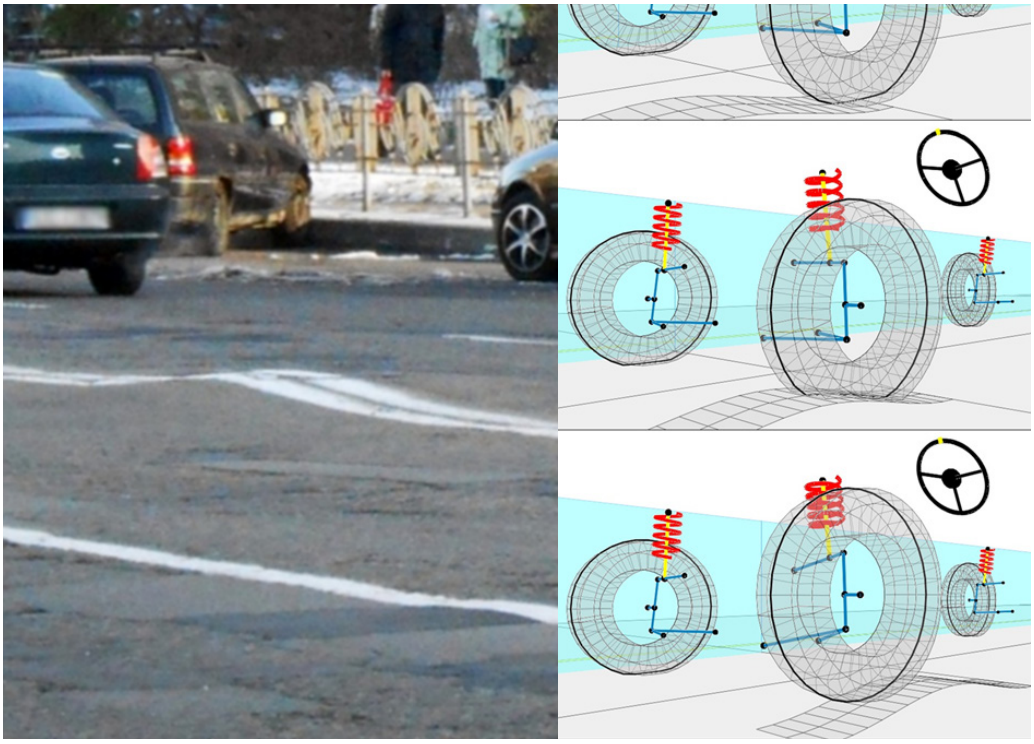
It is worth noting that [8] analyzes the disturbing effect of road irregularities on a vehicle. The author emphasizes that wave-like sections of asphalt roads have an intense disturbing effect. Measurements and static processing of such sections showed that the most common wavelengths are from 1.5 m to 4.5 m.

At the same time, harmonic irregularities can be single, both with a negative height (potholes whose sharp edges are smoothed out by the wheels of vehicles) and with a positive height (for example, protrusions in the area of manholes (Fig. 4a) [13]) [17]. The harmonic bump profile is often chosen (in accordance with the standardized methodology for calculating the smoothness of a car's ride) when studying the interaction of a car wheel with an uneven road surface [1, 2, 5, 6, 9, 11, 13, 17, 18, 23].

The profile characteristic of a harmonic bump (Fig. 4a) allows the tire contact patch to be considered as a plane that changes its height and inclination relative to the horizon (bump attack angle). This greatly simplifies the mathematical modeling of the processes that occur when an elastic tire interacts with an uneven road surface (Fig. 4b) [17].

It should be noted that from the point of view of the micro profile and its impact on the nature of vehicle movement (Fig. 3), a characteristic defect of the pavement of bridge crossings occurs in the area of expansion joints (Fig. 3, Fig. 5).

Fig. 4. Photo of a road surface defect with a harmonic profile (a) [13]



and visualization of mathematical modeling of its overcoming by a car (b) [17]

Fig. 5. Characteristic defects of bridge pavement in the area of expansion joints

From the analysis of Figures 3 and 4, it can be seen that from the point of view of mathematical modeling of the interaction of a car wheel with a bearing surface, defects in the pavement of bridge crossings in the area of expansion joints, as well as potholes, the sharp edges of which are smoothed out by the wheels of vehicles on the one hand and absorbed by the pneumatic tire on the other (Fig. 1b), can be considered as bumps of a harmonic profile with a negative height.

Conclusions. 1. A literature review has shown that most studies [7, 12, 22, 24] are aimed at fixing and detecting defects in the bearing elements of reinforced concrete road bridges using modern monitoring technologies, such as high-resolution cameras, neural networks, and artificial intelligence. Scientific works that consider defects and damage to roadway elements of road bridges [3, 14, 15, 19] are aimed at solving the problem of road and pedestrian safety, as well as planning the time and cost of repairs.

2. From the point of view of the theory of car movement, the unevenness of the bearing surface is classified depending on their impact on the car. There are macro-profile, micro-profile and pavement roughness irregularities. The microprofile directly affects the process of oscillation of the vehicle and leads to the appearance of dynamic loads acting in the contact of the car wheel with the road surface.

3. The main influence on the nature of vehicle movement, which leads to dynamic loads on the bridge crossing, is exerted by road surface defects, which by their geometric parameters belong to the microprofile (wavelength – from 10 cm to 100 m). The most intense fluctuations in the unsprung mass of the vehicle and fluctuations in the dynamic reactions between the wheel and the road are observed on bumps with a wavelength of 1 m to 2 m when driving at average operating speeds. The harmonic bump profile is often chosen (in accordance with the standardized methodology for calculating the smoothness of a vehicle) when studying the interaction of a vehicle wheel with an uneven road surface. The profile characteristic of a harmonic bump makes it possible to treat the bearing surface of the bump as a plane that changes its height and inclination relative to the horizon in the area of the tire contact patch. This greatly simplifies the mathematical modeling of the processes that occur when an elastic tire interacts with an uneven road surface. From the point of view of the micro-profile and its impact on the nature of vehicle movement, a characteristic defect of the bridge pavement occurs in the area of expansion joints, which, from the point of view of mathematical modeling of the interaction of a car wheel with the bearing surface, as well as potholes, the sharp edges of which are smoothed out under the action of vehicle wheels on the one hand and absorbed by the pneumatic tire on the other, can be considered as bumps of a harmonic profile with a negative height.

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References:

1. Blundell M., Harty D. The Multibody Systems Approach to Vehicle Dynamics : 2nd edition. Oxford : Butterworth-Heinemann, 2015. 756 p.

2. Bohomolov V.O. Modeliuvannia dorozhnoi poverkhni dlia rozrakhunku dynamiky rukhu transportnykh zasobiv / V.O. Bohomolov, V.I. Klymenko, AL. IIIylov. R.V. Alekseiev // Avtomobilnyi transport. – 2011. – Vyp. 29. – S. 37-42. [Ukrainian]

3. Bondar L., Stepanov S. Vyznachennia prohnozovanoi vartosti provedennia remontiv mostiv z vykorystanniam analitychnoi ekspertnoi systemy upravlinnia mostamy. Dorohy i mosty. 2016. № 16. S. 28–35. URL: http://dorogimosti.org.ua/files/upload/ЗБІРНИК_16.pdf (data zvernennia: 05.10.2023). [Ukrainian]

4. Davydenko O. Topical problems of elements of bridge crossing abutments and adjacent approaches. Mizhnarodna konferentsiia «Vprovadzhennia innovatsiinykh materialiv i tekhnolohii pry proiektuvanni, budivnytstvi ta ekspluatatsii obiektiv transportnoi infrastruktury v ramkakh prohramy «Velyke budivnytstvo». 2022. URL: https://doi.org/10.33744/978-966-632-317-3-2022-2-16-20 (date of access: 13.10.2023).

5. Dixon J. C. Suspension geometry and computation. Chichester: Wiley, 2009. 434 p.

6. Ekspluatatsiini vlastyvosti avtotransportnykh zasobiv. V 3 ch. Ch. 2. Plavnist khodu ta prokhidnist avtotransportnykh zasobiv : navchalnyi posibnyk / V. P. Sakhno, V. M. Poliakov, A. V. Kostenko ta in. Donetsk : LANDON-KhKhI, 2014. 354 s.

7. Eslam, Z. Tarek та F. Nour, "Synthesized Evaluation of Reinforced Concrete Bridge Defects, Their Non-Destructive Inspection and Analysis Methods: A Systematic Review and Bibliometric Analysis of the Past Three Decades", Buildings, t. 13, № 3, 2023, st. № 800. https://doi.org/10.3390/buildings13030800

8. Hordieiev V. N. Statystychne doslidzhennia oburiuvalnykh vplyviv vid nerivnostei shliakhu na transportni zasoby, shcho rukhaiutsia: dys. … kand. tekhn. nauk: 01.02.06 / Dnipropetrovsk, 1973. 126 s. [Ukrainian]

9. Jazar R. N. Vehicle Dynamics: Theory and Application. New York: Springer, 2008. 1015 p.

10. Klets D. M. Otsinka stiikosti avtombiliu proty zanesennia pry rusi nerivnoiu dorohoiu. Visnyk NTU "KhPI". 2013. № 30 (1003). P. 55-61 [Ukrainian]

11. Klets D.M. Vyznachennia normalnykh reaktsii na perednikh ta zadnikh kolesakh avtomobilia pid chas rukhu nerivnoiu dorohoiu. Visnyk KhNADU. 2013. Vyp. 61–62. P. 195-199 [Ukrainian]

12. M. Rathee, B. Bačić та M. Doborjeh, "Automated Road Defect and Anomaly Detection for Traffic Safety: A Systematic Review", Sensors, т. 23, № 12, 2023, ст. № 5656. https://doi.org/10.3390/s23125656

13. Mitschke Manfred, Wallentowitz Henring. Dynamik der Kraftfahrzeuge. Berlin: Springer, 2014. 919 p.

14. O. V. Kushnir, "Zabezpechennia dovhovichnosti dorozhnohoodiahu na pidkhodakh", Avtomob. dorohy i dorozh. bud-vo, № 107, s. 63–70, 2020.

http://publications.ntu.edu.ua/avtodorogi_i_stroitelstvo/107/63.pdf [Ukrainian]

15. O. V. Kushnir, I. P. Gamelyak, V. F. Raikovsky та U. M. Klimov, “Designing of a design of road clothes for transportation of large and especially heavy loads by roads of Ukraine”, Sci. Educ. New Dimension, т. VIII(244), № 30, с. 53–62, груд. 2020. https://doi.org/10.31174/send-nt2020-244viii30-13 [Ukrainian]

16. Posibnyk dorozhnikh “khvorob”. Kyiv, 2019. 198 p. URL: https://zakon.help/files/article/10842/ПОСІБНИК%20ДОРОЖНІХ%20_ХВОРОБ_.pdf (data zvernennia: 05.10.2023).

17. Razboinikov O. O. Polipshennia kursovoi stiikosti lehkovoho avtomobilia pry rusi po nerivnii dorozi : dys. … kand. tekhn. nauk : 05.22.02 / Razboinikov Oleksandr Oleksandrovych. – Kyiv : NTU, 2021. – 214 p. [Ukrainian]

18. Rill G. Road Vehicle Dynamics : Fundamentals and Modeling. Boca Raton: CRC Press, 2012. 331 p.

19. Smolianiuk R., Smolianiuk N., Shtefan O. Vyznachennia rivnosti dorozhnoho pokryttia na shtuchnykh sporudakh. Avtomobilni dorohy i dorozhnie budivnytstvo. 2017. № 99. S. 98–105.

20. Soltus A. P. Osnovy teorii robochoho protsesu ta rozrakhunku keruiuchykh kolisnykh moduliv: avtoref. dys. … d-ra. tekhn. nauk: 05.22.02. Kyiv, 1995. 43 p. [Ukrainian]

21. Soltus A. P. Teoriia ekspluatatsiinykh vlastyvostei avtomobilia: navchalnyi posibnyk dlia VNZ. Kyiv : Aristei, 2010. 155 s. [Ukrainian]

22. T. Shuai, L. Zongchao та L. Xiaoda, “Improved YOLOv3-Based Bridge Surface Defect Detection by Combining High- and Low-Resolution Feature Images”, Buildings, т. 12, № 8, 2022, ст. № 1225. https://doi.org/10.3390/buildings12081225

URL: http://publications.ntu.edu.ua/avtodorogi_i_stroitelstvo/99/098-105.pdf (data zvernennia: 05.10.2023). [Ukrainian]

23. Wolfgang Matschinsky. Radführungen der Straßenfahrzeuge : Kinematik, Elasto-Kinematik und Konstruktion. München : Springer, 2007. 470 p.

24. Z. Chaobo, C. Chih-Chen та J. Maziar, “Simultaneous pixel-level concrete defect detection and grouping using a fully convolutional model”, Structural Health Monit., т. 20, № 4, с. 2199–2215, 2021. https://doi.org/10.1177/1475921720985437

ANALYSIS OF REGULATORY DOCUMENTS ESTABLISHING REQUIREMENTS FOR GEOMETRIC AND MASS PARAMETERS OF HEAVY VEHICLES

Inessa Rutkovska,
Candidate of Technical Sciences, Associate Professor,
National Transport University, Ukraine
ria_ntu@ukr.net; ORCID: 0000-0001-7832-4222
Olena Usychenko,
Candidate of Technical Sciences, Associate Professor,
National Transport University, Ukraine
fbbk@ukr.net; ORCID: 0000-0002-7482-8420
Oleksandr Ivanushko,
Ph.D, in Automobile Transport,
National Transport University, Ukraine
o.ivanushko@ntu.edu.ua; ORCID: 0000-0003-0176-3256

Annotation. *In order to develop a new standard model for the load on existing road bridges according to the actual parameters of heavy vehicles and to harmonize the national regulatory requirements of Ukraine regarding the dimensions and weight parameters of vehicles, bringing them to the European standards, as well as the possibility of taking into account the parameters of the existing freight flow and the possibility of forecasting them for the future, an analysis was carried out domestic and foreign regulatory documents that set the permissible maximum values for geometric parameters and mass parameters of heavy-duty motor vehicles both at the design stage of transport infrastructure facilities and at the stage of operational maintenance.*

Keywords: *transport infrastructure, geometric parameters of vehicles, weight parameters of vehicles, load model, bridge carrying capacity.*

Introduction. The calculated values of overall and weight parameters of vehicles play a key role both at the stage of designing transport facilities and at the stage of operational maintenance. These parameters determine the types of vehicles and calculated loads. The ability to absorb these loads determines the durability and safety of the transport infrastructure. Road bridges as elements of the transport system are strategic structures, the defense capability of the state depends on their reliability and durability, especially in the conditions of martial law and countering external aggression against Ukraine. The main operational characteristic of bridges is load capacity. In Ukraine, the load carrying capacity of a bridge is determined by calculating the requirements for the first group of limit states of its load-bearing structures. At the same time, the values of the characteristic loads are taken in accordance with the current regulatory documents. However, according to Ukravtodor, at the beginning of martial law, the average age of bridges was 56 years, since 81% of bridges were built before 1980 [1]. The amount of loads and the composition of the traffic flow, as well as

the requirements of regulatory documents, have changed significantly. In connection with the introduction of martial law on the territory of our country, the complete closure of air traffic and significant restrictions on sea transportation, road transportation has become an important element of the logistics chain. As part of the implementation of the contract "Development of a load model based on the actual parameters of heavy-duty rolling stock to determine the load-carrying capacity of road bridges during their restoration and operation in the war and post-war periods" with the National Research Fund of Ukraine, scientists of the National Transport University (Kyiv, Ukraine) performed generalization and analysis of the requirements of national and foreign regulatory documents regarding the dimensions and weight parameters of vehicles at the stages of design and operational maintenance of transport infrastructure objects in the direction of further improvement and development of a load model for determining the carrying capacity of bridge crossings, which are operated taking into account all the parameters and features of modern heavy vehicles for the transportation of goods and passengers on the road network of Ukraine.

The objective of the study. The growth of cargo transportation between Ukraine and the EU countries in the conditions of war is an important aspect of providing humanitarian aid and economic stability in the region in the conditions of difficulties associated with the military conflict. Road transport plays an important role in providing food and medical aid, humanitarian cargo, other strategic goods and cargo for the Armed Forces of Ukraine. The rapid development of road transport is aimed at increasing the weight and overall parameters of cargo vehicles, which has become a critical problem for the transport network of Ukraine, especially in conditions of active military operations. Given that one of the key political and economic initiatives in the history of our country is the movement of Ukraine to join the European Union, it is necessary to ensure the compliance of national norms and standards with European requirements, taking into account world experience and the needs and specifics of our country. The object of the research is the requirements of regulatory documents of different countries regarding the dimensions and weight parameters of vehicles at the stages of design and operational maintenance of transport facilities.

Presentation of the main material. According to the data of the State Statistics Service of Ukraine, road freight transportation accounts for approximately 33% of the total volume of freight transportation in Ukraine [2, 3]. A more detailed distribution of the volumes of transported goods by types of transport in the period 2018-2023 is presented in the table. 1.

One of the simplest ways to increase the efficiency of the use of road vehicles is to increase their carrying capacity. But this, in turn, will lead to an increase in the overall dimensions and total weight of such a vehicle. It is logical that the increase in size and mass cannot be infinite, and these parameters must comply with existing regulatory documents that regulate their maximum values.

In Ukraine, the primary regulatory document establishing the basic principles of the operation and use of road transport in general is the Law of Ukraine «On Road

Transport» [4] and the Law of Ukraine «On Road Traffic» [5]. At the same time, the Law of Ukraine «On Motorways» [6] is in effect in Ukraine, which defines the characteristics of public highways, norms for the construction, reconstruction, repair, and maintenance of highways, as well as the rights and obligations of road users. These legislative documents form the basic concept of interaction between road vehicles and roads.

Table 1

Volumes of transported goods by types of transport in the period 2018 - 2023 [2, 3]

Transport	Volumes of transported goods in the year, million tons					
	2018	2019	2020	2021	2022	2023 (till June)
Air	0,1	0,1	0,1	0,1	nda	nda
Automobile	187,2	244,2	191,4	224,0	317,5	149,7
Water	5,6	6,1	5,6	5,3	nda	nda
Railway	322,3	312,9	305,5	314,3	nda	nda
Pipeline	109,4	112,7	97,5	77,6	nda	nda

*Source: * nda – no data available*

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Taking into account the variety of possible designs of motor vehicles and for the possibility of their registration and admission to operation in Ukraine, the Resolution of the Cabinet of Ministers of Ukraine (CMU) «On unified requirements for the design and technical condition of wheeled vehicles in use» [7], which corresponds to norms of the countries of the European Union (EU). This regulatory document provides for the following categories of vehicles by mass parameters:

− wheeled vehicles of category M3 – mechanical wheeled vehicles that have at least four wheels and are intended for the transportation of passengers and their luggage, which has a maximum technically permissible weight of more than 5 tons;

− wheeled vehicles of category N3 – mechanical wheeled vehicles that have at least four wheels and are intended for the transportation of goods, the maximum technically

permissible weight of which is more than 12 tons;

− wheeled vehicles of category O4 – trailed wheeled vehicles, intended and designed for the transportation of goods or people, as well as for use as living quarters, with a maximum technically permissible weight of more than 10 tons.

In addition, the Resolution of the Cabinet of Ministers of Ukraine «On Traffic Rules» [8] (TR), which defines specific maximum permissible values for geometric parameters and mass parameters of road vehicles, is in force in Ukraine.

In some cases, the movement of vehicles is allowed on the roads of Ukraine in which the actual values of geometric parameters and mass parameters exceed the maximum permissible. In this case, the Resolution of the Cabinet of Ministers of Ukraine «On the passage of large-sized and heavy vehicles on highways, streets and railway crossings» becomes effective [9]. However, this Resolution does not prohibit or limit the possibility of movement of vehicles with geometric parameters and mass parameters that exceed permissible norms. This resolution only establishes additional security measures and a permit system.

Among the foreign regulatory documents that set requirements for overall and mass parameters of road vehicles, we can include the Council Directive 96/53/EC dated July 25, 1996 [10]. The maximum allowable parameters of the dimensions and weights of the vehicle according to this Directive.

Vehicle size and weight regulations are among the most important factors that determine road and bridge design and maintenance requirements, as well as freight costs. All states regulate the weight and dimensions of vehicles on public roads. In general, these state regulations regulate the following sizes:

− maximum weight on any individual axle;
− maximum mass for any group of vehicle axles;
− the maximum weight of the entire vehicle;
− maximum length, width and height of the vehicle or combination of vehicles;
− the maximum number of trailers.

Some states also regulate other sizes, and some set separate limits for different road classes. There are also special provisions that impose stricter restrictions on certain roads and bridges.

Traffic regulations of Ukraine regulate such maximum values of external dimensions as width, height from the road surface and length of vehicles separately for different types (truck, road train, car (tractor) with a semi-trailer, route vehicle).

Council Directive 96/53/EC, in turn, fixes the maximum permissible values of geometric parameters for various types of vehicles. Specifically:

− maximum length for motor vehicles, trailers, articulated vehicles, road trains, various buses, buses;

− the maximum width for all vehicles and superstructures of conditioned vehicles or conditioned containers or changeable bodies;

− maximum height (for any vehicle);

− the maximum distance between the axle of the semi-trailer and the rear part of the

semi-trailer;

− the maximum distance measured parallel to the longitudinal axis of the road train from the extreme front point of the loading area behind the cab to the extreme rear point of the combination trailer, without taking into account the distance between the rear part of the tractor and the front part of the trailer;

− the maximum distance measured parallel to the longitudinal axis of the road train from the extreme front point of the loading zone behind the cab to the extreme rear point of the combination trailer.

As for the maximum permissible values of the parameters of the actual weight and axle load of road vehicles, the Traffic Regulations [8] regulate them separately for different categories of highways (state and local) and types of vehicles. Specifically:

− trucks: two-axle, three-axle, four-axle;

− four-axle cars with two steering axles and driving axles equipped with paired wheels;

− combined vehicles: two-axle vehicles (tractors) with a two-axle and three-axle semi-trailer, three-axle vehicles (tractors) with a two-axle or three-axle semi-trailer, two-axle vehicles (tractors) with a three-axle semi-trailer (container truck),

− road trains: two-axle or three-axle cars with a two-axle or three-axle trailer.

Council Directive 96/53/EC [10] fixes the maximum permissible mass without distribution by road category:

− trailers that have 2 and 3 axles, motor vehicles that have 2 axles, with a semi-trailer that has 3 axles, motor vehicles that have 3 axles, with a semi-trailer that has 2 or 3 axles, motor vehicles that have 3 axles, with semi-trailers having 2 or 3 axles;

− road trains having 4 axles consisting of a motor vehicle having 2 axles and a trailer having 2 axles;

− articulated vehicles that have 4 axles, consisting of a motor vehicle that has 2 axles and a semi-trailer that has 2 axles and a different distance between the axles of the semi-trailer;

− motor vehicles that have 2 and 3 axles and operate on alternative types of fuel;

− motor vehicles with 2 and 3 axles with zero emissions;

− buses with 2 axles;

− motor vehicles with 3 axles;

− motor vehicles that have 4 axles, including 2 swivel axles;

− articulated buses with 3 axles;

− articulated buses that have 3 axles and operate on alternative types of fuel;

− articulated buses with 3 axles and zero emissions.

Traffic regulations [7] regulate the maximum load on:

− on a single axis;

− on double axles with different distances between axles and types of vehicles;

− on built axes at different distances between axes.

Council Directive 96/53/EC regulates the maximum permissible load on:

− single non-driven axles;

− double axles of trailers and semi-trailers, with different distances between the axles;
− aligned axles of trailers and semi-trailers, with different distance between axles;
− drive axles of a road train with 5 or 6 axles or articulated vehicles with 5 or 6 axles;
− drive axles of road trains with 2 and 4 axles, consisting of a motor vehicle with 2 axles and a trailer with 2 axles;
− the axles of articulated vehicles that have 4 axles and consist of a motor vehicle that has 2 axles and a semi-trailer that has 2 axles;
− motor vehicles with 2, 3 and 4 axles, including 2 swivel axles; articulated buses that have 3 axles;
− double axles of motor vehicles, with different distance between axles.

In 2022, the Decree of the Cabinet of Ministers of Ukraine on the liberalization of the transportation of oversized and heavy cargo, which introduces European standards regarding dimensional and weight restrictions, detailed and clarified the maximum permissible axle loads depending on the number of axles and the distance between the axles. The transition to European standards became possible thanks to the technical characteristics of the new Ukrainian highways.

So, for ordinary trucks, the maximum values of the actual mass on state roads include:
− 18 tons – for 2-axle cars;
− 25 tons - for 3-axle cars;
− 32 tons – for 4-axle cars;
− 38 tons – for 4-axle cars (with two steering axles, leading axles and equipped with paired wheels).

Norms have also been established for tractors with semi-trailers.

For trucks connected to a trailer or a semi-trailer (combined), the maximum values of the actual mass on state roads provide for:
− 36 tons – for 2-axle tractors with a 2-axle semi-trailer;
− 40 tons – for 2-axle tractors with a 3-axle semi-trailer;
− 40 tons – for 3-axle tractors with 2-axle or 3-axle semi-trailer;
− 42 tons – for 2-axle tractors with a 3-axle semi-trailer carrying one or more containers or mixed bodies, with a maximum length of 13.716 m (container trucks);
− 44 tons – for 3-axle tractors with a 2-axle or 3-axle semi-trailer that transports one or more containers or mixed bodies with a maximum length of 13.716 m (container trucks).

In the United States of America, there is a generally accepted formula for calculating the permissible weight of vehicles [11]. This formula takes into account the possibility of vehicles moving across the bridge. In 1975, Congress passed the Bridge Formula to limit the weight-to-length ratio of a vehicle crossing a bridge. This is achieved by distributing the weight on additional axles or by increasing the distance between the axles. Compliance with Bridge Formula weight restrictions is determined by the formula [12]:

$$W = 500 \cdot \left(\frac{L \cdot N}{N - 1} + 12 + N \cdot 36 \right) \quad (1)$$

where W - the total gross weight on any group of two or more consecutive axles to the nearest 500 pounds;

L - the distance in feet between the outer axles of any group of two or more consecutive axles;

N - the number of axes in the group under consideration.

According to this formula, the maximum permissible weight of vehicles is 80,000 pounds (approximately 36 tons). The load on a single axle vehicles cannot exceed 20,000 pounds (9 tons), on a double axle - 34,000 pounds (15.4 tons) [11].

In Canada, the values of geometric parameters and mass parameters of road vehicles are regulated by the Federal Provincial Territorial Memorandum of Understanding on Interprovincial Weights and Measures [13].

According to this Memorandum, restrictions apply in Canada [13]:

in maximum length

truck – 12.5 m;
intercity bus – 14 m;
semi-trailer – 16.2 m;
a truck with a trailer - 23 m;
tractor with semi-trailer - 23.5 m;
two-seater car train of categories A and C - 25 m;
two-seater car train of category B - 27.5 m.

by weight

the maximum weight of the steering axle is 5,500 kg;

for the second axle equipped with two single tires, each of which has a width of 445 mm or more - 7,700 kg;

for a group of axles equipped with single tires, each of which has a width of 445 mm or more - 15,400 kg;

for the second axle equipped with two double tires - 9,100 kg;
for a group of axles equipped with two double tires - 17,000 kg;
trucks and long-distance buses - 24,250 kg;
combined weight of a truck with 3 axles – 23,700 kg;
the combined weight of a truck with 4 axles is 31,600 kg;
combined weight of a truck with 5 axles – 39,500 kg;
the combined weight of a truck with 6 axles is 46,500 kg
the combined weight of the tractor with a semi-trailer is 46,500 kg;
two-seater motor train of category A - 53,500 kg;
two-seater motor train of category B - 62,500 kg;
double car train of category C - 58,500 kg.

In Canada, vehicle loading standards also depend on weather conditions. Under favorable weather conditions, the load on a single axle cannot exceed 9 t, on a

double axle - 18 t, on a straight axle - 21 t (the distance between the axles should be from 2.4 m to 3 m). For triple axles, the distance between the far axles of which ranges from 3 m to 3.6 m, the maximum weight is 24 tons, if the distance between the axles is 3.6 to 3.7 m, the permissible weight is 26 tons. During the thaw period, these indicators decrease from 21 t to 18 t, from 24 t to 21 t, and from 26 t to 22 t, respectively. In the event of deviation, truck drivers must either distribute the weight more evenly between the axles or remove the excess weight before continuing [11].

Failure to comply with the above requirements leads to premature damage or destruction of the transport infrastructure, both highways on which vehicles travel, and bridges. According to data [1], it was established that as of the beginning of the war, more than 10,000 (out of 16,155) bridge structures of Ukraine did not meet the standards for size and load capacity. Significant destruction of the transport infrastructure caused by military aggression against our country significantly worsened these indicators. The current regulatory document regulating the basic principles and algorithms for determining the load capacity of existing highway bridges is the Methodological Recommendations of the MP B.2.3-37641918-921:2021 [14]. According to these recommendations, the carrying capacity of the bridge is checked by comparing the calculated force from the characteristic load with the ultimate force for the cross-section of the structure. At the same time, the value of the characteristic load is regulated by the State Building Regulations [15]. In the resourse [16], a detailed analysis of the requirements and a comparison of the est imated vehicle loads of the AK model in national standards with the LM1 model of the Eurocode EN 1991-2 and the track model according to the US AASHTO LRFD standards was carried out. It was established that a significant shortcoming of the national norms is the underestimated values of the characteristic loads almost twice compared to the European norms. It should be noted that the current national regulations were approved back in 2009 and do not take into account the changes that occurred in the composition of the traffic flow, especially in the conditions of military operations.

Conclusions. As can be seen from the above analysis of regulatory documents establishing requirements for geometric parameters and mass parameters of heavy vehicles, they have specific features depending on the country of their application. Thus, the Council Directive 96/53/EC and the Memorandum take into account more possible combinations of the construction of road vehicles than in the TR. However, most of the allowable values of geometric parameters and mass parameters are the same.

These requirements have important economic implications, as road transport accounts for the majority of all freight transport and its cost depends on the size and weight of the truck. Size and weight restrictions also affect the costs of building and maintaining highways and bridges, as well as the damage caused by accidents on them. These regulations also affect international trade, as the restrictions in force in different countries differ.

At the current moment, the question of developing and using a load model based on the actual parameters of modern heavy-duty vehicles is relevant, which will allow to

more reasonably determine the real carrying capacity of bridge crossings and, as a result, increase their reliability and durability. To do this, it is necessary, first, to carry out a set of measures to determine the composition of heavy trucks in the transport flow and the share of the most popular and heavy types of them, and then, based on the statistical processing of research results, to develop predictive models of the load on transport facilities.

References:

1. Center for transport strategies - [Electronic resource] – URL: https://cfts.org.ua/spetsproekty/navesti_mosty_chto_nuzhno_znat_o_natsionalnoy_programme_vosstanovleniya_mostov_

2. Volumes of transported goods by types of transport. – URL: https://ukrstat.gov.ua/operativ/operativ2018/tr/opv/arh_opv_u.htm

3. Transported cargo and passengers, cargo and passenger traffic. – URL: https://ukrstat.gov.ua/operativ/operativ2022/tr/pvp_vp_new/arh_pvp_22_u.htm

4. Law of Ukraine «On Road Transport» (Vedomosti Verkhovna Rada of Ukraine (VVR), 2001, No. 22, Article 105) - Redaction dated 03.23.2023 - [Electronic resource] – URL: https://zakon.rada.gov.ua/laws/show/2344-14#Text

5. Law of Ukraine «On Road Traffic» (Vedomosti of the Verkhovna Rada of Ukraine (VVR), 1993, No. 31, Article 338) - Redaction dated 01.10.2023 - [Electronic resource] – URL: https://zakon.rada.gov.ua/laws/show/3353-12#Text

6. Law of Ukraine «On Motor Roads» (Vedomosti Verkhovna Rada of Ukraine (VVR), 2005, No. 51, Article 556) - Redaction dated 12.19.2021 - [Electronic resource] – URL: https://zakon.rada.gov.ua/laws/show/2862-15#Text

7. Resolution of the CMU «On unified requirements for the design and technical condition of wheeled vehicles in use» (No. 1166 dated December 22, 2010) - Edition dated January 14, 2021 - [Electronic resource] – URL: https://zakon.rada.gov.ua/laws/show/1166-2010-п#Text

8. Resolution of the CMU «On Traffic Rules» (No. 1306 of October 10, 2001) - Edition of December 14, 2022 - [Electronic resource] – URL: https://zakon.rada.gov.ua/laws/show/1306-2001-%D0%BF#Text

9. Decree of the CMU «On the passage of large and heavy vehicles on highways, streets and railway crossings» (No. 30 of January 18, 2001) - Edition of 05/11/2023 - [Electronic resource] – URL: https://zakon.rada.gov.ua/laws/show/30-2001-п#Text

10. COUNCIL DIRECTIVE 96/53/EC of July 25, 1996 establishing for certain road vehicles in circulation within the Community the maximum permitted dimensions for domestic and international road traffic and the maximum permitted mass for international road traffic. – Editorial office dated 08/14/2019– URL: https://zakon.rada.gov.ua/laws/show/984_002-96#Text

11. Dimensions and weight standards when loading vehicles, fines for exceeding them and methods of control (experience of the EU, USA and Canada)– URL: https://

infocenter.rada.gov.ua/uploads/documents/29199.pdf

12. Bridge Formula Weights – U.S. Department of Transportation. Federal Highway Administration – URL: http://ops.fhwa.dot.gov/freight/publications/brdg_frm_wghts/index.htm

13. Heavy Truck Weight and Dimension Limits for Interprovincial Operations in Canada. Resulting From The Federal-Provincial-Territorial Memorandum of Understanding on Interprovincial Weights and Dimensions (January 2019) – URL: https://comt.ca/english/programs/trucking/MOU%202019.pdf

14. Methodological recommendations MP B.2.3-37641918-921:2021

15. DBN V.1.2-15:2009. Mosty ta truby. Navantazhennia i vplyvy [State Building Norms (DBN V.1.2-15:2009) Bridges and pipes. Loads and influences]. Kyiv, 2009. 84 p. (Information and documentation) [in Ukrainian].

16. Mykhailo Korniev. Proposals for changing the load on bridges. Dorogi i mosti [Roads and bridges]. Kyiv, 2023. Iss. 27. p. 189–198 [in Ukrainian].

THE METHOD OF CALCULATING THE EFFECT OF DAMPING OF THE WAVE HEIGHT OF THE FLOW BY THE VEGETATION IN FLOODPLAIN AREAS OF BRIDGE CROSSINGS

Olena Slavinska,
Doctor of Technical Sciences, Professor,
National Transport University, Ukraine
elenaslavin9@gmail.com; ORCID: 0000-0002-9709-0078,
Andrii Bubela,
Doctor of Technical Sciences, Professor,
National Transport University, Ukraine
bubelaandrey@ukr.net; ORCID: 0000-0002-5619-003X,
Liudmyla Bondarenko,
Candidate of Technical Sciences, Assistant Professor,
National Transport University, Ukraine
luda_bond@ukr.net; ORCID: 0000-0002-8239-065X,

Annotation. *To solve the applied problems of road and bridge construction, a method of calculating the effect of damping of the flow wave height by the vegetation on floodplains is given. To achieve the necessary effect of extinguishing dangerous waves, the parameters of the strip of shrub plantings are substantiated. The proposed method is implemented in the form of engineering formulas for determining the degree of reduction of wind waves during their passage through thickets on floodplain areas of open water flows in the zone of influence of bridge crossings.*

Keywords: *wind waves, floodplains, effective shrub height, approach embankment, bridge crossing.*

Introduction. The forms of unsteady flow in open channels are diverse, but the most characteristic type for rivers is a displacement wave. During the movement of displacement waves, in particular flood waves, significant volumes of water can be carried downstream and there is always a change (increase or decrease) in flow rates. Accordingly, the zone of influence of the bridge crossing extends not only to the riverbed, but also to the floodplain.

The floodplain is a complex system. The geomorphometry of floodplain areas is characterized by the presence of significant vegetation, silt from previous floods and floods and determines the genetic dissimilarity with the riverbeds. The surface of the floodplain is mostly covered with vegetation, varying in thickness and size of thickets, which affects the flow capacity of the floodplain [1-3]. The removal of vegetation under the bridge crossing is not possible, as it can lead to significant negative environmental consequences – erosion of the banks, the development of deformations at the bottom of floodplains and on embankments approaching bridges. Plant elements lead to additional vortex formation, the development of resistance to the movement of water flow, the distribution of velocities in which depends on the density of vegetation and

its height. Accordingly, the processes of the development of deformations in floodplain areas depend on the cohesive qualities of bottom soil particles and on the distribution of vegetation, which reduce their intensity [4, 5].

The objective of the study.

The displacement wave in open watercourses can take different forms. If the level increases during the movement of the wave, then the wave is positive, if the level decreases, the wave is negative [6]. A forward wave (positive or negative) moves downstream, a reverse wave moves upstream (against the current). A direct positive wave that carries an increase in water flow downstream is usually called a filling wave. The reverse positive wave, which occurs, for example, in the upstream when the drop shields of the dam are completely or partially closed or the turbines are stopped, is called a support wave. The backwater wave carries the decrease in flow up the river. A direct negative wave is called a tidal wave; its occurrence can be caused, for example, by a decrease in costs in the upper reaches of the river (during the period of flood subsidence), and in the downstream by a decrease in the passage of water through buildings. The reverse negative wave is called an outflow wave; it arises in the upstream of the dam with an increase in the passage of costs through the structures, spreads up the river and carries with it an increase in costs.

The front of a wave is its leading edge that moves up or down, and the main part of it is the body of the wave. Positive waves usually have a relatively steep front, while negative waves have a gentle one. When the wave front passes, the change in the hydraulic elements of the flow is quite rapid, but within the body it is slow. The propagation of a wave, in particular its front, occurs at wave speed, but not every wave in a river flow propagates at this parameter.

The speed of movement of flood waves on large rivers is determined not only by the hydraulic parameters of the formed filling wave, but also by the conditions of its formation and transformation when passing through the channel and floodplains, where part of the water accumulates, especially from the frontal part of the flood, which leads to a decrease in the speed of movement of the actual front. On the other hand, the wave is fed by lateral tributaries that replenish the volume of the wave throughout the entire body or part of it.

Practical significance of the obtained results. To solve the applied problems of road and bridge construction, a method implemented in the form of engineering formulas for determining the degree of reduction of wind waves during their passage through thickets on floodplains of open water streams is given.

As part of this approach, the effective height of the shrub is first determined by the formula:

$$h_{eff.h} = H + 0,7h \quad (1)$$

where H – depth of flooding of the floodplain, m;

h – estimated wave height, m.

Next, the effective height of the shrub is compared with the actual height of the

thickets $h_{th.}$. If the effective height of the vegetation is less than the actual height of the thickets , then the effect of damping the wave in the shrubbery will be $(h_{eff.h} < h_{th.})$achieved; if $h_{eff.h} < h_{th.}$ then it is necessary to provide for the planting of a shrub of greater height.

If there are gaps in the shrub, the percentage of thicket density decreases in proportion to the area of the gaps:

$$\Delta P_{th.} = P_{th.} \frac{(100 - S_{gaps})}{100}, \quad (2)$$

where S_{gaps} is the area of the gaps, %;

$P_{th.}$ – percentage of thicket density, %.

The percentage of thicket density can be determined according to methodical recommendations [7] depending on the diameter of the main trunks and their number per 1 m2 of thicket area.

The height of the wave in the wave system of the calculated storm, after it passes through the strip with vegetation, will be reduced to:

$$\Delta h_{wave\ red.} = h \frac{(100 - P)}{100}, \quad (3)$$

where *P* is the percentage of wave height damping, %.

Also, formula (3) makes it possible to determine the required percentage of wave repayment:

$$P = \frac{(100 - \Delta h_{wave\ red.})}{h} 100. \quad (4)$$

Figure 1 shows the results of a numerical experiment on the influence of the density of thickets on the reduction of the calculated wave height. For calculations, the diameter of the main trunks is assumed equal to 3 cm, the plane of the gaps – 30% of the total area of the floodplain. As can be seen from Fig. 1, an increase in the density of vegetation thickets accelerates the effect of wave damping on floodplain areas of open water streams.

Here are several test practical examples of the application of formulas (1)-(4).

Test example 1. Suppose that in the process of research and preliminary design, it turned out that the floodplain of the river in the wave-dangerous direction is partially overgrown with small forests. Thickets with a height of 1,5-2 m, not continuous, with a plane of gaps that is 30% of the total area of the floodplain.

In the process of dumping the flood embankment, it is assumed that the shrubbery will be removed at a distance of 20 m from the base of the embankment, and the remaining strip of shrubbery will be 40 m wide. The depth of flooding of the floodplain at a level of 0,33% – *H*=1,2 m; estimated wave height of 1% assurance in the system of storm waves of 50% pr assurance at the approach to the strip of small forest – *h* = 0,4 m.

It is necessary to determine the height of the waves on the approach to the highway embankment

In this case, the effective height of the shrub will be $h_{eff.h} = 1,2 + 0,7 \cdot 0,4 = 1,48 m$which is less than the height of the shrub on the floodplain of 1,5 m. Therefore, the effect of damping the wave in the bush will be achieved.

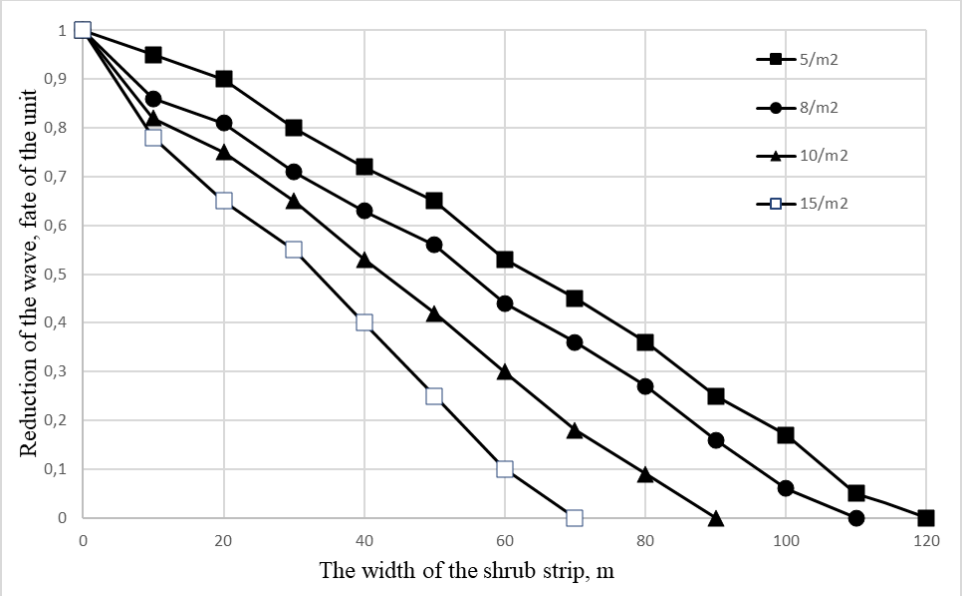

Fig. 1. Influence of thicket density on wave damping in floodplains of open water streams

According to surveys data, there are on average 5-6 trunks with an average diameter of 3 cm for every 1 m2 of thickets.

According to [7] the density of the bush will be 0,353, and taking into account the gaps: $\frac{0,353 \cdot (100-30)}{100} \approx 0,25$.

For the width of the shrub strip of 40 m, we will get a percentage of wave height damping of 28% [7].

The estimated wave height of 1% assurance after passing through a 40 m wide shrub will be: $\frac{100-28}{100} \cdot 0,4 \approx 0,29$ m.

Test example 2. During the design of the floodplain part of the embankment, it was established that a wave with a height of 0.1 m rolling onto the road slope is safe.

The depth of the floodplain at the level of 0,33% – H = 0,9 m, the estimated wave height is of 1% assurance in the storm wave system, 50% assurance on the approach to the designed planting strip h=0,3 m. It is proposed to plant a strip of shrubs with a diameter of the main trunks of 3 cm on a width of L=60 m.

It is necessary to determine the density of shrub plantings to achieve the necessary effect of extinguishing dangerous waves.

In this case, the necessary height of the shrub is determined, not less than:

$H + 0,7h = 0,9 + 0,7 \cdot 0,3 = 1,11$ m

In this case, the required percentage of wave damping will be:

$$P = 100 - \frac{0,1}{0,3}100 = 66,7\%.$$

Thus, when P = 66,7 % and L=60m we determine p=0,48.

Further, according to [7], when p=0,48 and a diameter of the main trunks is 3 cm, we find the number of main trunks per 1 m² – 7 pieces.

Test example 3. The depth of the floodplain in the wave-dangerous direction beyond the level of 0.33% H=1,5 m, the calculated wave height of 1% assurance in the storm wave system of 50% assurance on the approach to the designed forest strip h=0,6 m.

According to the conditions of construction of the embankment, a wave of no more than 0,1 m should approach it.

A 2 m tall shrub with an average trunk diameter of 4 cm is available for planting.

It is necessary to determine the width of the shrub planting strip and its quantity per 1 m² to achieve the necessary effect of damping of dangerous waves.

First, we will check the effectiveness of the height of the bush. The minimum height of the shrub should be: $H + 0,7h = 1,5 + 0,7 \cdot 0,6 = 1,92$ m.

Thus, the height of the bush is sufficient to dampen the waves.

Let's determine the required percentage of wave damping:

$$P = 100 - \frac{0,1}{0,6}100 = 83,3\%.$$

According to [7], at P = 83,3% the following variants of a forest strip with boundaries are possible:

– for thickets density of 0,25% – width 100 m;

– for thickets density of 1,2% – width 40 m.

If the average diameter of the main trunk is 4 cm, then we can offer the following options for planting a shrub [7]:

– for a width of 100 m, 2 trunks/m² are required;

– for a width of 80 m – 4 trunks/ m²;

– for a width of 60 m – 5 trunks/ m²;

– for a width of 40 m – 10 trunks/ m².

A planting width of 40 m with the number of bushes of 10 pcs/m² will be optimal, which corresponds to the distance between bushes in a row and between rows of approximately 30 cm.

Test example 4. The depth of the floodplain in the wave-dangerous direction beyond the level of 0,33% H=1,8 m, the calculated wave height of 1% assurance in the storm wave system of 50% assurance at the approach to the designed forest strip of the h=0,9m.

According to the conditions of construction of the embankment, a wave with a height greater than 0,05 m should not approach it.

For planting, a shrub with an average height of 2,5 m and with an average trunk diameter of 3,5 cm is available. Planting will be carried out at a density of 8 pieces per 1 m².

It is necessary to determine the width of the forest strip to meet the established requirements.

In this case, the effective height of the shrub will be: $H + 0{,}7h = 1{,}8 + 0{,}7 \cdot 0{,}9 = 2{,}43$ m.

Thus, the effect of wave damping will be achieved.

With a diameter of the main trunk of 3.5 cm and a planting density of 8 pieces per 1 m², we find p=0,77 [7].

Next, we determine the required percentage of wave damping:

$$P = 100 - \frac{0{,}05}{0{,}9}100 = 94{,}4\% .$$

For p = 0,77 and P = *94,4*%, we get the required width of the shrub strip – 70 m.

The proposed method of calculating the effect of damping of the height of the flow wave by the vegetation on floodplain sections of bridge crossings makes it possible to solve important problems that arise during the design of highways, in particular:

1) Determination of the reduction of the estimated height of the waves after their passage through the shrub on floodplains – approaches to highway embankments;

2) Determination of the width and density of the strip of shrub plantings to achieve the necessary effect of damping of dangerous waves in floodplain areas of open streams – approaches to bridge crossings.

References:

1. Vargas-Luna, A. Morphological adaptation of river channels to vegetation establishment: a laboratory study [Text] / Vargas-Luna, A., Duró, G., Crosato, A., Uijttewaal, W. // JGR Earth Surface. – 2019. – Volume124, Issue7. – P.1981–1995. Access mode: \ www/ URL: https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2018JF004878

2. Konsoer, K. Length scales and statistical characteristics of outer bank roughness for large elongate meander bends: The influence of bank material properties, floodplain vegetation and flow inundation [Text] / Konsoer, K., Rhoads, B., Best, J., Langendoen, E., Ursic, M., Abad, J., Garcia, M. // Earth Surface Processes and Landforms. – 2017. – Volume 42, Issue 13. – P. 2024–2037. Access mode: \www/ URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/esp.4169

3. Crosato, A. Numerical study on the effects of floodplain vegetation on river planform style [Text] / Crosato, A., Saleh, M. // Earth Surface Processes and Landforms. – 2010. – Volume 36, Issue 6. – P. 711–720. Access mode: \www/ URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/esp.2088

4. Slavinska, A. Tsynka, I. Bashkevych. Predicting deformations in the area of impact exerted by a bridge crossing based on the proposed mathematical model of a floodplain flow. Eastern-European Journal of Enterprise Technologies. 2020. 4/7 (Vol.106). DOI: https://doi.org/10.15587/1729-4061.2020.208634

5. Slavinska O., Tsynka A. Determination of the influence area of a bridge crossing in a river stream. Technology audit and production reserves.2020. Vol 4, No 2(54). DOI: 10.15587/2706-5448.2020.210504

6. Kondratyev N.E., Popov I.V., Karaushev A.B., River hydraulics. – L.: Gidrometeoizdat, 1969. – 416 p.

7. Methodological recommendations for designing and establishing structures for strengthening the slopes of the earth surface on public roads MR V.2.3-37641918-929:2023. – Kyiv, 98p.

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