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Determining Patterns of Interest in the Theme of State Regulation of Economic Risk in Small Enterprises Activity

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Abstract. In the course of the intensification of globalization and integration processes in the world economy, activities of small enterprises are becoming increasingly exposed to new economic risks. This accounts for the necessity to determine the level and dynamics of interest in the theme of economic risk as well as for the emerging need to improve the system of its state regulation. The purpose of the research is to model the processes of assessing the level of interest and making decisions to improve the mechanisms of state regulation of economic risk. The research methodology is based on the use of the method of Internet resources analysis, the method of forecasting, the method of exponential smoothing, the decision support system (hereinafter DSS) Decision Making Helper, etc. In determining the level of interest in the theme of economic risk and conducting an analysis of it, Google Trends web application tools were used based on search queries for the category “economic risk” in Ukrainian, Spanish, Chinese and English. Based on the obtained data, trend line models were constructed for the distribution diagrams of search queries for the concepts of “riesgo económico” and “economic risk”, which have a satisfactory value of approximation reliability and can be used for forecasting. At the same time, the trend models for analysing user interest trends in Ukraine are of low quality. With the use of the DSS Decision Making Helper, the assessment of alternative options for state regulation of economic risk in small enterprises activities was carried out. In particular, the priority of improving the taxation process as the most effective and relevant mechanism was determined. The practical significance of the research findings suggests that the developed proposals can be applied in assessing the level and dynamics of interest in the theme of economic risk as well as in making decisions on its state regulation

Keywords: small business, new economic threats, search query, user interest, economic risk management

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● INTRODUCTION

The intensification of structural transformations of national economies of all countries in the world as a result of enhanced globalization and integration processes necessitate increased attention to economic risk in activities of small enterprises. Comprehensive support for entrepreneurship leads towards improved provision of various goods and services to the population, increased employment rates, broader opportunities for self-realization, accelerated innovative development and solutions to socio-economic problems, including those caused by the spread of the COVID-19 pandemic. Small enterprises in many countries, including Ukraine, China, Kazakhstan, India and others, appear to be in the riskiest market area, consequently facing problems related to limited available resources, the growing need for financial support for enterprises, and increased competition. Therefore, the issues of identifying and analysing the most important causes and possible consequences of economic

risk in small enterprises activities as well as improving its state regulation, are gaining particular importance and relevance.

The issues of improving the processes of assessing the level of interest and the degree of spread of the theme of economic risk are also brought into view. Scientific works of many scholars are dedicated to studying the impact of new economic risks on small business activities as well as to searching for innovative solutions for their development in the context of global socio-economic changes.

In particular, B.I. Kosovich and V.O. Dmitruk [1] explore in their work the main modern globalization challenges and how they affect activities of small enterprises in terms of the risk for their development, and they also emphasize the importance of state support for the development of innovative entrepreneurship. In their scientific work, M.I. Karlin, O.V. Stashchuk and O.V. Borysyuk [2]

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underline the need for a detailed and in-depth analysis of new economic threats in small business activity in the context of a systemic impact on its finances. Taking into consideration studies of foreign experiences, these scholars also recommend developing a relevant system of incentives for small enterprises, specifically as to their revenue taxation. In particular, N.E. Kovshun [3] outlines in her work certain advantages and disadvantages of modern market transformations, state regulation of entrepreneurship in China, and emphasizes that they should be taken into account in order to develop a strategy for the development of small enterprises in Ukraine. It is also worth noting research developments of Ukrainian economist N.M. Vnu-kova [4], which are based on the application of an innovative approach to the use of the automated decision support system (hereinafter DSS) Decision Making Helper to assess the level of intensifying the expansion of the access to means of financing the implementation of promising projects from small and medium-sized enterprises.

Foreign scholars A.J. Hibbert [5] and G. Gao [6] in their research activities pay considerable attention to the practical aspects of measuring and managing economic risks in the development of small enterprises. A.A. Bartik [7] and M. Belitski [8] investigate the effects of the spread of the COVID-19 pandemic on the financial performance of small business and suggest possible ways to overcome them.

However, despite the large number of scientific developments, there is insufficient attention paid to assessing the level of interest and demand for information on economic risk among users as well as to improving practical ways of state regulation of new economic risks.

The object of the present research is economic risk in activities of small enterprises. The capacity and effectiveness of state regulation of economic risk in small business activities depends on informational, methodological and other kinds of support, which are the basis for determining its level. For its part, assessing the degree of user interest in the theme of economic risk using Google Trends web application allows setting trends and current tendencies in its state regulation.

The aim of the paper is to provide recommendations for determining the patterns of interest in the theme of state regulation of economic risk in activities of small enterprises.

Given the aim, the research process seeks to achieve the following objectives:

- determine the level of interest of Internet users in information related to the concept of “economic risk” using Google Trends;
- use the DSS Decision Making Helper to make optimal decisions in state regulation of economic risk in activities of small enterprises.

● MATERIALS AND METHODS

The research methodology is based on the use of general scientific and special methods

To study the general trends in the level of user interest in the theme of economic risk, to assess the demand for this issue by the criteria of spread and relevance, the method of analysing Internet resources via tools of Google Trends public web application by Google was used. It is based on the Google search engine and shows how often a certain term is searched for relative to the total volume of queries in

different world regions and in different languages [9]. Google Trends is one of the most convenient traditional monitoring methods along with Google Alerts, Google Advanced Search, etc. [10].

In the initial stage of the research, Ukrainian, Chinese and English were chosen for the analysis of various stakeholders’ interest in finding information related to the concept of “economic risk”. In the next stages of the research, however, Spanish as the second most common world language was chosen instead of Chinese. All operations for forming a statistical base were carried out as of the beginning of 2022. In the study of the statistical data of users’ search queries on the analysed concept of “economic risk” obtained in Google Trends web application, the method of statistical analysis was used in order to establish patterns of interest in the theme of economic risk and to identify structural shifts. For consolidating specific single facts about the demand for information related to economic risk, the generalization method was used.

Accordingly, the graphical method made it possible to visualize the number of search queries for the category under study, while the forecasting method allowed to construct models of trend lines to forecast the level of user interest in the theme of economic risk. To construct the most reliable models, the R.G. Brown method of exponential smoothing was used [11], which gives the most accurate approximation to the initial dynamic series. The smoothing parameter was $\alpha = 0.75$, which is close to one, so for the forecast models the impact of the final values of the users’ search queries was primarily taken into account. The application of this method made it possible to create more qualitative and reliable trend lines with a satisfactory value of the coefficient of determination R^2 .

The observation method was used for collecting information on new economic risks and reasons for their emergence while the deduction method was applied in the process of extrapolating the consequences of new economic risks for the performance of national economies of different countries on activities of small enterprises.

In order to choose the best alternative of state regulation and to reduce the degree of economic risk in small enterprises activities, the Decision Making Helper software product as a DSS was used. This program is accessible to Internet users and performs automated calculations using the expert ranking method to determine the weight coefficients of the selected criteria and alternatives as well as pairwise comparisons of expert judgments, thus significantly reducing the subjectivity of their opinions [4]. This approach allowed to obtain multiple result variations, among which the highest priority for state regulation of economic risk was chosen on the basis of such criteria as efficiency, relevance and affordability of implementation.

According to the terms of the DSS Decision Making Helper, determination of the importance level for each criterion and evaluation of alternatives is carried out through the requisite rating: from (-5) “maximum unimportant” to (+5) “maximum important”, 0 – neutral [4; 12].

● RESULTS AND DISCUSSION

Assessment of the level of Internet users interest in the concept of “economic risk” using Google Trends web application
Small enterprises are the backbone for the development

of modern economic systems of all countries in the world, accounting for quite a significant share in the total number of economic entities. They play a facilitating role in eliminating imbalances in individual commodity markets, creating additional jobs and reducing unemployment, ensuring social stability, activating innovative processes and developing competition. Furthermore, a developed small business sector provides a considerable share of revenues to budgets at all levels, sometimes constituting a greater share of gross domestic product than corporations, holding companies and other large enterprises.

However, it is worth noting that any business activity is associated with risk. It acts as a dueling two-factor element, characterized as an opportunity for development on the one hand and as a threat that requires finding solutions to avoid it on the other [1]. In all spheres of small business activity, the theme of economic risk is becoming increasingly important, and therefore the determination of the degree of spread and user interest in this issue can indicate its development and prospects for further research among scholars and practitioners.

Currently there is no unified approach to the definition of the concept of “economic risk”, which is due to

its multifaceted nature [5; 13]. According to the authors, a fairly complete and meaningful interpretation of this category is presented by Chinese scientist G. Gao, who views economic risk as “the probability of an enterprise losing part of its resources, lack of revenue or the incurrence of additional costs as a result of certain production and financial activities” [6]. At the same time, modern economists are increasingly moving away from the established conceptions of risk associated with traditional categories (loss, indefiniteness, uncertainty, etc.) in their definitions and introducing new terms into the interpretation, specifically paying attention to the peculiarities associated with globalization and digitalization in all spheres of activity. In particular, Ukrainian practitioners, V. Galasyuk and M. Soroka emphasize that “economic risk is a possible decrease in the value of positive conditional monetary prospective periods and a likely increase in the value of negative ones that occur as a result of an event undesirable for a particular actor of economic relations” [14].

Comparing the popularity dynamics of the term “economic risk” worldwide in Chinese and English via Google Trends tools revealed insufficient demand among users for information search in Chinese (Fig. 1).

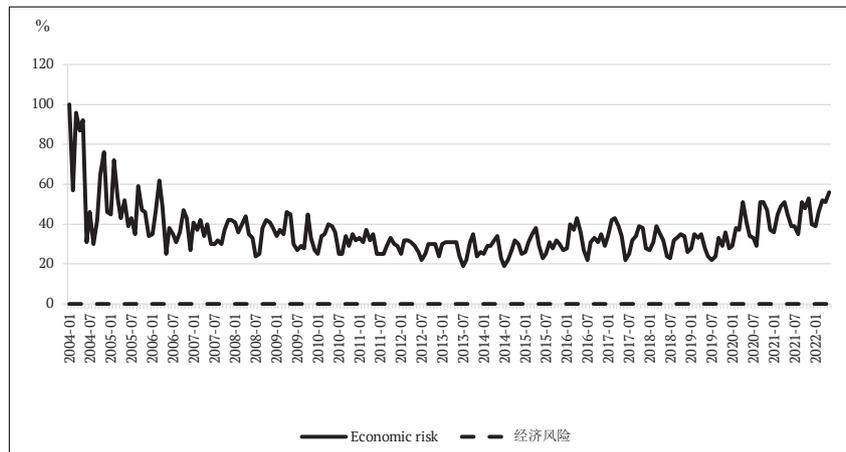


Figure 1. Distribution diagram of search queries for the concepts of “economic risk” and “经济风险” worldwide since 2004

Source: retrieved from Google Trends by reference [15]

Let us analyse the interest of various users in studying information related to the category of “economic risk” in Ukrainian, Spanish and English by considering

their search queries by the first ten countries according to the data from 2004 onwards (Table 1).

Table 1. User search queries worldwide for the concepts of “economic risk” in Ukrainian, Spanish and English by country

| Concept | “Economic risk” | “Riesgo económico” | “Economic risk” |
|-----------|-----------------|--------------------|-------------------------------|
| Countries | Ukraine – 100 | Colombia – 100 | Ethiopia – 100 |
| | | Peru – 82 | Republic of South Africa – 63 |
| | | Mexico – 58 | Kenya – 55 |
| | | | Philippines – 49 |
| Countries | Ukraine – 100 | | Singapore – 35 |
| | | | Nepal – 30 |
| | | | Nigeria – 29 |
| | | | Malaysia – 24 |
| | | | Hong Kong – 23 |
| | | | Sri Lanka – 18 |

Source: retrieved from Google Trends by reference [15]

The data in Table 1 indicate that, taking into account the linguistic features of each country, the concept of “economic risk” is of 100% interest to users from Ukraine. At this stage, we should provide the distribution of their search queries, which is to be found further in the study.

The demand for information on the category “riesgo económico” in Spanish was revealed in the following countries: Colombia – 100%, Peru – 82% and Mexico – 58%. At the same time, the interest in the term “economic risk”

presented in English was most reflected in the user searches from the following countries: Ethiopia – 100%, South Africa – 63%, Kenya – 55%, Philippines – 49%, Singapore – 35%, Nepal – 30%, Nigeria – 29%, Malaysia – 24%, Hong Kong – 23% and Sri Lanka – 18%.

To obtain a greater visualisation of user searches worldwide by the terms “riesgo económico” and “economic risk”, distribution diagrams for each of the categories are presented in Figure 2 and 3, respectively.

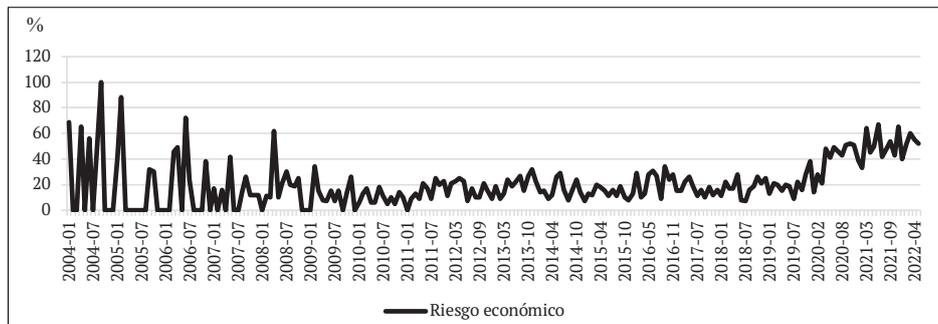


Figure 2. Distribution diagram of search queries for the concept of “riesgo económico” worldwide since 2004

Source: retrieved from Google Trends by reference [15]

By analysing the data in Figure 2, a distinctive tendency to a mostly consistent and steady increase in the interest in studying information related to the term “riesgo económico” can be noticed from the search queries of users from different countries. From January 2011 onwards, more and more searches for information related to this topic have been made each month, and the number of search queries has never reached a zero value. This has been caused by a

range of financial and economic crises, which have increased the need of users from the second group of countries for a more detailed analysis of the causes and potential consequences of economic risk.

The graph shows that a swift rise in the interest in the concept of “riesgo económico” occurred in April 2020, when the rapid spread of the COVID-19 pandemic began and the economic situation of many states was at risk.

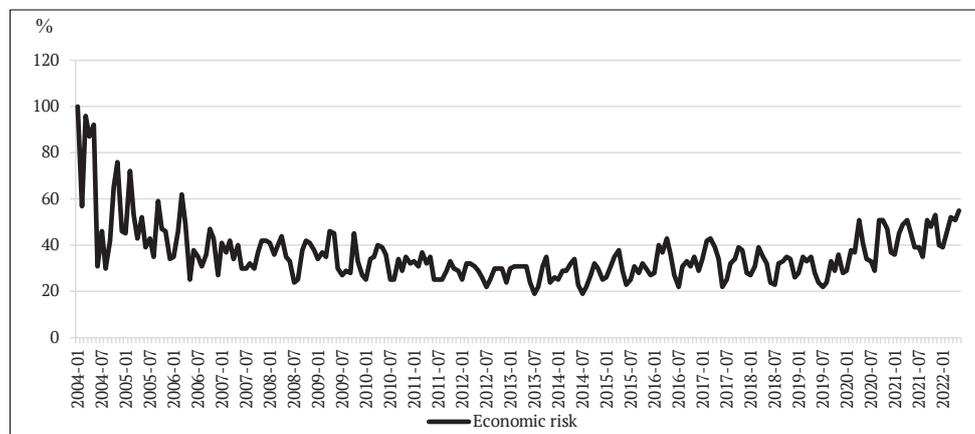


Figure 3. Distribution diagram of search queries for the concept of “economic risk” worldwide since 2004

Source: retrieved from Google Trends by reference [15]

The graph presented in Figure 3 demonstrates a stable trend of search queries for the category of “economic risk” from June 2006 onwards. This may be due to the understanding of English-speaking users, notably scientists, practitioners, etc., of the relevance of economic risk issues in various areas of activity. According to Figure 2 as well, since April 2020 there has been an increase in the demand for studying economic risk issues in English, which may be explained by the spread of the coronavirus crisis. It should also be noted that from February 2022 onwards the interest

of users in searching for information on the category of “economic risk” has begun to grow rapidly due to the emergence of conflicts at the international level.

To establish trends and model the degree of Internet users’ interest in the terms under study, trend lines with a forecast for 12 months were added to the distribution diagrams. However, for both the concept of “riesgo económico” and the term “economic risk” the forecast models constructed from the data based on search queries since 2004 were of insufficient quality and had unsatisfactory values

of the reliability of approximation R^2 , which were 0.2855 and 0.4846, respectively. This indicates the impossibility of

using them for forecasting. Figures 4-5 presents the design of more qualitative and reliable approximation functions.

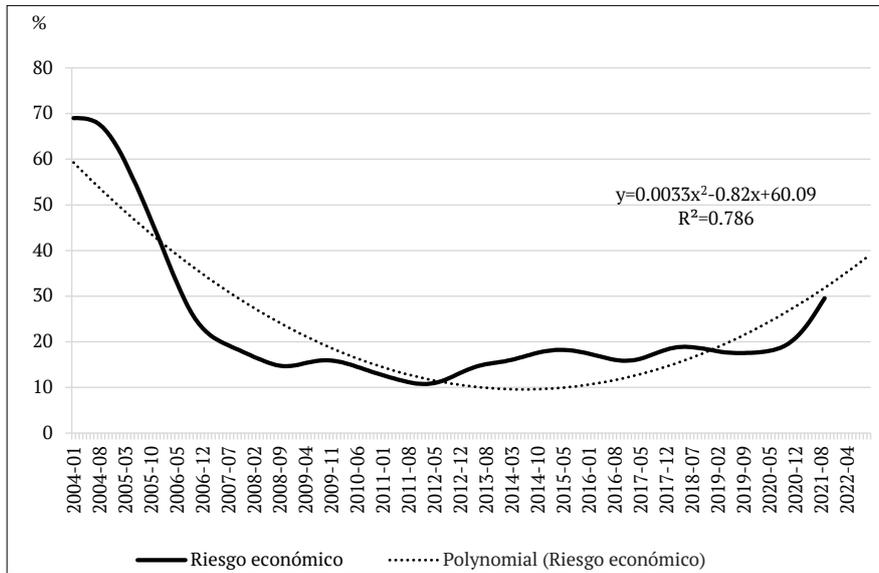


Figure 4. Forecasting the degree of user interest in the concept of “riesgo económico” worldwide since 2004
Source: retrieved from Google Trends by reference [15]

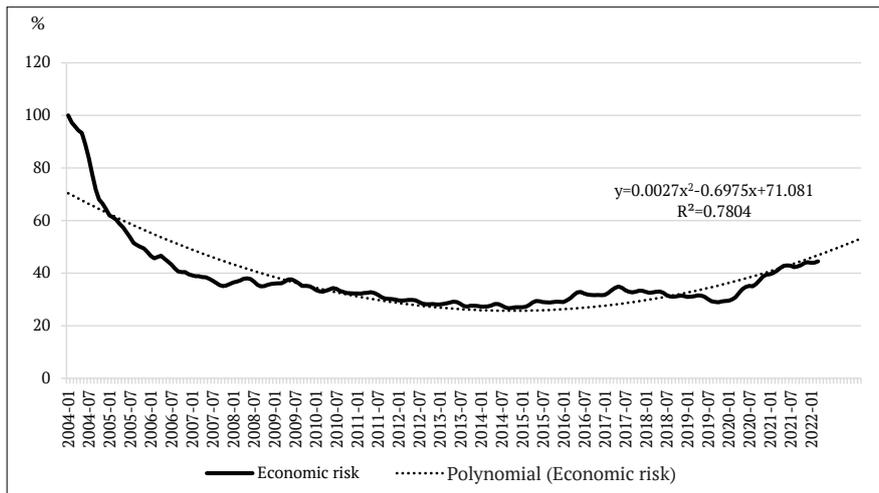


Figure 5. Forecasting the degree of user interest in the concept of “economic risk” worldwide since 2004
Source: retrieved from Google Trends by reference [15]

By analysing the created trend lines for the concepts of “riesgo económico” and “economic risk” in Figures 4-5, it may be concluded that they are adequate and reliable, because the values of the coefficient of determination R^2 exceed 0.75 and are 0.7860 and 0.7804, respectively. This indicates that the models obtained may be used for

forecasting the user demand for information related to the terms under study.

Table 2 shows the approximation functions derived from the constructed trend lines, confirming the significance of the results of forecasting user search queries for the analysed term worldwide in Spanish and English.

Table 2. Approximation functions for the studied categories based on the search queries data

| Concept | Approximation function | Approximation accuracy |
|--------------------|------------------------------|------------------------|
| “Riesgo económico” | $y=0.0033x^2-0.82x+60.09$ | $R^2=0.7860$ |
| “Economic risk” | $y=0.0027x^2-0.6975x+71.081$ | $R^2=0.7804$ |

Source: retrieved from Google Trends by reference [15]

We created the trend line models for the studied concepts based on the data of user search queries worldwide in the Google information search engine using the method of exponential smoothing. As shown in Table 2, the models have a satisfactory value of the coefficient of determination R^2 , that being 0.7860 for the category “riesgo económico” and 0.7804 for the term “economic risk”.

The results of the data analysis in Figures 4-5 and in Table 2 confirm the interest and strengthening of the role,

importance and relevance of research on economic risk worldwide. To determine the demand of stakeholders in Ukraine for information related to economic risk, the volume dynamics of search queries for the concepts of “economic risk” and “economic risk” from 2004 onwards was considered, and diagrams of their distribution in Google Trends web application were constructed (Figs. 6-7). The term “riesgo económico” is characterized by a low occurrence in search queries, so the interest in it among users in Ukraine was not assessed.

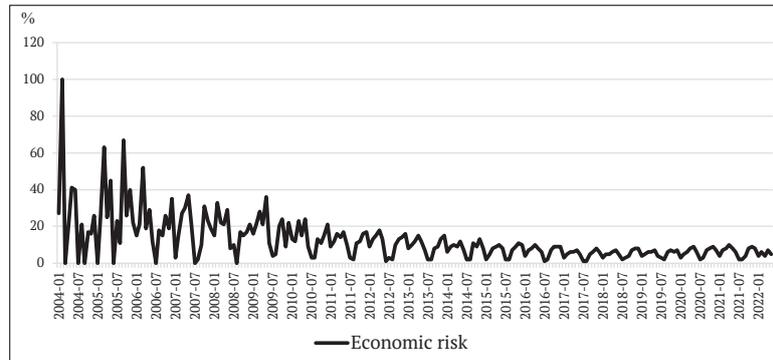


Figure 6. Distribution diagram of search queries for the concept of “economic risk” in Ukraine since 2004

Source: retrieved from Google Trends by reference [15]

The graph shown in Figure 6 defines a gradual reduction in search queries for the term “економічний ризик” (“economic risk” in Ukrainian) by July 2018, followed

by a slight growth and consistent monitoring of this concept. Additionally, it should be noted that there is a tendency towards gap reduction in the volume of search queries.

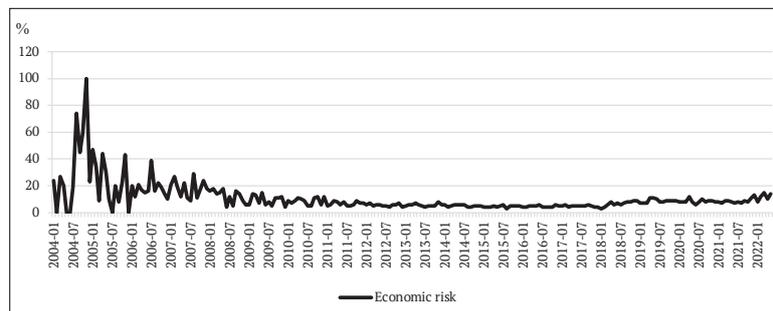


Figure 7. Distribution diagram of search queries for the concept of “economic risk” in Ukraine since 2004

Source: retrieved from Google Trends by reference [15]

On analysing the data in Figures 6-7, a general conclusion about the user interest in information about the concepts of “economic risk” and “economic risk” in Ukraine should be drawn, as there has been observed a sustainably low volume of search queries, especially since 2011. A slight increase is observed in 2018, which may be caused by globalization processes worldwide and their active impact. Moreover, it should be noted that the interest of Internet users in Ukraine in economic risk is associated with the economic and political situation in the country as well as with its aggravation due to the spread of the COVID-19 pandemic in early 2020 and the emergence of conflicts at the international level.

In order to make a forecast for each of the distribution diagrams presented in Figures 6-7, trend lines were added. Sixth-degree polynomial models were constructed to obtain a higher value of the reliability of approximation R^2 , but even under such conditions they were of low quality for forecasting, and were inadequate.

Thus, the distribution shown in Figures 6-7 demonstrates a consistent decline in research in the field of economic risk with a slight increase since 2018, which may indicate a certain underestimation of the significance of a more thorough and detailed analysis of the causes, consequences and methods of managing economic risk in various sectors of activity.

Using the DSS Decision Making Helper to make decisions in the field of state regulation of economic risk in small enterprises activity

It should be noted that there is a global trend towards the increase in the level of user interest in economic risk issues, which is determined with language peculiarities taken into account. Economic risk always exists and is one of the most important elements of the performance of national economies in all countries worldwide, requiring economic entities to make managerial decisions with a structured approach. Accordingly, their task is to create new projects,

improve the quality of products, be able to sell them in international markets and promptly respond to global challenges caused by socio-economic changes, relying on the analysis of the impact of risk factors in the external and internal economic environment.

Modern globalization and integration processes are annually expanding their network of influence, shaping new challenges and requirements, which leads to the concern of entrepreneurs about the growing uncertainty and instability in the global business space. In the future the development of small enterprises will increasingly depend on considerations of new economic risks, among which the following kinds should be identified: climatic, epidemiological (primarily coronavirus), protectionist, populist, income inequality [2].

First of all, as most countries of the world entered an economic crisis in the first half of 2020, which was largely triggered by the quarantine due to the COVID-19 pandemic and the resulting suspension of activities of many small enterprises, especially in the areas of catering, entertainment, tourism, beauty industry and non-food retail, with many of them going bankrupt, the need to review traditional approaches to determining economic threats was brought onto the agenda [7; 8; 16]. At the same time, climate threats to human development are growing worldwide, which can force international organizations to strengthen control over activities of those enterprises that produce greenhouse gases, leading to a decrease in their work efficiency. The sharp drop in living standards in most countries in 2020 has significantly increased the influence of populist forces

on governments, which are forced to respond by increasing social benefits through an increase in external borrowing, which can objectively lead to rising inflation and depreciation of small enterprises' revenue [2]. Such actions of many politicians in power will not solve another urgent problem – inequality in wealth and quality of life, which is becoming exacerbated every year not only in relations between individual countries, but also within each of them [17]. We can therefore expect to see the imposition of the so-called wealth tax both in individual states and at the international level. This, in turn, will call into question the willingness of the owners and shareholders of many small enterprises to expand their production and create more job opportunities. The latter is the main condition for recovery from the crisis, which cannot be underestimated by politicians in power.

Therefore, the successful adaptation of small enterprises to modern realities of economic activity in the national and international markets requires effective mechanisms of state regulation of economic risk. Among them, we should highlight improvement of the process of taxation for small enterprises and simplification of the tax administration system, development of concessional lending programs for small enterprises involving the capabilities of state banks and their state guarantee, establishment of specialized state institutions for export-import operations insurance [3; 18; 19].

The results of determining the level of importance of the criteria in choosing the best of these alternatives as well as evaluating options for improving state regulation of economic risk are presented in Table 3.

Table 3. Determination of the level of importance of the criteria and evaluation of the alternatives of state regulation of economic risk in small enterprises activity by experts in the field of small business development

| Criterion/Value | Alternative | | |
|--------------------|-------------------------|----------------------|--|
| | Improvement of taxation | Concessional lending | Establishment of insurance institutions for export-import operations |
| Efficiency (+5) | +5 | 4 | 4 |
| Relevance (+4) | +5 | 4 | 4 |
| Affordability (+5) | 4 | +3 | 4 |

In reference to the data in Table 3, the information was entered into the DSS Decision Making Helper (Fig. 8).

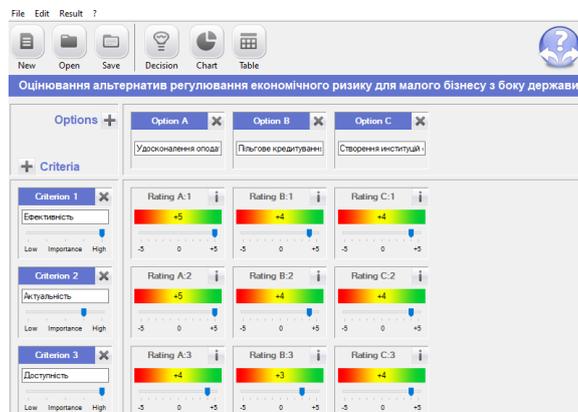


Figure 8. The DSS Decision Making Helper dialogue box with the evaluation of the alternatives of state regulation of economic risk in small enterprises activity

Source: retrieved from Decision Making Helper by reference [12]

Based on the data presented in Figure 8, the DSS Decision Making Helper produced the final results for deciding on the choice of the most preferred way to manage economic risk (Figs. 9-10) It should be noted that this software product

automatically calculates the value of the solution for each regulatory mechanism in percentages from (-100%) to (+100%) and on the scale: “unsatisfactory/quite unsatisfactory/neutral/quite positive/positive” [4; 20].

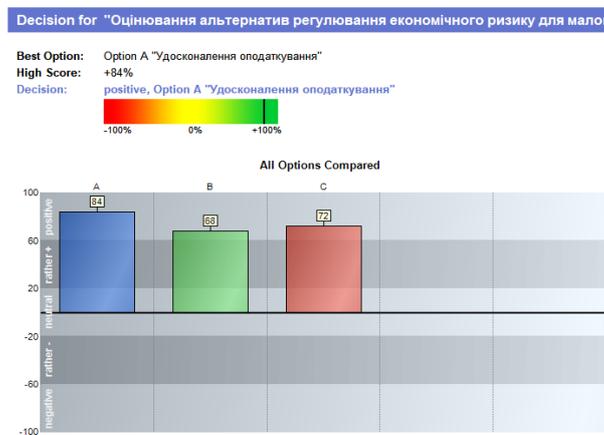


Figure 9. The DSS Decision Making Helper dialogue box with the results for the alternatives of state regulation of economic risk in small enterprises activity

Source: retrieved from Decision Making Helper by reference [12]



Figure 10. The Decision Making Helper dialogue box with the results for the alternatives of state regulation of economic risk in small enterprises activity (radar method)

Source: retrieved from Decision Making Helper by reference [12]

It can be concluded from the analysis of the obtained results in Figures 9-10 that the most appropriate alternative that would facilitate economic risk regulation and reduction of its effects on small enterprises activity is improvement of the taxation process and simplification of the tax administration system. This mechanism, compared to others, is the most effective and relevant under present conditions.

This is especially important as due to crisis developments in the Ukrainian economy there has been a decline in the production sector. Due to the increase in competition in the domestic and global markets, individual enterprises do not have sufficient development rates [20].

In particular, one of the main directions of improving the taxation process is the performance by tax authorities of the servicing function instead of the supervisory and punitive ones. Its essence is to support charge and payment of taxes rather than filling the budget by whatever means. Other main methods are reducing the number of taxes,

their rates and simplifying the procedure for their calculation and payment, digitalization of services for small enterprises, improving tax administration, creating a system of tax control due to the degree of risk in enterprises activities etc. [21].

Thus, the novelty is the improvement of the process of assessing the level of interest and the degree of spread of economic risk topics via Google Trends search engine tools, and the upgrade of the decision-making process as to the choice of mechanisms of state regulation of new economic risks using the DSS Decision Making Helper.

The practical significance of the research findings lies in the fact that the developed proposals can be used in assessing the relevance of information related to economic risk among Internet users and in state regulation of new economic risks in small enterprises activity in order to improve their performance under the present conditions of socio-economic changes.

● CONCLUSIONS

Therefore, the successful performance of small business both in the global business space and in Ukraine in the future will significantly depend on the consideration of new economic risks. By conducting a detailed analysis of user interest in searching for information on the concept of “economic risk” in Ukrainian, Spanish and English on the basis of user search queries since 2004, it can be concluded that the role and relevance of this research area has increased. In particular, the constructed trend line models for the distribution diagrams of search queries for the categories “riesgo económico” and “economic risk” have a satisfactory value of approximation reliability (0.7860 and 0.7804) and can be used for forecasting the level of interest among Internet users. As for the constructed trend models based on search queries in Ukraine, they are of low quality and are not recommended for forecasting. The resulting distribution is somewhat contradictory, as it demonstrates a gradual decline in the demand for information on economic

risk with a slight increase since 2018. Such dynamics may be associated with the impact of globalization and integration processes as well as with the economic and political situation in Ukraine, which has been exacerbated by the spread of the COVID-19 pandemic at the global level in early 2020 and the emergence of conflicts at the international level at the end of February 2022.

Alternatives of state regulation of economic risk were evaluated with the DSS Decision Making Helper and it was determined that the improvement of the taxation process and simplification of the tax administration system is the most optimal alternative. This mechanism, compared to others, is the most effective and relevant under the present conditions of small enterprises activity. Thus, it should be emphasized that the successful adaptation of small enterprises to the current realities of economic activity in the national and international markets requires effective mechanisms of state regulation of economic risk and its assessment, which presents the subject of further research.

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Визначення закономірностей щодо зацікавленості тематикою державного регулювання економічного ризику діяльності малих підприємств

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Анотація. Під час посилення глобалізаційних та інтеграційних процесів у світовій економіці діяльність малих підприємств все більше зазнає впливу нових економічних ризиків. Це зумовлює необхідність у визначенні рівня та динаміки зацікавленості тематикою економічного ризику, а також виникає потреба в удосконаленні системи його державного регулювання. Метою дослідження є моделювання процесів оцінювання рівня зацікавленості та прийняття рішень щодо покращення механізмів державного регулювання економічного ризику. Методика проведення дослідження базується на використанні методу аналізу Інтернет-ресурсів, методу прогнозування, методу експоненційного згладжування, системи підтримки прийняття рішень (далі – СППР) Decision Making Helper тощо. У процесі визначення рівня та проведення аналізу зацікавленості тематикою економічного ризику застосовувалися інструменти веб-додатку Google Trends на основі пошукових запитів категорії «економічний ризик» українською, іспанською, китайською та англійською мовами. За отриманими даними побудовано моделі лінії трендів для діаграм розподілу пошукових запитів за поняттями «riesgo económico» та «economic risk», які мають задовільну величину достовірності апроксимації та можуть бути використані для прогнозу. Водночас побудовані трендові моделі для аналізу тенденцій зацікавленості користувачів в Україні мають низьку якість. Проведено, із застосуванням СППР Decision Making Helper, оцінювання альтернативних варіантів державного регулювання економічного ризику діяльності малих підприємств. Зокрема, визначено пріоритетність удосконалення процесу оподаткування як найбільш ефективного та актуального механізму. Практична значимість результатів дослідження полягає в тому, що розроблені пропозиції можуть застосовуватися у процесі оцінки рівня та динаміки зацікавленості тематикою економічного ризику, а також під час прийняття рішень щодо його державного регулювання

Ключові слова: малий бізнес, нові економічні загрози, пошуковий запит, зацікавленість користувачів, управління економічним ризиком

TVAR-Models of Financial Security Indicators for Macroeconomic Systems: Impact Assessment of Energy “Shock”

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Abstract. The break of connections in economic systems results in imbalance and a theoretical possibility of a threat for their development. This raises the issue of finding an effective mechanism for economic security in general and financial security in particular, which are important elements of how macroeconomic components work. The purpose of the study is to develop models that allow assessing the impact of an energy “shock” on financial security indicators, to identify the threshold values of exogenous variables at which the “shock” has a destructive influence on the level of financial security and can lead to the financial system destabilization. The work uses a branched structure of scientific methods which consist of theoretical and empirical research of the financial security for macroeconomic systems. The main results of this work are devoted to the consideration of the problem of how to design effective mechanisms for ensuring financial security under the conditions of exogenous “shocks” of the global economy. It considers the concept of “shock” and gives the examples of the impact of “shocks” on macroeconomic indicators. The work highlights the energy “shock” as dominant for the analysis and formation of an effective macroeconomic stability policy. The information area of research features is substantiated, including BRENT oil price data and indicators of monetary and currency security, such as the rate of inflation and the exchange rate. Emphasis on subsystems of monetary credit and currency security is made due to the importance of these channels of crisis infection in order to ensure financial security. The value of the lag in the model is substantiated with the help of information criteria; evaluation and testing of the quality of the model have been carried out; system stability has been assessed based on the impulse response function, the TVAR model has been developed. The areas of change of the exogenous variable reflecting the statistically significant impact of the energy “shock” on the rate of inflation are analyzed. Thus, the obtained results made it possible to identify the regimes of energy security, which become a channel of infection of the financial sphere and a significant increase in the level of inflation. Practical significance includes the versatility and applicability of the evaluation approach for research due to the ability to use the entire algorithm as a complete ensemble of models. The results of this material can be used in the formation of government financial security policies and reactions to destabilizing external influences

Keywords: security of macro-regions, risks and threats, security indicators of macroeconomic, oil price, threshold regimes

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● INTRODUCTION

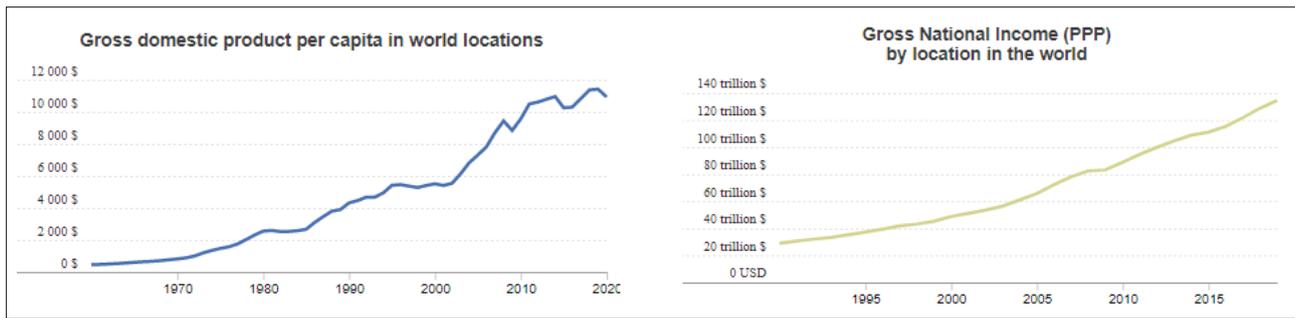
The current stage of economic development is characterized by strengthening globalization processes. The latter carry a number of advantages and, at the same time, pose new threats and risks that require an adequate adaptation of existing management systems to ensure sustainable functioning

and development of macroeconomic systems. Thus, as a metric of increasing the efficiency of production and economic systems functioning as a result of globalization processes, we can single out the graphical exponential model of the world economy growth observed in the last 30 years (Fig. 1) [1].

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a) Dynamics of Gross Domestic Product per capita in the period of 1960-2020

b) Dynamics of Gross National Income per capita in the period of 1985-2019

Figure 1. Factors of improving the general well-being of the global population expressed in income terms

Source: [1]

The exponential growth model of the world economy has become possible due to the high mobility of labor and capital resulting from globalization, the speed of innovation, etc. At the same time, due to the lack of formal borders the global economy creates new types of risks and threats, which, at a certain point, can lead to an increase in the probability of “shocks” which are understood as extraordinary stimuli (factors) that make conditions for a sharp change in the modes of how economic systems work and lead to destabilization. In economic sphere, the expansion of “shocks”

happens with the help of channels of distribution, where trade, information and financial channels are most often seen. As shown by numerous studies, the financial channel plays the key role since its “shocks” lead to the lasting negative security fluctuations and the formation of crisis situations. This raises the question of how the “shocks” influence the financial security indicators of macroeconomic systems [2]. Figure 2 shows the application of the impact of different “shocks” on the indicators of economic security, namely, financial security of macro-regions.



a) Inflation in the Eurozone, the period of 2008-2022



b) The level of the world unemployment, the period of 1990-2020



c) the level of the world rate of GDP growth, the period of 1960-2020.

Figure 2. The impact of “shock” on certain macroeconomic indicators

Source: [3; 4]

The period of 2022 is characterized by the energy “shock” produced by the disruption of standard supply chains of raw materials, the restrictions in the movement of payments and capital investments, the international

isolation of territories that were the main suppliers of energy resources in past years. The increased impact of the energy “shock” is confirmed by the dynamics of the price per barrel of BRENT oil shown in Figure 3.



Figure 3. Graphical interpretation of the energy “shock” in BRENT oil prices in US dollars

Source: [5]

In the current conditions, one of the urgent tasks of financial security management is the assessment of the impact of the energy “shock” on the dynamics of financial security indicators, the scenario analysis of its possible consequences in order to choose adequate tools for ensuring macroeconomic stability.

When evaluating [5], it should be emphasized that in the first quarter of 2022, the so-called energy “shock” took place in the world economy resulted from the change in the situation on international markets. The key supplier of energy resources, the Russian Federation, as a result of the military invasion into Ukraine, found itself under international economic sanctions and significantly reduced the export of oil, gas and other resources. In such conditions, there was a significant decrease in supply of energy resources due to the lack of adequate replacement of the reduced energy carriers, that, in its turn, brought about an increase in demand and prices.

Also, in 2020, as an exit measure from the international lockdown caused by COVID-19, the world financial system was given a boost to economic growth. These infusions made it possible the prognosticated effect of renewal, though, the surplus of money resulted in the incremental rise in inflationary pressures.

Thus, the prices for energy resources and inflation have resonated. This work reconsiders the hypothesis about a significant impact of “shock” in energy security on the pace of inflation expectations.

● LITERATURE REVIEW

A significant number of publications are dedicated to the financial security of macroeconomic systems both in Ukrainian and foreign scientific literature. The author M. Ermoshenko [6] sees financial security as the state of financial and credit system of the country, the balance between all financial instruments and draws attention to the mandatory condition of being resistant to the influence of destabilizing factors. P. Mekshun [7] emphasized the combination of economic and financial security, where the specified elements are accepted as parts for the formation of sustainable development and general well-being. As the analysis of the sources showed, special attention is paid to the implementation of the system of indicators in the formation of financial security mechanisms, for example, the source [8]. Some of the foreign authors try to

describe financial security through a retrospective view of crisis phenomena [9], the study of systemic risk in the markets [10]. However, the most widespread vision of the formation of mechanisms for ensuring the financial security of macroeconomic systems can be found in combination with economic and mathematical methods. Thus, the author O. Faryna [11] considers financial security through the prism of financial stability; uses a vector model to diagnose the stability of Ukraine’s financial security. In the work of Yu. Bazhenova [12], the research focus is on the formation of a dynamic stochastic model of economic equilibrium that takes into account the impact of monetary and fiscal policies on the security of the country as a whole. The team of authors led by L. Guryanova [13] dwelled on the application of VAR (Vector Autoregressive Model) and ECM (Error Correction Model) to analyze the effects of the impact of “shocks” on the economic and financial security of macroregions through the justification of the system of indicators and the formation of a comprehensive assessment of security levels. Works of scientists [14; 15] investigate the possibility of using TVP-VAR models to assess the consequences of the impact of “shocks”.

Summarizing the analysis of scientific viewpoints, we should mention the unconditional effectiveness of the approaches proposed by the authors and the prospects of using various modifications of VAR-modeling technologies to study the impact of “shocks” on indicators of financial security [16; 17]. At the same time, it should be noted that the existing viewpoints do not fully consider the issue of assessing the impact of energy “shock” [18; 19] on indicators of financial security, therefore the model evaluation apparatus has been improved. Furthermore, a new theoretical and practical approach to the combination of the model basis has been developed.

The purpose of the study is to develop models that allow assessing the impact of an energy “shock” on indicators of financial security, to identify threshold values of exogenous variables at which the “shock” has a destructive nature on the level of financial security and can lead to destabilization of the financial system.

● MATERIALS AND METHODS

As mentioned above, the VAR model is an effective tool for building a model of the dynamics of financial security indicators. The choice of this mathematical toolkit is due to

the possibility of modeling interdependent variables evaluating the impact of “shocks” on economic dynamics. Construction of the VAR model includes the following stages: checking time series for stationarity using the Dickey-Fuller test; determining the order of integration and adjustment of variables; testing for the nature of causal relationships based on the Granger test; evaluation and determination of the order (lag) of the VAR model; construction of impulse functions, decomposition of variances and assessment of system stability [20]. The work uses such a modification of the VAR model as the TVAR model (Threshold Vector Autoregressive Model) that allows determining the threshold values of exogenous indicators which, when exceeded, will lead to the destructive impact of “shocks” on the financial security of economic systems.

In order to estimate the energy “shock” it is proposed to select data on the cost of the most important resource of this type – oil, or more precisely – the cost of 1 barrel of BRENT oil for the monthly periods from January 2012 to March 2022 [5]. As financial security indicators we consider monetary and currency security indicators (inflation rates and the value of the dollar exchange rate) since it is exactly the currency security that remains the main critical

subsystem of financial security for the national economy if we turn to countries with developing economies [21-23]. Data processing has been carried out in the EViews environment.

At the stages of the preliminary analysis, the time series have been tested for stationarity, have been transformed and then analyzed for the presence of two-way causal relationships. The presence of significant relationships has been confirmed. The created VAR model includes three factors: the rate of inflation (INFLATION_LEVEL), the dollar exchange rate (EXCHANGE_RATE), the price of one barrel of BRENT oil (BRENT_PRICE). The results of its implementation are considered below.

● RESULTS AND DISCUSSION

Figure 4 features the definition of the lag order of the model which is based on the analysis of various statistical criteria [24; 25]. Statistics of the value of the logarithmic probability (LogL), modified linear regression (LR), final prediction error (FPE), Akaike information criteria (AIC), Schwartz (SC) and Hannan-Quinn (HQ) have been considered [26; 27]. Optimal values marked with (*) are automatically selected for each of the criteria. Thus, it is determined that the lag which should be taken into account in the model, equals 3.

Sample: 2012M01 2022M03
Included observations: 115

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| 0 | -1082.765 | NA | 31864.03 | 18.88286 | 18.95447 | 18.91193 |
| 1 | -749.3572 | 643.6213 | 113.0067 | 13.24099 | 13.52742 | 13.35725 |
| 2 | -727.2816 | 41.46377 | 90.05434 | 13.01359 | 13.51484 | 13.21705 |
| 3 | -670.2232 | 104.1936 | 39.07505* | 12.17779* | 12.89386* | 12.46844* |
| 4 | -665.5671 | 8.259527 | 42.20845 | 12.25334 | 13.18423 | 12.63118 |
| 5 | -655.4725 | 17.38029* | 41.51780 | 12.23430 | 13.38001 | 12.69934 |
| 6 | -652.2327 | 5.408980 | 46.06351 | 12.33448 | 13.69501 | 12.88671 |
| 7 | -649.7239 | 4.057632 | 51.83471 | 12.44737 | 14.02273 | 13.08680 |
| 8 | -639.0471 | 16.71165 | 50.69002 | 12.41821 | 14.20838 | 13.14483 |

Figure 4. Determination of the VAR model lag order

Source: author’s calculation.

Figure 5 presents the quality criteria of the developed vector autoregression model. The coefficients of determination (R-squared) for the variables INFLATION_LEVEL, EXCHANGE_RATE and BRENT_PRICE are close to 1, which indicates the statistical significance of

the model. The values of Fisher’s test (F-statistic), which exceed those in the table, confirm the adequacy of the developed model. The information criteria of Akaike and Schwartz also show good prognostic properties of the model (Fig. 5) [20].

```

Estimation Proc:
=====
LS 1 3 INFLATION_LEVEL EXCHANGE_RATE BRENT_PRICE

VAR Model:
=====
INFLATION_LEVEL = C(1,1)*INFLATION_LEVEL(-1) + C(1,2)*INFLATION_LEVEL(-2) + C(1,3)*INFLATION_LEVEL(-3)
+ C(1,4)*EXCHANGE_RATE(-1) + C(1,5)*EXCHANGE_RATE(-2) + C(1,6)*EXCHANGE_RATE(-3) +
C(1,7)*BRENT_PRICE(-1) + C(1,8)*BRENT_PRICE(-2) + C(1,9)*BRENT_PRICE(-3) + C(1,10)

EXCHANGE_RATE = C(2,1)*INFLATION_LEVEL(-1) + C(2,2)*INFLATION_LEVEL(-2) + C(2,3)*INFLATION_LEVEL(-3)
+ C(2,4)*EXCHANGE_RATE(-1) + C(2,5)*EXCHANGE_RATE(-2) + C(2,6)*EXCHANGE_RATE(-3) +
C(2,7)*BRENT_PRICE(-1) + C(2,8)*BRENT_PRICE(-2) + C(2,9)*BRENT_PRICE(-3) + C(2,10)

BRENT_PRICE = C(3,1)*INFLATION_LEVEL(-1) + C(3,2)*INFLATION_LEVEL(-2) + C(3,3)*INFLATION_LEVEL(-3) +
C(3,4)*EXCHANGE_RATE(-1) + C(3,5)*EXCHANGE_RATE(-2) + C(3,6)*EXCHANGE_RATE(-3) +
C(3,7)*BRENT_PRICE(-1) + C(3,8)*BRENT_PRICE(-2) + C(3,9)*BRENT_PRICE(-3) + C(3,10)

VAR Model - Substituted Coefficients:
=====
INFLATION_LEVEL = 0.438447584574*INFLATION_LEVEL(-1) - 0.158505760963*INFLATION_LEVEL(-2) -
0.0868431261887*INFLATION_LEVEL(-3) + 0.568543812843*EXCHANGE_RATE(-1) +
0.291841547235*EXCHANGE_RATE(-2) - 0.838807204011*EXCHANGE_RATE(-3) +
0.0207757708347*BRENT_PRICE(-1) - 0.0109919589974*BRENT_PRICE(-2) - 0.00296559796249*BRENT_PRICE(-3)
+ 48.3904777273

EXCHANGE_RATE = - 0.0829800505089*INFLATION_LEVEL(-1) + 0.0776172355092*INFLATION_LEVEL(-2) -
0.0174432659277*INFLATION_LEVEL(-3) + 0.746175834427*EXCHANGE_RATE(-1) +
0.117783630736*EXCHANGE_RATE(-2) + 0.0945740830162*EXCHANGE_RATE(-3) -
0.0508429096177*BRENT_PRICE(-1) + 0.00216883719847*BRENT_PRICE(-2) + 0.0330982928849*BRENT_PRICE(-3)
+ 4.336569392

BRENT_PRICE = 0.245688352967*INFLATION_LEVEL(-1) - 0.0187151534869*INFLATION_LEVEL(-2) -
0.289656752208*INFLATION_LEVEL(-3) - 0.365866693344*EXCHANGE_RATE(-1) +
0.592851352855*EXCHANGE_RATE(-2) - 0.11569501475*EXCHANGE_RATE(-3) + 1.41632909325*BRENT_PRICE(-1) -
0.657665155961*BRENT_PRICE(-2) + 0.245038652133*BRENT_PRICE(-3) + 3.8750237335
    
```

| | | | |
|----------------|-----------|-----------|-----------|
| R-squared | 0.786643 | 0.974134 | 0.930645 |
| Adj. R-squared | 0.769187 | 0.972018 | 0.924970 |
| Sum sq. resids | 89.13179 | 186.0535 | 2540.697 |
| S.E. equation | 0.900161 | 1.300537 | 4.805959 |
| F-statistic | 45.06319 | 460.2973 | 164.0038 |
| Log likelihood | -152.4301 | -196.5852 | -353.4347 |
| Akaike AIC | 2.707168 | 3.443086 | 6.057246 |
| Schwarz SC | 2.939459 | 3.675377 | 6.289537 |
| Mean dependent | 100.9983 | 21.54775 | 59.20242 |
| S.D. dependent | 1.873656 | 7.774639 | 17.54539 |

a) alignment of the VAR model

b) quality criteria

Figure 5. Results of building a vector autoregression model

Source: author’s calculation

Figure 6 presents the accuracy criteria of the forecast obtained on the basis of the VAR model. Thus, the value of the average absolute percentage error of the model (MAPE) for the identified factors is less than 10% which corresponds to high forecasting accuracy. Figure 7

presents the result of constructing an impulse function which shows the response of variables in response to a “shock” – a change in the random component of the time series of the price of one barrel of oil by one standard deviation.

Sample: 2012M01 2022M03
Included observations: 123

| Variable | Inc. obs. | RMSE | MAE | MAPE | Theil |
|------------------|-----------|----------|----------|----------|----------|
| BRENT_PRICE | 123 | 4.601356 | 3.251012 | 5.834693 | 0.037324 |
| EXCHANGE_RATE | 123 | 1.245169 | 0.737817 | 3.972493 | 0.027211 |
| INFLATION_LEV... | 123 | 0.861838 | 0.643935 | 0.635887 | 0.004266 |

Figure 6. Predictive characteristics of the VAR model

Source: author’s calculation

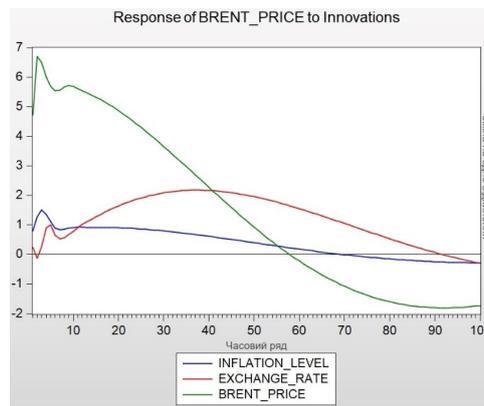


Figure 7. Graphs of impulse functions

Source: author’s calculation

The data of Figure 7 allow us to confirm the hypothesis about the significant impact of the energy “shock” on such indicators of financial security as the inflation rate and the exchange rate. Then, the hypothesis that this influence is differentiated at different threshold values of

the exogenous variable has been put forward. We used the TVAR model to test the hypothesis. Figure 8 shows the parameters of the developed threshold vector autoregression where the price of BRENT oil per barrel is presented as a threshold value.

Sample: 2012M01 2022M03
Included observations: 123
Selection: Trimming 0.15, Sig. level 0.05
Threshold variable: BRENT_PRICE

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|-------------|-----------------------|-------------|--------|
| BRENT_PRICE < 44.799999 – 29 obs | | | | |
| INFLATION_LEVEL | -0.466858 | 0.649188 | -0.719141 | 0.4736 |
| EXCHANGE_RATE | -0.938991 | 0.280474 | -3.347870 | 0.0011 |
| C | 108.5901 | 67.66992 | 1.604703 | 0.1115 |
| 44.799999 <= BRENT_PRICE < 55.109999 – 26 obs | | | | |
| INFLATION_LEVEL | -0.113164 | 0.343972 | -0.328993 | 0.7428 |
| EXCHANGE_RATE | 0.034500 | 0.291007 | 0.118554 | 0.9058 |
| C | 61.43795 | 37.10701 | 1.655697 | 0.1007 |
| 55.109999 <= BRENT_PRICE < 65.769999 – 26 obs | | | | |
| INFLATION_LEVEL | -0.336199 | 0.291511 | -1.153298 | 0.2513 |
| EXCHANGE_RATE | 0.035884 | 0.267074 | 0.134360 | 0.8934 |
| C | 92.57136 | 32.50633 | 2.847794 | 0.0053 |
| 65.769999 <= BRENT_PRICE < 83.369999 – 24 obs | | | | |
| INFLATION_LEVEL | -0.246459 | 0.704735 | -0.349719 | 0.7272 |
| EXCHANGE_RATE | -0.461196 | 0.099506 | -4.634846 | 0.0000 |
| C | 107.9939 | 70.91044 | 1.522963 | 0.1307 |
| 83.369999 <= BRENT_PRICE – 18 obs | | | | |
| INFLATION_LEVEL | 6.501979 | 1.644053 | 3.954847 | 0.0001 |
| EXCHANGE_RATE | -0.580837 | 0.272392 | -2.132355 | 0.0352 |
| C | -558.3694 | 162.4583 | -3.437002 | 0.0008 |
| R-squared | 0.961744 | Mean dependent var | 59.96382 | |
| Adjusted R-squared | 0.956785 | S.D. dependent var | 17.99803 | |
| S.E. of regression | 3.741576 | Akaike info criterion | 5.580740 | |
| Sum squared resid | 1511.934 | Schwarz criterion | 5.933690 | |
| Log likelihood | -328.8305 | Hannan-Quinn criter. | 5.730045 | |
| F-statistic | 193.9373 | Durbin-Watson stat | 1.564185 | |
| Prob(F-statistic) | 0.000000 | | | |

Figure 8. The result of building the TVAR model

Source: author’s calculation

Among the obtained results of the threshold vector autoregression, the greatest practical value belongs to the ones where the inflation and exchange rate parameters are statistically significant. This condition corresponds to the range where $BRENT_PRICE > \$83.37$. That is, if the price of oil is higher than the specified numerical value, then there is a statistically significant change in inflation and the dollar exchange rate. Thus, the TVAR model allows us to determine the threshold value of the cost of energy resources which, when exceeded, can lead to a destabilizing effect on the financial system and become a threat to monetary and currency security.

Drawing parallels with works [28-30], we can talk about the implementation of an atypical approach to assessing the financial security of macroeconomic systems. In works [31; 32], the authors provide a vision of the global economy through the use of macroeconomic modeling that implements generalized calculation algorithms. Sources [33-35], on the other hand, have common key features with this work, but local systems of economic indicators are considered without reference to global macroeconomic shifts. This paper presents a study of a separate “shock” in the energy sector, which is quite difficult to predict using standard approaches of VAR or ECM models.

Therefore, the chosen implementation strategy definitely has made it possible to obtain significant practical results of forecasting macroeconomic parameters.

● CONCLUSIONS

The paper explores the possibilities of using the TVAR model (Threshold Vector Autoregressive Model) to assess the impact of an energy “shock” on indicators of financial security, in particular, on monetary and currency security. The model has been tested on the data of the country representing a cluster of countries with a developing economy. The results of modeling made it possible to identify critical modes of energy security which are becoming a channel of infection that the crisis may spread in the financial sphere and the cause of a significant increase in the level of inflation. The determined threshold values of prices for energy resources can be used as a marker in the development of energy policy which makes it possible to ensure macroeconomic stability. The prospect of further research is the development of ways to use a list of exogenous variables for testing subsystems of financial security for manifestations of various types of “shocks” and the implementation of scenario analysis of macroeconomic systems behavior.

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TVAR-моделі індикаторів фінансової безпеки макроекономічних систем: оцінка впливу енергетичного “шоку”

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Анотація. При порушенні зв'язків в економічних системах виникає розбалансування та існує теоретична ймовірність загрозливого стану для їх розвитку. Звідси постає питання проблематики пошуку ефективного механізму економічної безпеки загалом та фінансової безпеки зокрема є важливими елементами роботи макроекономічних складових. Метою дослідження є розробка моделей, що дозволяють оцінити вплив енергетичного «шоку» на індикатори фінансової безпеки, виявити порогові значення значення екзогенних змінних, при яких «шок» має деструктивний характер на рівень фінансової безпеки та може призвести до дестабілізації фінансової системи. У роботі використано розгалужену структуру наукових методів, які полягають у теоретичному та емпіричному дослідженні фінансової безпеки макроекономічних систем. Основні результати роботи присвячені розгляду проблеми проектування ефективних механізмів забезпечення фінансової безпеки за умов дії екзогенних «шоків» глобальної економіки. Розглянуто поняття «шоку», наведено приклади впливу «шоків» на макроекономічні індикатори. У роботі виділено енергетичний «шок» як домінуючий для аналізу та формування ефективної політики макроекономічної стабільності. Обґрунтовано інформаційний простір ознак дослідження, що включає дані ціни на нафту марки BRENT та такі індикатори грошово-кредитної та валютної безпеки, як темп інфляції та валютний курс. Акцент на підсистемах грошово-кредитної та валютної безпеки зроблено через значущість даних каналів інфікування кризою задля забезпечення фінансової безпеки. Обґрунтовано величину лага в моделі за допомогою інформаційних критеріїв; проведено оцінювання та тестування якості моделі; здійснено оцінку стабільності системи на основі функції імпульсних відгуків, розроблено TVAR-модель. Проаналізовано галузі зміни екзогенної змінної, що відображають статистично значущий вплив енергетичного «шоку» на темп інфляції. Таким чином, отримані результати дозволили виділити режими енергетичної безпеки, які стають каналом інфікування фінансової сфери та суттєвого зростання рівня інфляції. Практична значущість включає універсальність та можливість застосування підходу оцінки для досліджень через можливість використовувати увесь алгоритм як повноцінний ансамбль моделей. Результати даного матеріалу можуть використані при формуванні державних політик фінансової безпеки та реакції на дестабілізуючі зовнішні впливи

Ключові слова: безпека макрорегіонів, ризики та загрози, індикатори безпеки, ціна нафти, порогові режими

Development of Marketing of Educational Services Based on Application of Netiquette Principles in Distance Learning

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Abstract. In modern conditions, Ukrainian institutions of higher education found themselves in a situation of military aggression, which is the reason for the transfer of students' education to the online space. Such changes impose new requirements on marketing of educational services aimed both at attracting new consumers and at keeping and preserving those who are already studying. Transformations of approaches in marketing of education are a consequence of its development. The development of marketing of educational services during distance online learning is impossible without the introduction of modern digital technologies and involves taking into account the rules of netiquette. The application of the principles of netiquette in distance learning will contribute to the resolution of contradictions in marketing of educational services and its development. This determines the relevance of the chosen research topicality. The purpose of the study is to determine the principles of netiquette as a basis for the development of marketing of educational services in the process of distance learning. The work uses such research methods as the method of logical generalization, the method of analysis and synthesis, the method of content analysis, and the method of focus group interview. The result of the conducted research is the development of general principles of netiquette in the organization of distance learning, taking into account the specifics of educational services. The concept of relationship marketing, provisions on distance learning and classic general principles of netiquette were used as a theoretical basis for the substantiation of these principles. The practical basis for the conclusions was the analysis of cases of US universities regarding netiquette policies, as well as the results of a focus group interview with students of institutions of higher education regarding the norms and rules of behavior in the Internet space during the interaction of teachers and students in the process of distance learning. The practical significance of the application of the rules of netiquette is that it ensures digital freedom of communication, attracts a larger segment of consumers of the educational service and will contribute to the formation of a new type of academic community

Keywords: signs of development, contradictions, netiquette as a norm of behavior, education marketing, digital space, focus group

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● INTRODUCTION

The events of the last two years related to the COVID-19 pandemic contributed to the global transition of most spheres of life in Ukraine and in the world to the digital space. Mass transition of education to distance education, practice of remote work (some companies left the possibility of partial or full remote work even after the normalization of the epidemiological situation), expansion of the range of services and increasing popularity of e-commerce (the sphere of the digital economy, which includes all financial and trade transactions that carried out using the Internet, and business processes

related to these transactions). The new conditions in which the higher education industry found itself require new approaches in the organization of the development of marketing of educational services with an emphasis on the use of modern digital technologies.

The purpose of this article is to define the principles of netiquette as a basis for the development of marketing of educational services in the process of distance learning. To achieve the specified goal, the following tasks are set in the work: 1) to consider the signs of development and

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contradictions in marketing of educational services; 2) justify the role of digital technologies and netiquette in the development of marketing of educational services; 3) to form a theoretical basis for the development of marketing of educational services, taking into account the concept of relationship marketing, distance learning provisions and general principles of netiquette; 4) conduct a study of the points of view of students of institutions of higher education (IHEs) of economic specialties regarding distance online learning and the rules of conduct of its participants; 5) to consider the practical principles of the development of marketing of educational services based on the principles of netiquette, taking into account the analysis of the netiquette policies of US universities and the results of the student survey; 6) develop the principles of netiquette for the field of educational services, taking into account the specifics of the latter, and substantiate their importance for the development of marketing of educational services.

The prevalence of digital practices is evidenced by the objective indicator – the level of Internet penetration: according to the international monitoring study Datareportal Ukraine, in January 2020 there were 27.46 million Internet users, while the level of Internet penetration in Ukraine was 63%. In January 2021, Ukraine had 29.47 million of Internet users, while the level of Internet penetration in Ukraine has increased to 67.6% [1]. In 2022, the number of Internet users in Ukraine is 31.1 million, the level of Internet penetration in Ukraine has increased to 71.8% [1].

Digitization processes are actively supported at the level of state policy. That is, a constant increase is observed in both absolute and relative indicators, which is reflected in the creation of the Ministry of Digital Transformation, the development of the Diya portal with the aim of transferring 100% of public services online. Thus, according to the Strategy of Ukraine-2030, developed by the National Institute of Strategic Studies, strategic goal No. 1 is structural modernization. “Structural modernization for the purpose of forming a competitive economy, which is based on innovations and modern production potential. It provides high environmental and resource-efficient standards, is adaptable to the needs of the domestic market and global competitive challenges” [2].

Within the framework of this goal, one of the strategic directions is digital transformation. It is implemented through: 1) promoting the accelerated integration of digital technologies into production processes; 2) promoting the implementation of “smart” community development networks in key infrastructure areas; 3) implementation of sectoral projects for the development of digital infrastructures (energy, transport, water supply and drainage, health care, education, etc.) and ensuring their compatibility on the basis of standardization; 4) development of information communications infrastructure (expansion of broadband access, mobile Internet coverage, spread of 5G networks, implementation of “cloud” technologies, creation of data centers, etc.); 5) implementation of financial tools to motivate the digital transformation of businesses and communities; 6) promoting the development of digital competences of citizens in the professional sphere and everyday life.

The rapid digitalization of all spheres of life actualizes the issue of studying the rules of behavior in the digital space, which involves the development of universal

rules of such behavior – netiquette. The concept of interaction marketing is used in this article. The marketing of the relationship between the participants of the interaction, namely the teacher and the student, is considered. For successful relationships and communication in social networks, new rules are needed, for example, netiquette. Netiquette is network etiquette (formal rules of behavior, communication on the Internet) and specific rules for each field (education, health care, production, business, etc.). In the marketing of educational services, netiquette is also in demand, because almost 100% of teachers of institutions of higher education communicate with students in social networks, offering distance learning.

At the same time, if it is considered the implementation of the principles of netiquette for the development of marketing of educational services, it is important to apply these principles on reasonable grounds to resolve contradictions that arise when interacting with consumers.

Therefore, there is a need to know and understand the opinions of consumers of educational services regarding the norms of behavior in social networks during distance learning. Consumers decide what is the norm of communication that satisfies them, with which they agree. Thus, it is possible to attract, retain and expand segments of consumers of educational services.

The novelty of the research is in the further development of the consideration of the principles of netiquette based on the content analysis of netiquette policies of US universities and the focus group survey of Ukrainian netiquette practices, which made it possible to develop the principles of netiquette for the field of educational services, taking into account the national specificity and the needs of recipients of educational services.

● LITERATURE REVIEW

Marketing of education is a fairly popular field of scientific research that has been studied by many scientists. Today, the following important trends influence the choice of marketing approaches: globalization of education, erasure of national borders in the educational process, mass transition to online learning technologies and digitalization of education. These trends also determine the need to develop, apply and implement new approaches to the development of marketing of educational services. Many works of modern economists are devoted to the study of the problems of development in general, and the development of marketing in particular. In the work [3], the authors systematized approaches to defining the concept of development and proposed to combine them into three groups: understanding development as a definition, as a property, and as a comparative characteristic of an object.

M. Umar, H. Nawawi, N. Latifah, S.A. Eko analyze in detail the process of marketing of educational services, clarify the importance of marketing in the world of education. Competition in the world of education is very intense, as the above-mentioned scientists claim, so special strategies are needed in the marketing of education [4]. Particular attention should be paid to works that clarify the problems of digital and Internet marketing development. Today, it is digital technologies that form the basis of the development of marketing of educational services. The results of the study of the role of marketing tools in the process of

building the image of institutions of higher education were proposed in the paper [5]. The authors offer their conclusions based on a primary survey of respondents who are consumers of educational services. The study showed that there is an important correlation between the perception of the image of the faculty and the evaluation of certain elements of the website of the faculty. A number of scientists [6] consider a set of data on the quality of interactive services in higher education marketing and claim that quality means exceeding consumer expectations. From the point of view of scientists, the quality of education is the suitability of educational results and experience for use.

The paper [7] describes how digital technologies for creating communication and providing educational services that are valuable to consumers have greatly increased the competitiveness of institutions of higher education in recent years. Innovative digital technologies have ensured various types of influence on consumer behavior pattern. Digitalization of educational marketing will create prerequisites for improving education and forming the motivation of modern consumers of educational services. One of the tools for improving the marketing of educational services within the framework of the concept of marketing of interaction and building marketing relationships between teachers and students is the application of principles of behavior in social networks – netiquette.

Researchers [8] consider netiquette as a component of digital competence, which means a theoretical approach to the new reality, especially in the educational field (it is noted that digital competence is mandatory for teachers of the future), a concept that confirms the impact of digital technologies on personal development. Digital competence can also be considered as an element of augmented reality. According to these authors, this means that educational institutions should revise their approach to new needs and requirements.

In general, scientific works on netiquette can be united into several groups. The first group of works focuses on arguing the necessity of netiquette and demonstrates the advantages of having this competence. Thus, L. Scheuermann and G. Taylor [9] emphasize that knowledge of netiquette forms a competitive advantage over those who do not know it. The second group of works presents proposals for the rules of behavior on the Internet, based both on the data of empirical research and theoretical approaches. The work [10] focuses on netiquette as a new way of defining professionalism through network communication and notes the need to include netiquette in the syllabi of disciplines by teachers in order to define expectations and the consequences of its violations for each discipline.

The third group of works raises the issue of such risks of Internet communication as security, protection of personal information and considers how netiquette can work with these risks using the example of email. The purpose of the study [11] was to analyze the prevalence of the perception of Internet and smartphone use problems among young people for the period 2006-2017. The fourth group of works [12] is devoted to separate empirical segments of netiquette, for example, the study of communications between students and teachers in the Facebook social network, based on a survey of students and teachers. Despite a large number of studies on the issue of netiquette and

attempts to develop policies for the construction of Internet communications since the 1990s, the topic related to the rules of behavior in the process of distance learning remains little studied, which determines the topicality of the problem.

The novelty of this research is in the development of the principles of netiquette in the process of distance learning, the implementation of which will contribute to the growth of marketing of educational services.

● MATERIALS AND METHODS

To achieve the purpose set in the work, a number of research stages were implemented, each of which was based on the use of certain methods, which are listed below by stages.

At the first stage, the existing contradictions in marketing of educational services were analyzed and the main signs of the development of marketing of educational services were systematized. For this, the method of logical generalization was used.

At the second stage, the expediency of using digital technologies, including social networks, for the development of marketing in the field of education is substantiated, and the place and role of netiquette among such technologies is determined. For this purpose, methods of analysis and synthesis were applied.

At the third stage, the theoretical and practical basis for the development of the principles of netiquette in distance learning for the development of marketing of educational services is substantiated. The theoretical basis was made up of: the concept of relationship marketing, provisions and requirements for the organization of distance learning in institutions of higher education, classic general principles of netiquette. The practical basis was formed on the basis of the analysis of cases of US universities (the University of Nevada, the University of Potomac, Lincoln University, the University of Texas and El Paso) regarding policy of netiquette using the method of content analysis, as well as the survey of students of institutions of higher education by the method of focus group interview. Ukrainian researchers N. Kostenko and V. Ivanov consider the method of content analysis as a technique of systematic description and analysis of the content of communication [13]. In this article, this method is used to describe netiquette in communication in the field of educational services at US universities. A focus group interview was conducted in accordance with the recommendations on the technology of conducting research using this method [14]. A pilot survey was conducted in May 2022 in order to study Ukrainian netiquette practices and ask students about online behavior during their studies: one online focus group in chat format. The object of the study was the process of distance learning of students of Simon Kuznets Kharkiv National University of Economics. Focus group participants were offered a guide (a list of open questions), to which they had the opportunity to provide answers within two days. All participants saw each other's answers and had the opportunity to interact with other participants, commenting on their answers for three days, which ensured interactivity, group dynamics, while maintaining comfort for the participants.

Advantages of online focus groups include: convenience for respondents, facilitating control of group dynamics. Online interaction allows you to receive sincere

and relaxed answers and reactions. In addition, it is logical to investigate the online phenomenon of netiquette using online methods. The method of an online focus group in the format of a chat regarding the norms of communication during distance learning and the rules of communication behavior on the Internet helped to reveal the perception of Ukrainian students of netiquette, which already exists at universities around the world, and at the same time to study the needs of students regarding online interaction and the practice of such interaction. Students of economics were selected as participants of the group. Features of a focus group interview: the recommended number of participants (8-12 people) are gathered in one place, in this case in a chat room; 12 students, 20-21 years old, 8 women, 4 men were interviewed, the interaction of the participants is approved, unlike other research methods; the guide offered by the moderator is aimed at focusing the participants on the problem and revealing different opinions regarding the solution of the problem. A set of different points of view helps to clarify the possible patterns of behavior of people on the problem under discussion. During the focus group, on the one hand, comfort is observed, because everyone understands that he is a part of the group and his opinions are important. On the other hand, group dynamics demonstrates what are common opinions. They, as a rule, attract the attention of the moderator.

At the fourth stage, the principles of netiquette were developed. The basis for their development was the above-mentioned theories and the results of the student survey, and the methodological basis was the method of logical generalization.

At the fifth stage, it has been proven that the implementation of the developed principles of netiquette in the educational process will contribute to the development of marketing of educational services, since in this case the contradictions related to the attraction of external consumers and the retention and increase of loyalty of existing ones can be resolved.

● RESULTS AND DISCUSSION

Obtaining *the results of the first stage* – conducting an analysis of existing contradictions in the marketing of educational services and substantiating the signs of its development. It is important to pay attention to existing research on these issues. According to the studies of L.G. Melnyk [15; 16], and I.V. Prangishvili [17], the following signs of systems development can be distinguished: irreversibility, orientation, regularity, variability, heredity, selection, the presence of qualitative changes and resolution of contradictions. The development of marketing of educational services will be characterized by the manifestation of the above-mentioned signs in this field. The most significant signs are the presence of qualitative changes and the resolution of contradictions. Let's consider how these signs will manifest themselves in marketing of educational services. Qualitative changes in marketing of educational services can be manifested in the transition from certain types of marketing activities to integrated marketing communications, to the expansion of the range of channels of interaction with potential and existing consumers, to a better correspondence of the channels chosen by the educational institution to the characteristics and preferences of consumers of educational services. Regarding the resolution of contradictions, it is appropriate to consider first the examples of contradictions that currently exist in the field of educational marketing.

One of the contradictions is that, on the one hand, the vast majority of educational institutions in Ukraine, including institutions of higher education, continue to use more traditional means of promoting their services and communication channels. On the other hand, their potential clients (applicants) due to their age and preferences massively use innovative modern means and channels for obtaining information. This is proven by the statistics of 2022, which are shown in Figure 1.

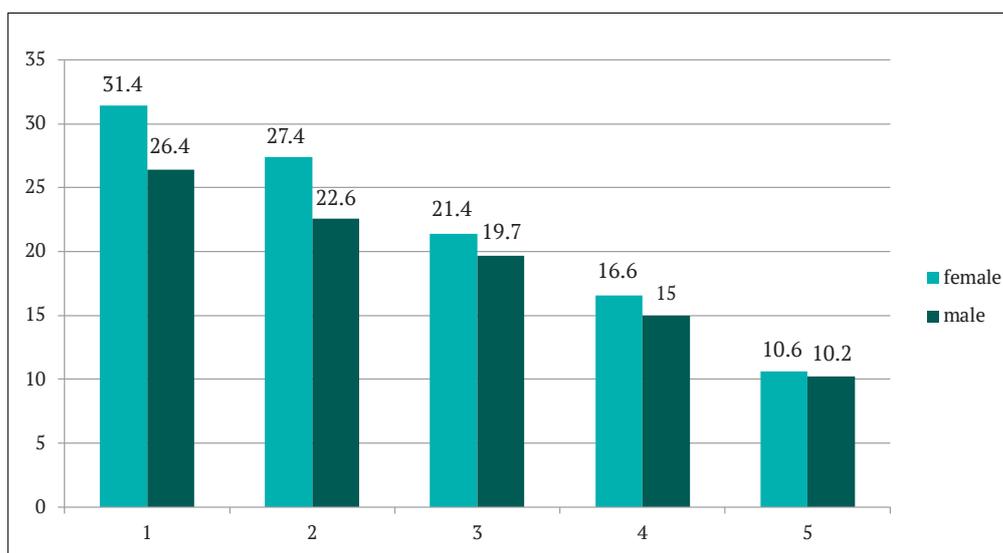


Figure 1. Percentage of Internet users who follow influencers in social networks

(1 – Internet users aged 16-24 years; 2 – Internet users aged 25-34 years; 3 – Internet users aged 35-44 years; 4 – Internet users aged 45-54 years; 5 – Internet users aged 55-64)

Source: [18]

As it can be seen in Figure 1, the largest number of users of social networks who are under the influence of influencers are users aged 16-24. It is this age category that is potential entrants to institutions of higher education, both bachelor's and master's programs. Thus, it is logical to promote higher educational services through influencers in social networks, which, unfortunately, is not often done by educational institutions. At the same time, it is necessary to remember that communication in social networks has its own characteristics and rules. These rules are governed by the netiquette policy. The development and improvement of the principles of netiquette when interacting with applicants and students of institutions of higher education will contribute to the elimination of the existing contradiction regarding the choice of channels for the promotion of educational services.

Another contradiction that exists in the field of marketing of educational services is that the main marketing efforts of institutions of higher education are aimed at attracting new applicants. At that time, those students who are already studying in educational institutions, as a rule, are not considered as those at whom marketing activities are directed. As a result, the percentage of those who go to study for a master's degree to continue their education is much lower than at a bachelor's degree program. Of course, there are other reasons why not all students decide to study for a master's degree. However, when applying marketing measures aimed at students of 2-4 years, this percentage can

be increased. The mass transition of Ukrainian institutions of higher education to distance learning as a result of first the pandemic, and then military actions, actualized those channels of transmission of educational material and communication with students, which previously played a secondary role.

Special attention is paid to the digital technologies of distance learning and the existing contradictions in this field in the documents of the European Union [19]. Thus, in the appeal of the European Commission to the European Parliament, emphasis is placed on the need to develop the Digital Education Action Plan. This appeal states the following: "Personalized teaching can result in increased motivation by focusing on individual learners. However, progress on integrating technology in education remains limited. More than 80% of young people in Europe use the internet for social activities. Mobile access to the internet has significantly increased over the last few years. But use of technology for educational purposes lags behind" [19]. Such a situation leads to another contradiction in marketing of educational services: on the one hand, the importance of forming a loyal attitude of students to education and higher education through a personalized approach to education, on the other hand, the insufficient level of use in institutions of higher education of the entire range of modern Internet technologies that can ensure such an approach.

Figure 2 shows the main contradictions in marketing of educational services, including those related to the formation of student loyalty in the distance learning process.

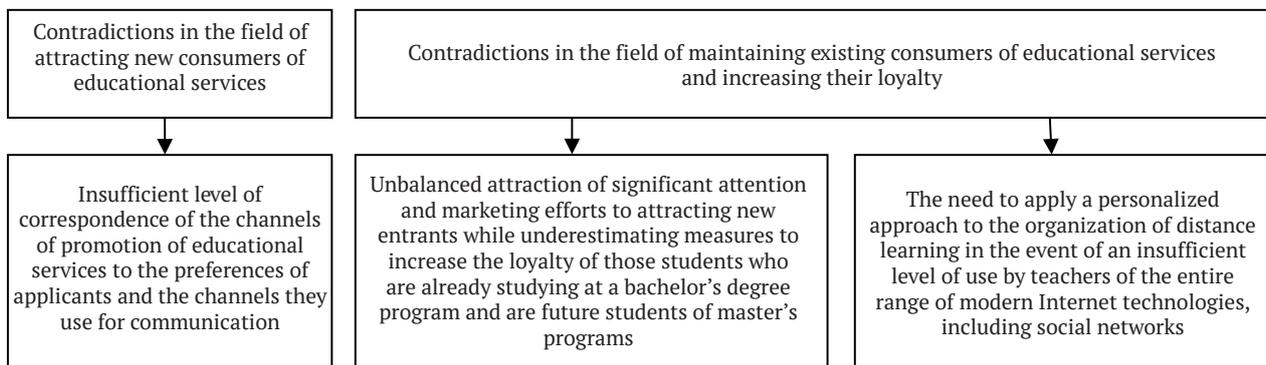


Figure 2. Contradictions of marketing of educational services in the field of consumer attraction and retention

The results of the second stage. One of the ways to resolve the above contradictions based on establishing long-term and trusting relationships with students and increasing their level of loyalty to institutions of higher education is the use of digital marketing in the organization of distance learning in compliance with the principles of netiquette.

The theoretical basis of this approach consists of:

- the concept of relationship marketing, which involves building a system of long-term interaction with consumers of educational services and forming their loyalty;
- the main provisions of the organization of the distance learning process at institutions of higher education;
- principles of netiquette.

The practical basis of the proposed approach consists of:

- the analysis of cases and practices of US universities regarding the implementation of netiquette principles in

the educational process carried out in the work;

- study of the opinions of respondents (students of institutions of higher education) regarding the organization of distance learning and compliance with the rules of conduct in online communication (that is, the rules of netiquette) using the focus group method.

Let's consider the theoretical basis of the development of marketing of educational services. The main provisions of the concept of relationship marketing are [20]:

- 1) emphasis on retention of consumers, not on their attraction, on long-term interaction, not on short-term transactions;
- 2) targeting certain target segments of existing consumers in order to increase the degree of their involvement and sale of additional goods and services;
- 3) greater emphasis on quality than in the traditional concept of marketing;
- 4) paying special attention to internal marketing;

5) traditional marketing complex (4R) is insufficient for building long-term relationships with consumers, therefore relationship marketing operates with an extended marketing complex;

6) quantitative assessment of the effectiveness of mutual relations.

Results of the third stage. The organization of distance learning in Ukraine is regulated by the Regulation on Distance Learning [21] and other normative documents of the Ministry of Education and Science. In the European educational space, the Digital Education Action Plan for 2021-2027 has been approved, which is aimed at eliminating problems related to the organization of the educational process in two priority areas: fostering the development of a high-performing digital education ecosystem and enhancing digital skills and competencies for the digital transformation. This document proclaims the guiding principles of making education and training systems fit for the digital age [21, p.8-10]:

1. High-quality and inclusive digital education that respects the protection of personal data and ethics should be a strategic goal of all bodies and agencies involved in education and training.

2. The transformation of education for the digital age is the task of the entire society.

3. Appropriate investments in connectivity, equipment and organizational capacity and skills should ensure that everyone has access to digital education.

4. Digital education should play a key role in increasing equality and inclusiveness.

5. Digital competence should be a core skill for all teachers and teaching staff and should be included in all areas of teacher professional development, including initial teacher education.

6. Educational leaders play a key role in digital education.

7. Digital literacy is essential for living in a digital world.

8. Basic digital skills should become part of the basic transferable skills that everyone should have in order to be able to develop personally; participate in society as an active citizen; use state services; and enjoy fundamental rights.

9. Sustaining competitiveness requires people with state-of-the-art advanced digital skills to support the dual digital and green transition of society, public services and all parts of the economy.

10. There is a need for high-quality educational content to increase the relevance, quality and inclusiveness of European education and training at all levels.

The adaptation of this theoretical background to the researched problem is that when providing educational services and organizing distance learning, it is advisable to use digital marketing, including marketing in social networks, taking into account the principles of netiquette. Yes, according to G. Sedalo, H. Boateng, J.P. Kosiba, social media enables enterprises “to create and sustain relationships... can engage their customers, instill trust in them, and build cooperative relationships... to engage customers regularly” [22, p. 5]. Establishing long-term relationships aimed at retaining consumers of educational services and forming a positive image of institutions of higher education largely depends on observing the principles of netiquette in the process of online interaction with students (consumers of educational services).

The generally accepted principles of netiquette, which are presented in the classic work of David Rooney [23], include:

1. Remember about the person.

2. Adhere to the same standards of conduct online as you do in real life.

3. Know where you are in cyberspace.

4. Respect other people’s time and capacity.

5. Look good online.

6. Share your expertise.

7. Help keep emotional outbursts under control.

These classic principles of netiquette remain relevant today. However, it is necessary to investigate how they are implemented in the activities of institutions of higher education using the example of US universities. Next, we will reveal the practical basis of the study, starting with the case analysis of US universities, which is given below.

Empirical research [24] is aimed at studying the implementation of university netiquette policy. The results of the study showed that students have a common opinion about the general rules of using the network, but they indicated a limited awareness about specific rules and aspects of netiquette. In addition, the study recorded varying degrees of implementation of netiquette policies at universities.

One of the tasks of the work is to review the netiquette policies of universities. Netiquettes of four US universities were selected for analysis, so that they did not repeat, but instead complemented each other.

Thus, on the website of the University of Nevada (USA) [25] in the section “Policies of online learning” it is noted that netiquette or network etiquette refers to guidelines and recommended practice for online communication and should be used in all areas of online communication: e-mail, chat, blogs, discussion forums, messages, etc.

Principles of netiquette include: 1) respect (remember that you are dealing with real people and be polite and respectful even if you disagree. Remember the golden rule: treat others as you would like to be treated; 2) checking (think before you post. Be aware of who might be viewing your post and how it might be interpreted. Try to maintain a fair and objective tone); 3) concentration on the topic (make sure that your communication is related to the subject and does not deviate from the topic); 4) clarity of expression (although the online environment may seem more informal than your face-to-face course, it is still an academic course and clear, mature communication is expected. Correct spelling and grammar are required, and proper sentence structure and punctuation); 5) use of appropriate language and style (obscene language or offensive wording is not allowed); 6) attention to others (do not make humiliating, condescending or insulting remarks. Communication should be friendly and clearly formulated and aimed at creating a positive learning environment. Sarcasm is inappropriate); 7) readiness for misunderstandings (keep in mind that written communication can often convey the wrong tone or intentions in the absence of non-verbal communication); 8) citation rules (if you publish a work that does not belong to you, be sure to cite the original sources).

The University of Potomac (USA) [26] suggests the following netiquette rules for students: 1) be careful with tonality; 2) be accurate and factual; 3) first search, then ask; 4) do not use sarcasm; 5) be as polite as in face-to-face

communication; 6) use proper grammar and punctuation; 7) stay on topic; 8) remember that nothing is private on the Internet; 9) express yourself clearly and concisely; 10) respect people’s privacy; 11) use the proper regalia of your professors/teachers; 12) respect the opinion of others; 13) do not abuse the chat box; 14) be careful in completing tasks.

Lincoln University (USA) [27] emphasizes that netiquette can be summarized by three simple rules: 1) remember that there is a person on the other end of your communication; 2) treat this person with respect; 3) do not transmit any message that you would not want to communicate face-to-face. Further, the university provides the following guidelines for students, which are similar to those provided by the Association of Collegiate Marketing Educators, noted above.

The University of Texas and El Paso (USA) [28] suggests 10 rules of netiquette: 1) make sure identification is clear in all messages. Start with a greeting and end with a signature; 2) review what you wrote and try to interpret it objectively; 3) if you wouldn’t say it face to face, don’t say it online; 4) don’t assume that everyone understands where you come from. Your online class is made up of people of all ages and cultures who come from different backgrounds, lifestyles and geographic locations. With that in mind, review what you’ve written and ask yourself, “Will everyone get the joke?”; 5) do not distribute spam; 6) use emoticons. Emoticons can help convey feelings that might otherwise be lost in translation, including humor, irritation, exhaustion and even confusion; 7) respect the privacy of others; 8) remember, something is on the Internet, it is everywhere; 9) follow the rules; 10) forgive and forget. If you are offended by something another student says online, remember that you may have misunderstood them.

The participants of the focus group were offered a guide with questions about the principles of behavior in social networks during distance learning in institutions of higher education. Taking into account the needs and comments of students in the conditions of the dominance of paid educational services was noted as a mandatory condition by 67% of the participants of the focus group, 100%

of the participants agreed with the need for equal access to communication in social networks of representatives of all socio-demographic groups, regardless of their location, which, as a result, destroys borders and opens up prospects for distance learning, 83% of the focus group participants agreed that distance learning provides an opportunity to level the manifestation of gender discrimination if the principles are followed netiquette. The statement that the use of the polite words “please”, “thank you”, addressing on formal terms should be the norm in communication during distance learning. This is a manifestation of respect and tolerance for the opinions of others. It was supported by 92% of the focus group participants.

Respect for the time of others and meeting the deadlines of the interlocutors was noted as a necessity by 92%. They agreed that the rules of conduct during distance learning should be followed by both sides of the communication, because this would ensure a comfortable interaction 100%. Openness and honesty during distance learning can be achieved by offering an online discussion (in the form of comments), according to 67% of the focus group participants. 58% expressed the opinion that social responsibility is the fulfillment of tasks solely by one’s own efforts on the basis of one’s knowledge. As for the norms of communication, 67% answered that these are useful communications in messengers and through the mailbox, reasonable answers to questions (for both parties). Desirable is the ability to hear each other, reasoning about assessments, respect for personal boundaries, lack of excessive indifference or, on the contrary, interest, absence of voice messages, unless it has been previously agreed.

The results of the fourth stage. Figure 3 shows the logic of substantiating the principles of netiquette when organizing distance learning, taking into account the specifics of the educational field.

The analysis and generalization of the given above theoretical and practical background makes it possible to formulate the basic principles of netiquette in the educational sphere in Ukraine in the conditions of distance learning (Table 1).

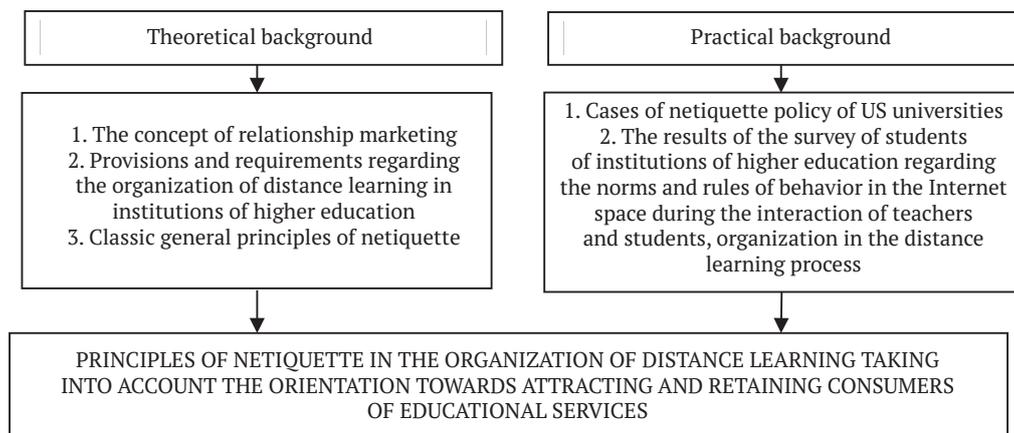


Figure 3. The logic of substantiating the principles of netiquette in the field of educational services

Table 1. Principles of netiquette in marketing of educational services

| Number of principle | Description of principle |
|---------------------|---|
| 1 | The use of separate channels for formal communication in order to deliver educational material, for informal communication in order to help students solve their problems and to provide marketing information. At the same time, these channels should provide the possibility of mutual transition and contain mutual links |
| 2 | Maximum transparency of communication, which involves mandatory identification of communication participants, both teachers and students. Especially in the case of enquiries and transmission of official information |
| 3 | Paying special attention to the design of profiles in social networks, messengers, etc., which are used by teachers for online communication (availability of a photo in a business style, real first and last name, etc.) |
| 4 | Maximum use of the capabilities of messengers and social networks to create groups and channels where all participants, students have the opportunity to comment or ask questions on various educational topics |
| 5 | Observance of equal rights of all students regarding access to educational content, description of assessment procedures, fairness and impartiality |
| 6 | The provision of the possibility to limit access to the communication channels of haters and aggressively minded persons who are not related to the educational process, are not students or employees of institution of higher education and are determined to obstruct education |
| 7 | Unwanted use of ambiguous jokes, innuendos or highly emotional statements that are perceived differently in different cultures and ages |
| 8 | Regular conducting online surveys for constant feedback in order to be able to monitor the degree of students' understanding of the material, their personal needs, problem areas in the presentation of the material, etc. |
| 9 | Stimulating students to self-expression, creativity to reveal their individual needs, presentation at the request of their own channels and social networks, provided their content is acceptable |
| 10 | Demonstration of a respectful, equal, neutral attitude towards applicants, students, regardless of personal preferences |
| 11 | It is mandatory to convey all the above rules of netiquette to the participants of the educational process before its start, explaining the need for mutual respect, as well as the measures applied to violators of the rules of communication in the network |
| 12 | Selection of the optimal number of communication channels for students who are already studying at institution of higher education: selection of one main and 2-3 additional channels for organizing the educational process. Informing all participants about the possibilities of receiving information through these channels. When organizing the educational process, a very large number of communication channels should not be used, since it is difficult to systematize all the information received through different channels |
| 13 | Selection of the optimal number of communication channels for entrants: selection of as many channels as possible for disseminating information about institution of higher education and admission conditions, which increases the level of coverage of potential consumers and forms a system of integrated marketing communications to attract consumers |

Results of the fifth stage. Table 2 presents a generalized vision of how adherence to these principles in distance learning will help resolve contradictions in marketing of educational services and contribute to its development.

Table 2. Resolving contradictions in marketing of educational services based on the implementation of the principles of netiquette in distance learning

| Numbers of principles | What contradictions in marketing of educational services are resolved when implementing these principles | How contradictions in the marketing of educational services are resolved when implementing these principles |
|-----------------------|--|--|
| 1,2,3,4,7,10,13 | Insufficient level of correspondence of the channels of promotion of educational services to the preferences of the applicants and the channels they use for communication | The conformity of communication channels with the requests and preferences of the target audience of institutions of higher education will be observed, the requirements for correct communication will be observed, and a system of integrated marketing communications will be formed to attract customers – consumers of educational services |
| 1,4,5,6,8,11,12 | Unbalanced attraction of significant attention and marketing efforts to attracting new entrants while underestimating measures to increase the loyalty of those students who are already studying at the bachelor's level and are future students of master's programs | Loyal treatment will be provided to those who were bachelors in this institution of higher education. The percentage of bachelors who wish to stay in the master's program at the same institution of higher education, and not transfer to another, will be increased |
| 1,2,3,4,5,8,9,11 | The need to apply a personalized approach to the organization of distance learning in the event of an insufficient level of use by teachers of the entire range of modern Internet technologies, including social networks | Teachers will be able to ensure the quality of education, interest in the methods of teaching subjects, and form respect for themselves as professionals. Gradually switch to the use of modern Internet technologies |

As mentioned above, one of the key features of the development of marketing of educational services is the resolution of contradictions. Table 2 shows how and exactly which contradictions will be resolved when applying the developed netiquette principles in the activity of institution of higher education.

● CONCLUSIONS

The article examines the signs of development and contradictions in the marketing of educational services and substantiates the role of digital technologies and netiquette in the development of marketing of educational services, as well as formulates a theoretical basis for the development of marketing of educational services taking into account the concept of relationship marketing, the provisions of distance learning and general principles of netiquette. A focus group interview of the students of economic specialties was conducted in order to study their points of view regarding the rules of conduct in the distance learning process.

The principles of netiquette in the process of distance learning have been developed, which will contribute to the resolution of contradictions in marketing of educational

services and the formation of integrated marketing communications. This will ensure qualitative changes in marketing of education. Since the main signs of development are the resolution of contradictions and the presence of qualitative changes, it can be argued that the application of these principles will determine the development of marketing of educational services.

Prospects for further research are due to the need to develop the process of learning and teaching at universities in the digital space. Such an opportunity provides digital freedom of communication at the level of academic practices. Students will not only learn, but also adapt to the rules of netiquette used at universities around the world. In this way, they will improve their professional knowledge, digital competence and their norms of communication in the digital space. Communication with observance of netiquette within marketing of educational services will attract a larger segment of consumers of the educational service. Teachers will get more opportunities to undergo advanced training at the best universities of the world, conduct trainings and master classes for foreign students, which will contribute to the formation of a new type of scientific and academic community.

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Розвиток маркетингу освітніх послуг на основі застосування принципів нетикету у дистанційному навчанні

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Анотація. У сучасних умовах українські заклади вищої освіти опинилися у ситуації військової агресії, що є причиною переводу навчання студентів у онлайн простір. Такі зміни висувають нові вимоги до маркетингу освітніх послуг, спрямованого як на залучення нових споживачів, так і на утримання та збереження тих, що вже навчаються. Трансформації підходів у маркетингу освіти є наслідком його розвитку. Розвиток маркетингу освітніх послуг при дистанційному онлайн навчанні неможливий без впровадження сучасних диджитал-технологій і передбачає врахування правил нетикету. Застосування принципів нетикету у дистанційному навчанні сприятиме вирішенню протиріч у маркетингу освітніх послуг та його розвитку. Цим обумовлена актуальність обраної теми дослідження. Метою дослідження є визначення принципів нетикету як основи для розвитку маркетингу освітніх послуг у процесі дистанційного навчання. У роботі використано такі методи дослідження, як метод логічного узагальнення, метод аналізу та синтезу, метод контент-аналізу, метод фокус-групового інтерв'ю. Результатом проведеного дослідження є розроблення загальних принципів нетикету при організації дистанційного навчання з урахуванням специфіки освітніх послуг. Для обґрунтування зазначених принципів у якості теоретичного підґрунтя використано концепцію маркетингу взаємовідносин, положення про дистанційне навчання та класичні загальні принципи нетикету. Практичну основу для висновків склав проведений аналіз кейсів університетів США щодо політик нетикету, а також результати фокус-групового інтерв'ю зі студентами закладів вищої освіти щодо норм та правил поведінки в інтернет просторі при взаємодії викладачів і студентів в процесі дистанційного навчання. Практичне значення застосування правил нетикету полягає у тому, що забезпечує цифрову свободу спілкування, залучає більший сегмент споживачів освітньої послуги та буде сприяти формуванню академічної спільноти нового типу

Ключові слова: ознаки розвитку, протиріччя, нетикет як норма поведінки, маркетинг освіти, цифровий простір, фокус група

Transformation of Ukrainian Youth Values in Times of Crisis

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Abstract. The value system of a certain society is characterized by stability, transmitted from generation to generation and determines the direction of the socio-economic, political development of the country. In a fragile, non-linear and incomprehensible globalized world, a shift in society's values can be triggered by global upheavals that threaten the survival of humans as a biological species. In the 21st century, society feels the danger of war, the threat of the spread of dangerous viruses, and the digitalization of all human life. The purpose of the conducted research is to identify the main values of Ukrainian youth and their transformation in the conditions of economic crises and war danger. Sociological research was conducted to verify hypotheses as to accelerating the transformation of Ukrainian youth values. The first wave of research on the value orientations of Kharkiv student youth was conducted in March 2014, similar research was conducted during November 2020 – January 2021, as well as in April-May 2022. The results showed that absolute and family values traditionally have a high level of priority for Ukrainian youth, regardless of living conditions and external factors. However, changes have taken place within value groups. With the aggravation of the military danger, the values of freedom, honesty, and preservation of life came to the fore. During the military threat, the importance of the group of civic and national values increased significantly. Among the national ones, the greatest growth was gained by the state independence of Ukraine, patriotism, readiness to defend the Motherland, love for the native culture, language, and traditions. Digital values have shown sufficient stability of results compared to pre-war times. Digital government services and digital technologies to improve energy efficiency have grown. The results of the study can be useful for building visions and strategies for the development of higher education institutions, modern youth regional policy

Keywords: youth values in Ukraine, digitalization of society, social research, economic crisis

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● INTRODUCTION

The values that are formed historically, at certain stages of social development and change over time with changing paradigms and the emergence of new phenomena are the determining factor in the development of mankind. Society recognized scientific values during the scientific revolution in the Renaissance. Educational values have become entrenched with the advent of educational institutions, information values are being formed in the XXI century with the widespread use of digital technologies. New living conditions of Ukrainians, caused by the danger of war and information confrontation regarding various spheres of social life, affect the consciousness, views, worldview, values of Ukrainians.

In the age of informatization, the process of transformation of values accelerated and became more manageable under the mass influence of information flows. Significant

shifts in the values of society can be provoked by economic, socio-political, military upheavals of society, accompanied by mass information attacks in conditions of information asymmetry and speculation of governments, institutions and organizations. The historical and logical development of information as a factor in the society progress at the present stage leads, on the one hand, to a sharp digitization of society, and on the other – to the gradual denial values of human civilization, live communication.

The whole world society is involved in the process of transforming the paradigm of human progress, which leads to an orderly digital life. The traditional world has completely changed and become fragile, disturbing, non-linear and incomprehensible in many ways.

In Ukraine, the process of transformation of society's values has accelerated as a result of the war, when

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among the value orientations are relevant those related to primary motives (saving lives, security, family care), social (collective protection and support), civil protection (state, their territories, homes), information (obtaining reliable information about events, critical attitude to the information space).

The most flexible social group is young people, who adapt faster and are more mobile. In Ukraine, this category is distinguished by the age of 14 to 35 years. The study of the transformation of the values of this social group, taking into account the conditions of military danger, was the subject of this study. The purpose of the study is to identify the main values of Ukrainian youth and their transformation in the conditions of economic crises and war danger.

● LITERATURE REVIEW

The values of society are formed under the influence of historical, cultural, economic, social, political and climatic factors, however, at the same time determine the possible direction of development of the state. Values play the role of integrative, communicative, socialization foundations in the life of society, ensure the spiritual and volitional unity of society, a high level of self-awareness and organization of its members. Social values are formed gradually as a set of habits, ways of life of a person, specific forms of behavior transmitted from generation to generation [1].

Value is the property of a social object to satisfy the needs of a social subject (people, groups of people, society); a concept that characterizes the socio-historical significance for society and the personal significance for a person of certain phenomena of reality [2]. Value determines the significance of certain realities from the point of view of human interests, satisfaction of material and spiritual needs; it is something that is meaningful and important to a person [3]. The system of values is the result of the spiritual work of society; it is the active side of social consciousness, taken in the unity of all its forms. In a way, it permeates all forms of social consciousness, uniting certain interests by various ideological, moral and aesthetic means, and becomes an important source of direct motives for behavior, stimuli of human activity [4]. Values play the role of integrating, socializing, communicative foundations in the life of society, ensure the spiritual and voluntary unity of society, a high level of organization and self-awareness of its members. Social values are formed gradually as a set of habits, methods of human life, specific forms of behavior, which are transmitted from generation to generation [5].

The international community is trying to understand how the values and beliefs of people of different nationalities, national traditions change over time, as well as how they affect the socio-political situation in the world. Since 1981, the World Network of Sociologists has been conducting a study of world values [6]. Based on the results of this study, a cultural map of the world of Inglehart-Welzel has been built, where countries are grouped by two pairs of social value groups (traditional values are opposed to secular values, survival values are opposed to the values of self-expression). The researchers propose to define the vector of change in each pair of values as indicators of intercultural change in the world. War in Ukraine has shown that such a trajectory of changing the values of societies in

the world does not exclude the possibility of inciting military conflicts between them. At the same time, intensive change of the environment is a factor in the transformation of society's values. Influences such as globalization, resource allocation, national and cultural integration, internationalization, digitalization of society, new conflicts in the world significantly affect the formation, transformation and functioning of values.

Digital technologies, information and communication methods, military danger change human values, make new requirements for the institutional provision of new "rules of the game", which is impossible without a critical rethinking of the processes of informatization of society and the development of new approaches to managing threats to business information and cyber security, organizations, institutions, the country as a whole. The dynamics of online digital platforms have affected the very essence of democratic processes and political communication. There are real security threats caused by social networks, as well as numerous privacy violations [7]. Support for enduring societal values such as tolerance, democracy, and transparency is increasingly undermined by the global "export" of American technology companies that dominate the Internet infrastructure in terms of the distribution of cultural goods online: video, social media, news, and private communication [8].

Implementation and development of an effective digital strategy provides significant competitive advantages in the economic development of the world. The digital strategy takes into account four different types of social values: civic, economic, administrative and social ones [9]. Digitalization is transforming the values of education and health. This process accelerated during COVID-19. For instance, in England Digitization of healthcare enables stakeholders to interact and co-create value. "Consultation line on health and safety", an occupational health and safety service, was introduced to provide support and advice to small and medium-sized enterprises [10]. COVID-19 has affected the economic viability, business viability and societal value of private education in England. Business spatiality was fundamentally rewritten. The social value of the industry was questioned because the service was vital and regressive in its distribution [11].

The new digital life of a man requires regulation of the information environment in terms of ethics and law. In the period from 1997 to 2000, UNESCO held conferences on the search for global ethical values in the new information environment [12].

Research of the digitalization impact on the values of Ukrainian youth was conducted in 2020/2021. The results showed that traditional values (absolute and family) have a stable high level of priority for Ukrainian youth. The importance of social values is differentiated and heterogeneous. Digital values are also becoming increasingly important, but still occupy a low position in the value structure [13].

The values of youth are the subject of sociological research in Ukraine, in particular, the annual study "The state of youth in Ukraine", commissioned by the Ministry of Education and Science of Ukraine. Based on the Reports of sociological research on the situation of youth for 2016-2021 [14], it is possible to trace the transformation of values (Table 1).

Table 1. Transformation of youth values in Ukraine for the period 2016-2021, %

| Group | Values | 2016 | 2017 | 2018 | 2019 | 2021 |
|----------|--|------|------|------|------|------|
| Personal | Family happiness | 71.7 | 63.6 | 59.9 | | 63.4 |
| | Happy own family | | | | 18.9 | |
| | My children | | | | 16.3 | |
| | Personal relationships | | | | 11.4 | |
| | Health | | 53.6 | 53.0 | 49.8 | 53.4 |
| | Make a career | 48.1 | 39.3 | 36.6 | | 42.7 |
| | Wealth | 25.0 | 28.1 | 23.5 | | 31.7 |
| | Material well-being | | | | 35.2 | |
| | Be able to realize your talents and abilities | 32.1 | 22.1 | 20.0 | | 30.9 |
| | Creative or professional self-realization | | | | 9.7 | |
| | Personal development | | | | 24.1 | |
| | Become a qualified specialist | 18.6 | 14.2 | 19.4 | | 14.4 |
| | Start your own business | | | | 35.2 | |
| | Interesting favorite work | | | | 10.4 | |
| Social | Bring benefit to your country | 12.7 | 8.1 | 9.9 | | 6.2 |
| | Be useful to society | | | | 20.0 | |
| | Power | 5.2 | 3.1 | 5.8 | | 3.3 |
| | Glory | 3.8 | 2.0 | 3.4 | | 2.8 |
| | A sense of security and confidence in the future | | | | 27.6 | |
| | Peace and opportunity not to interfere in anything | 10.5 | 7.0 | 6.8 | | 11.7 |
| Civil | Be free and independent in their decisions and actions | 38.0 | 29.1 | 28.2 | 12.8 | 27.7 |
| | I have not participated in the activities of any civil society organization | | | 80.5 | 54.2 | 84.4 |
| | Took part in student self-government | | | 7.9 | 25.4 | 31.0 |
| | “Are you ready to defend Ukraine with weapons if necessary?": Yes, if I am mobilized | 28.7 | | | 24.2 | |
| | No, I'm not ready, but in time I may consider such a need | 17.7 | | | 24.5 | |
| | Yes, I have already taken part or am taking part in hostilities | 2.4 | | | 3.2 | |
| | “Are you ready to defend the independence and territorial integrity of Ukraine by non-violent methods, such as volunteering, charity, etc.?": Yes, ready | 43.7 | | | 47.9 | |
| | Yes, I already did | 8.3 | | | 12.6 | |

Source: Developed by the author based on sources [15-17]

The Table 1 shows that personal values (family happiness, health, career building, the opportunity to realize their talents and abilities) are most manifested in the youth of Ukraine. Much lower are social (to benefit one's country, to be useful to society, the desire for power and glory) and civic values (in the activities of any civil society organization). At the same time, there is a willingness to defend the independence and territorial integrity of Ukraine (mostly by non-violent means).

Comparing the change in the manifestation of values indicates their sustainable nature over five years. Given the dynamics of world change in the global sense, it is important to consider the transformation of youth values, taking into account the renewal of the content of stable groups of values and the emergence of new ones.

Three groups of values can be distinguished among the main values of modern youth: 1) traditional values include absolute and family values, which are the basis of the spiritual sphere of a person; 2) social values include civic and national values that reflect the social significance of a person, their inclusion in the social community; 3) digital values that arose under the influence of the technical revolution, the development of information and communication technologies and digitalization.

Changing conditions of the social environment, external threats affect the content and speed of transformation of youth values in Ukraine.

The study of the transformation of youth values in Ukraine made it possible to put forward the following hypotheses.

Hypothesis 1. Global changes encourage the meaningful transformation of traditional values of young people in Ukraine towards their renewal and the emergence of new groups of values.

Hypothesis 2. Military danger accelerates the transformation of the values of Ukrainian society youth.

The challenges of the 21st century (war, the danger of viral diseases, digitalization of society) radically change all areas of human activity, the state and values of young people. The implementation of digital technologies in all spheres of life affects the system of value orientations of young people. The novelty of the study is that "points of change" were recorded in the transformation of the values of young people during the crises of 2014, 2021 and 2022. In addition, a group of digital values, the significance of which for society is increasing, was added to the research methodology.

● **MATERIALS AND METHODS**

The purpose of the study was to identify the basic values of Ukrainian youth, their transformation in conditions of military danger. The research method is an online survey of respondents using the Google form tool. For the collection of sociological information, a questionnaire containing 5 questions was developed. Each respondent was asked to choose from a list of values from 2 to 6 most important absolute human, national, social, family and digital values.

Geography, timing and sample population of the study.

The social research was conducted among student youth aged 18 to 35 in Simon Kuznets Kharkiv National University of Economics. Three similar studies were conducted in different periods of turmoil in Ukrainian society. The first wave of surveys was conducted in March 2014 (the sample consisted of 78 respondents), similar surveys were conducted during November 2020 – January 2021 (the sample consisted of 135 respondents: women (83%), men (17%), and in April-May 2022, the sample included 77 respondents: women (81.8%), men (18.2%).

The organization and conduct of the study included the following stages: 1) preparatory (development of the program and research tools); 2) collection of primary sociological information; 3) the stage of information processing; 4) analysis of the received information, comparison of results with previous researches; 5) preparation of generalized results and conclusions.

● **RESULTS AND DISCUSSION**

The results of the survey of student youth in Kharkiv made it possible to obtain primary data on the values of young people and summarize them by groups of values:

- absolute values, such as honesty, love, justice, truth, kindness, freedom, dignity, faith, generosity, forgiveness;
- family values – care for children, care for parents, family loyalty, agreement and trust in the family, mutual love of parents, respect for ancestors;
- civic values – equality of citizens before the law, human right to life and self-esteem, right to freedom of thought, tolerance of other people’s views, respect for the law;
- national values – attention to the ecological state of the region, the state independence of Ukraine, the desire to build a fair state system, love for native culture, language, traditions, and historical memory;
- digital values – constant use of digital technologies, the possibility of using the latest technologies, energy efficiency, digital public services, remote monitoring, remote work, communication in social networks, electronic sales.

The results of the study revealed the priorities in the system of values of modern Kharkiv youth, and also recorded the “points of change”. The results of the social research are processed and presented in Figures 1-5.

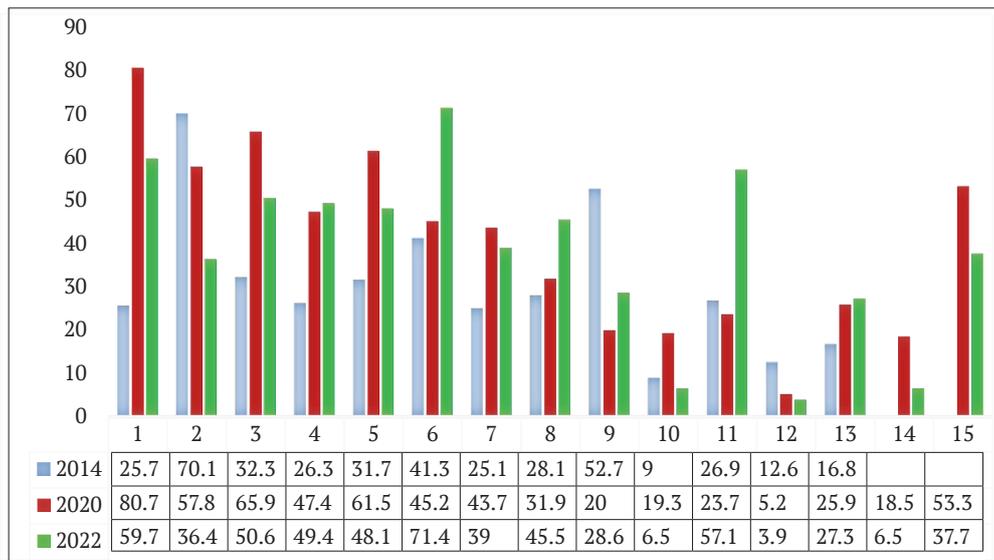


Figure 1. The importance of absolute values, %

1. Honesty, 2. Love, 3. Justice, 4. Truth, 5. Kindness, 6. Freedom, 7. Wisdom, 8. Dignity, 9. Faith, 10. Generosity, 11. Saving life, 12. Perfection, 13 Mercy, 14. Money, 15. Sincerity

Absolute values are basic and instilled in childhood, they are the least flexible and become a platform for the formation of family, community, national and digital values. In conditions of military danger, among the absolute values, the main value for the youth of Kharkiv has become freedom (70.1%), this value has increased significantly since 2014 and 2020. Also, the importance of preservation of life has increased significantly by 53.7%, while

such a value as honesty has high value (56.7%), but less than in 2020. Interestingly, according to the results of the eighth wave of the World Values Survey (WVS) in Ukraine in 2020 for 65.9% of the population security was more important than freedom (4.6% of respondents could not answer) [16]. However, during the war in 2022, according to our research, there were significant changes, at least in the values of student youth.

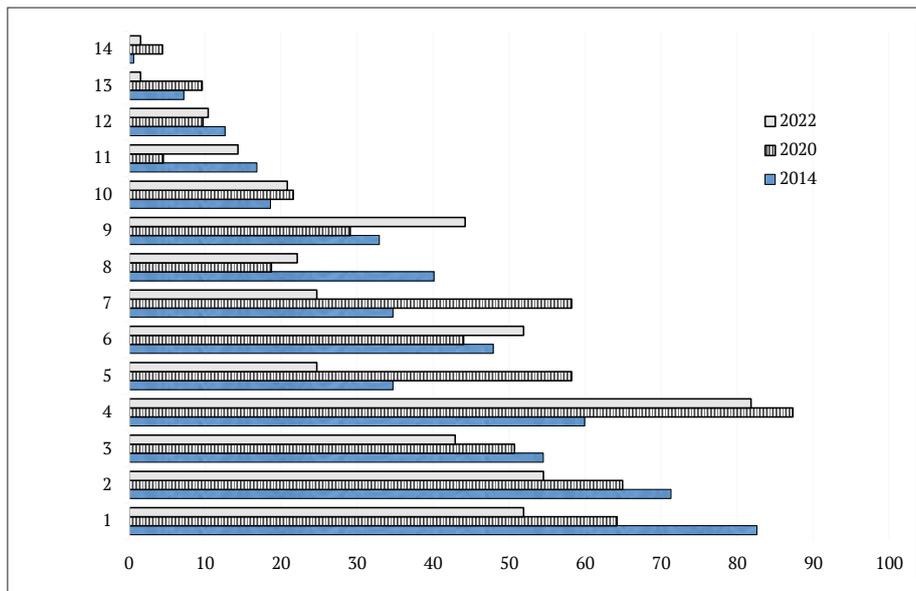


Figure 2. The importance of family values, %

1. Caring for children, 2. Caring for parents, 3. Family loyalty, 4. Consent and trust in the family, 5. Mutual love of parents, 6. Responsibility for family members, 7. Mutual love of parents, 8. Respect for ancestors, 9. Healthy lifestyle, 10. Democracy of relations, 11. Observance of folk customs and traditions, 12. Family openness to public life, 13. Cult of labor, 14. Large family

Family values have historically been a priority for Ukrainians, however, in a critical environment, family consent and trust have become paramount (80.6%). In a

situation of total danger, the value of mutual love between parents has become less significant. The importance of national and public values has risen in Ukrainian society.

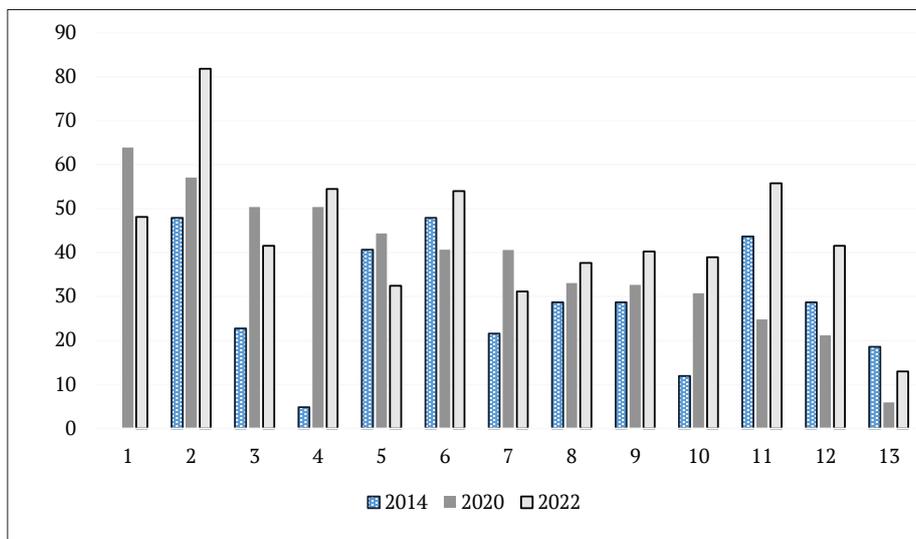


Figure 3. The value of national values, %

1. Attention to the ecological state of the region, 2. State independence of Ukraine, 3. Attention to strengthening the health of citizens, 4. The desire to build a just system of government, 5. Historical memory, 6. Love for native culture, language, traditions, 7. Careful attitude to national wealth, 8. Ukrainian language, 9. Sense of national pride, 10. Respect for the Constitution of Ukraine, 11. Patriotism, willingness to defend the homeland, 12. Respect for the national symbols, 13. Self-sacrifice for the freedom of the nation

The analysis of the survey results showed that the state independence of Ukraine came to the fore for Ukrainian youth (82.1%). In 2014 and 2022, during the aggravation of martial

law, there is an increase in patriotism among the student youth of Kharkiv. Attention to the region ecological state receded into the background and decreased from 63.9% to 43.3%.

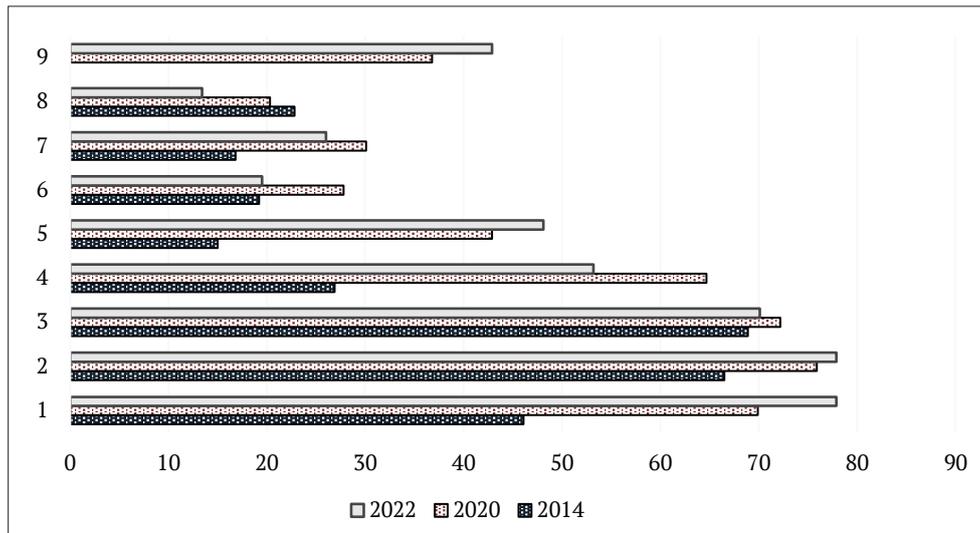


Figure 4. The importance of public values, %

1. Equality of citizens before the law, 2. Human right to life and self-worth, 3. Right to freedom of thought, 4. Tolerance of other people’s views, 5. Respect for the law, 6. Striving for social harmony, 7. Culture of social and political relations, 8. Upholding social and interethnic equality, 9. Anti-corruption.

Among civic values, the right to life and personal dignity (79.1%) and the equality of citizens before the law (77.6%) have become the most important in modern conditions. In the XXI century the transformation of values is influenced by information and communication technologies. Global coverage of digitalization processes has positive and negative effects on the society future. They have threatened the achievement of the world of civilization in terms of live communication, interaction, learning and cohesion. At the same time, the latest technologies provide

wide opportunities in a single global space for learning, employment and communication, especially in conditions of military aggression, uncertainty and illogical processes of the human environment.

The processes of digitalization in times of military danger in 2022 are of particular importance: access and transmission of information, in particular for the civilian population, support of communication through various applications, banking, the possibility of continuing online/offline training and work, receiving psychological assistance [18].

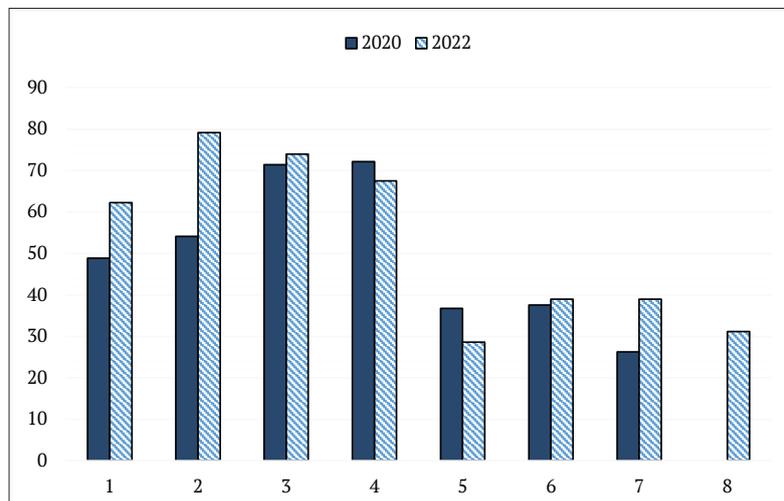


Figure 5. The importance of digital values, %

1. Digital public services, 2. Opportunity to use new technologies in medicine, 3. Empowerment of online learning, 4. Digital technologies to improve energy efficiency, 5. Development of electronic markets, 6. Electronic democracy, 7. News for all in social networks, 8. Empowerment of Internet marketing, 9. Available digital technologies to all and dissemination of digital awareness among all generations of the population.

During the war, the importance of digital public services increased significantly (77.6%). Young people have considerably greater adaptive abilities to digitalization processes, therefore the tendency to change values is more noticeable among this category of society. Youth is an

important progressive part of modern Ukrainian society, the bearer of the nation’s intellectual potential, a determining factor of the country’s socio-economic progress [19].

This research result does not contradict and complements the sociological research conducted among youth

aged 14-34 “Digital technologies in youth work in Ukraine”. The results of the study show that almost all young people use the Internet every day, young people mostly use smartphones to access the Internet (93.8%), communicate in social networks (92.8%), use e-mail (82.2%), and messengers (Skype, Viber, Messenger, etc.) (82.2%) [20]. Such involvement in the Internet increases the importance of digital values in a person’s life.

In this way, the proposed hypotheses regarding the meaningful transformation of traditional values of youth in Ukraine towards their renewal and the emergence of new groups of values under the influence of global changes and the acceleration of the transformation of values in the conditions of war danger were confirmed. The presented research has a certain limitation regarding the depth and scale of the sample of respondents who took part in the research, so further work is being carried out to research the values of young people from other regions, as well as people of other age groups, other social strata of society, and gender parity is also achieved.

The results of the presented empirical research should be taken into account in the future when conducting educational work in higher education institutions of Ukraine and forming youth policy of the region.

● CONCLUSIONS

Theoretical analysis of the results of previous and conducted during the period of military danger empirical study of the values of youth in Ukraine allowed us to draw the following conclusions:

The system of values is an important influential component of human consciousness, which shapes its worldview, patterns of behavior and incentives. The system of youth values is formed in the social environment under the influence of public consciousness and global challenges.

In the course of long-term research, the following groups of values were identified and generalized:

1) traditional: absolute, family; 2) public (civil, national); 3) new ones that appear under the influence of global trends in the development of technologies that are included in all spheres of life – digital.

The transformation of young people’s values is not happening quickly, but in times of crisis, the importance of certain values has changed. The group of absolute values remains the most stable and significant, but the significance of the values included in this group has undergone a significant redistribution. At the forefront were: freedom (71.4%), saving lives (57.1%), dignity (45.5%). The group of family values has hardly changed, except for the increase in responsibility for family members (51.9%).

During the military threat, groups of civic and national values increased significantly. Thus, among the national ones, of the greatest growth and significance were: state independence of Ukraine (81.8%), patriotism, readiness to defend the Motherland (55.8%), love for native culture, language, traditions (54.0%), respect for national symbols (41.6%), a sense of national pride (40.3%). Among civic values, the importance of the following has increased: equality before the law (77.9%), the right to life and dignity (77.9%), respect for the law (48.1%).

The manifestation of new values showed sufficient stability of the results in comparison with the pre-war period. Digital government services (79.2%) and digital technologies for energy efficiency increased.

Thus, the hypotheses regarding the meaningful transformation of traditional values of young people in Ukraine towards their renewal and the emergence of new groups of values under the influence of global change and accelerating the transformation of values in conditions of military danger were confirmed.

Further research will be aimed at studying the transformation of traditional, new (digital), educational values and personal values of the youth of Ukraine in the postwar period.

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Трансформація цінностей української молоді під час криз

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Анотація. Система цінностей певного суспільства характеризується стабільністю, передається від покоління до покоління та визначає напрям соціально-економічного, політичного розвитку країни. У крижкому, нелінійному та незрозумілому глобалізованому світі зсув цінностей суспільства може бути спровокований глобальними потрясіннями, що загрожують виживанню людини як біологічного виду. У ХХІ сторіччі суспільство відчуває воєнну небезпеку, загрозу поширення небезпечних вірусів, цифровізації всього життя людини. Метою проведеного дослідження є виявлення основних цінностей української молоді, та їх трансформація в умовах економічних криз та воєнної небезпеки. Для перевірки висунутих гіпотез, щодо прискорення трансформації традиційних цінностей української молоді, використовується метод соціальних досліджень. Перша хвиля досліджень ціннісних орієнтацій студентської молоді Харкова була проведена у березні 2014 року. Аналогічні дослідження проводились протягом листопада 2020 – січня 2021 року, а також у квітні-травні 2022 року. Результати показали, що традиційні цінності (абсолютні та сімейні) стабільно мають високий рівень пріоритету для української молоді незалежно від умов життя та динаміки оточуючого середовища. Однак всередині ціннісних груп відбулись зміни. При загостренні воєнної небезпеки на перший план вийшли цінність свободи, чесності, збереження життя. Під час воєнної загрози значно зросла значимість групи громадянських та національних цінностей. Так, серед національних найбільшого зростання та значущості набули: державна незалежність України, патріотизм, готовність до захисту Батьківщини, любов до рідної культури, мови, традицій. Цифрові цінності показали достатню стійкість результатів у порівнянні із довоєнним часом. Зростання значимості спостерігається щодо цифрових державних послуг та цифрових технологій підвищення енергоефективності. Результати дослідження можуть бути корисними для побудови візій та стратегій розвитку закладів вищої освіти, сучасної молодіжної регіональної політики

Ключові слова: цінності молоді в Україні, діджиталізація суспільства, соціальне дослідження, економічна криза

Development of Human Potential: Design Thinking as a Way of Improving Professional Competencies of Economists

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Abstract. In a post-industrial society, the quality of professional education becomes a leading factor in the formation of human potential. One of the ways to ensure the effectiveness of this process is the use of innovative educational technologies aimed not only at the formation of professional competences, but also at the development of creativity which, in the future, will contribute to the search for non-standard ways of solving real problems. The purpose of the work is to study the influence of interactive educational technologies based on the concept of *design thinking* on the success of students of economic specialties and their internal motivation to study mathematical disciplines. The format of a business game has been chosen as a method of implementing the concept of *design thinking*. It involved the construction of a mathematical model of a real economic problem and the use of a mathematical apparatus to solve it. In order to evaluate the effectiveness of gamification it has decided to distribute students according to academic performance and students ranked classes according to their preferences using the method of hierarchies analysis. The experience of implementing business games demonstrated by the example of the discipline “Operations Research and Optimization Methods” confirmed the effectiveness of this technique in the process of studying the disciplines of the mathematical cycle precisely due to the increase in students’ internal motivation. Compared to traditional teaching methods, the formation of students’ professional competencies has been enriched by the experience of solving transdisciplinary tasks. The results of the study allow us to conclude that the professional competencies of future economists are significantly improved thanks to the use of a business game in the learning process where a real economic problem is adapted to the topic of the discipline

Keywords: knowledge economy, hard and soft skills, learning process activation, transdisciplinary tasks, learning technologies, business game, gamification

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● INTRODUCTION

The leading paradigm of the development of post-industrial society is the reorientation from the accumulation of material goods to the development of human potential. Human potential (accumulation of knowledge and skills) and its subsequent transformation into human capital (the application of this knowledge in practical activities) are considered as one of the main driving forces that ensure the success of not only an individual, but also an organization [1] and even the country as a whole [2]. Back in 1965, the United Nations Development Programme [3] was presented whose main task was and remains to ensure the sustainable development of member-countries. And human potential is the factor that determines the ability for such development. Therefore, since 1990, the United Nations Development Programme has been publishing a

report on the Human Development Index every two years. One of the components of this integral indicator is the level of education, which reflects the level of literacy of the adult population, the level of involvement in the learning process of school-age children (expected years of education for school-age children). And since 2019, the Program has been publishing a report on the human capital index which reflects the quantitative indicators of education (expected duration of schooling by the age of 18) and the quality of education (scores of unified tests) [4]. The human capital development project [5] and similar global initiatives designed to promote larger and more effective investments in people aim to ensure the economic growth of each country and overcome social inequality among different nations. That is why, in recent decades, the attention of such

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international organizations as the United Nations Development Programme, the United Nations International Children's Emergency Fund, the World Bank, the Organization for Economic Co-operation and Development has been focused on the problems of human potential development and its further capitalization.

The quality of education is the determining factor in the formation of human potential. It plays a leading role in the formation and development of the modern knowledge-based economy [6-8]. Many large companies, especially those with a high level of added value, have come to understand the vital importance of both individual and collective human skills. This is understood by the employees themselves. Among the main reasons that prevent today's youth from developing entrepreneurial activity 34-38% of respondents consider their own knowledge to be insufficient [9]. At the same time, the high level of initial knowledge that a person acquires at the beginning of professional activity is insufficient to ensure long-term success. Education is seen as a primary requirement that helps meet many other needs and improves the quality of life. However, the content of education should be aimed at the ability to learn new knowledge, update it when necessary [10]. The needs of the innovative economy require a person to constantly update their knowledge, that is, to carry out lifelong learning. The modern education system was created back in the industrial era, when a clear focus on acquiring a certain amount of knowledge was important [11]. Modern problems, as a rule, are interdisciplinary in nature. Therefore, students should improve their analytical abilities, practice creative thinking skills, learn to comprehensively justify decisions. Accordingly, changing the very paradigm of education requires significant changes in the educational environment [12]. And such opportunities are provided by the wide application of digital technologies. Digitalization makes education not only more accessible in space and time for a wide range of the population, but also allows creating an individual learning environment that increases a person's involvement in learning and improves their adaptability [13]. It is thanks to digitalization that it becomes possible to study online in a virtual environment adapted to the purpose of learning. Therefore, at the stage of post-industrial development, when the reproduction and further improvement of human potential are determined, first of all, by the level of education in the country, to increase the quality of education at all levels is strategically important for the formation of the ability not only to assimilate knowledge, but also to apply it creatively. This determines the search for ways to improve the educational process and the use of innovative technologies to increase the effectiveness of learning in all educational fields and for people of any age. This especially applies to the study of science and mathematics disciplines, since these are the disciplines that determine the competence of a person who is capable of critical thinking and knows how to logically justify decision-making. As a response to the need for fundamental changes in the education system itself, the state of higher education in recent decades can be characterized as a time of reforming all aspects of its activity. At the same time, both the ultimate goal of education and the methods by which this goal is achieved undergo significant changes.

It should be noted that the active introduction of the latest digitization-based technologies into the educational

process has been observed since the beginning of the 21st century, but this issue is gaining special relevance right now, in the period of COVID-19 epidemic and the widespread transition to distance learning associated with it. And for Ukraine, these needs are intensified due to the need to ensure the learning process in the conditions of martial law in the country.

However, distance learning has its drawbacks. In such conditions, the student mostly manages his/her own education. Accordingly, the success of studies largely depends on the internal motivation of the student, their focus on the result. Therefore, there is a need to develop and apply such learning technologies that would maintain a student's constant interest in the disciplines under study, would motivate him/her to persevere in learning, that is, would contribute to the development of human potential. And in the future, this would give an opportunity to creatively implement the acquired knowledge at a higher level, namely when solving problems within those disciplines that correspond to the professional purposes.

The purpose of this article is to study the peculiarities of the implementation of interactive educational technologies based on the concept of *design thinking*, in particular, a business game, in the context of the development of human potential, as well as the impact of these technologies on the formation of the internal motivation of students of economic specialties to study mathematical disciplines. For this, it was necessary to develop such a scenario of a business game that allowed to combine the study of mathematical methods and their application in order to solve real economic problems.

● THEORETICAL FRAMEWORK

One of the most important needs of our time is not only the accumulation of knowledge, skills and abilities, but also the ability to creatively use them in professional activities that reflects the process of transforming human potential into human capital. Therefore, important components of the process of human potential formation are factors that contribute to the formation of a creative personality, their development and self-development. This approach is reflected in the concept of "*design thinking*". This idea was proposed by brothers Tom Kelley and David Kelley [14] who taught creative thinking in solving transdisciplinary problems to the students of Stanford University. The term "*design*" in this context should be understood as "creating", "constructing", and "*design thinking*" is considered as a technique focused on the final product of knowledge and on team cooperation in determining innovative solutions to achieve the strategic and/or tactical goal of research. Although this concept was primarily focused on improving business efficiency [15], it is now becoming popular in the organization of the educational process [16-18]. And it is the teachers who become the developers of those educational technologies, with the help of which later students construct their system of problem vision, and this system is based on the acquired knowledge.

In general, design thinking or design-based research is considered as a method of creating non-standard projects, products and services, etc. This method is aimed at solving specific problems based on the interests of the potential consumer. And in this case, the consumer is a student who is

a future specialist in a certain field of knowledge [19]. It is noted that *design thinking* involves discussing the problem in groups, when the teacher does not act as a Teacher or Leader, but only as a facilitator, that is, a person who ensures the success of group communication. Design thinking includes a variety of creative strategies for managing multi-stakeholder projects and facilitating organizational innovation. It helps to overcome the ambiguities encountered in such projects, to formulate the right questions, as well as to determine the possibilities of accomplishing the task. In fact, the concept of *design thinking* is an embodiment of the central idea of connectivism according to which students form a community that uses already known knowledge to create new one. And the Internet, which contains a large volume of all kinds of information, gives unique opportunities for this. That is why online education has become so

popular recently. So, on the one hand, e-learning creates conditions for freer communication in groups, and on the other hand, it requires the teacher to use such teaching methods that would contribute to the involvement of all students of the group in this process. In these conditions, the teacher's task is to develop and apply such interactive methods that would form students' internal motivation to study. The result of applying *design thinking* in the educational process can have a synergistic effect [20]. That is, not only the student as a user feels the benefits of this method of learning, but also the self-organization of education itself as a system of acquiring knowledge takes place.

The implementation of design-based research [21] involves certain stages that must be followed when applying this method in education. They can be presented in the form of such a scheme (Fig. 1).

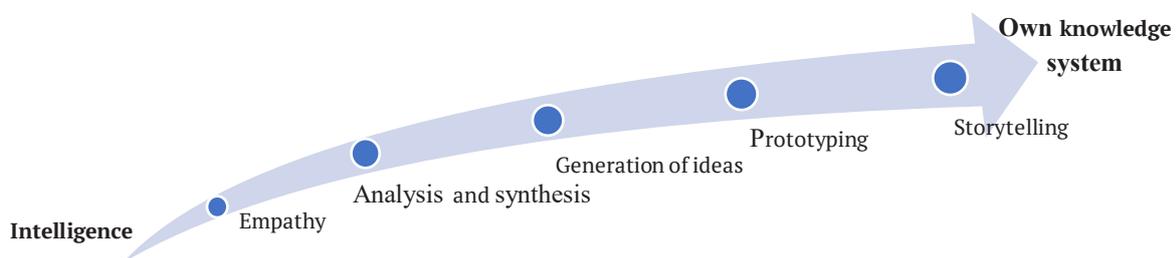


Figure 1. Stages of the design thinking implementation

The first stage is empathy, that is, the creation of such an atmosphere that would facilitate complete immersion in the problem. For this, it is necessary to reject stereotypes and be sensitive to new ideas. At the second stage, analysis and synthesis are carried out, i.e., the information obtained at the previous stage, is understood. The third stage involves the generation of ideas aimed at solving the main tasks within the limits of the investigated problem. In technical disciplines, new ideas can find their embodiment in the creation of models (prototyping) and their testing, and it is the fourth stage. In mathematical disciplines, simulation modelling can be used to test the correctness of proposed hypotheses. The final fifth stage (storytelling) is the generalization of the obtained results.

Among the learning technologies actively used in the educational process there are many interactive methods that implement the concept of design thinking to this or that extent. By its essence, *design thinking* has an interdisciplinary nature and is carried out as a project activity. These requirements are met by methods such as mind mapping (for generating ideas as a basis for conducted research), brainstorming (for generating new opportunities and alternative business models), workshop (where participants learn through their own active work on a problem), testing key hypotheses (for the formation of promising hypotheses that contribute to the implementation of the concept), etc. [18].

However, it is game techniques that most fully correspond to the principles of *design thinking*. This was even reflected in the term "Game Design" [21]. Gamification of the educational process allows for design-based research in any field of knowledge. Therefore, gamification can be considered as one of the leading trends in modern education in general [22; 23], as well as the national education

system in particular [24; 25]. Gamification, as a rule, is used in school education, especially in the education of younger students and, accordingly, is aimed at teachers of primary school [26]. However, recently it has attracted attention in the teaching of different disciplines in high schools, as well as in business education. The expediency of using this educational technology in higher education was demonstrated by the example of studying various disciplines, including mathematical ones, though such examples are few [27; 28].

It is worth noting that the term "gamification of learning" has a fairly broad meaning. In most cases, it is about the use of computer games in education dedicated to one or another topic of the discipline and even the creation of game design of the discipline as a whole [21]. However, in this case, the student interacts only with the computer program, i.e. ready-made knowledge acquisition is offered, and the game format makes the educational process less formalized, and therefore, more interesting and makes it easier to perceive the educational material. On the contrary, the game as an embodiment of *design thinking* involves close communication among the participants of the game and working out common rules according to which the game is played. This is the format of business games. And precisely such games were introduced in our study to stimulate the internal motivation of students and to improve their professional competences when studying mathematical disciplines.

In the process of training future specialists in the field of economics and management, mathematical disciplines are considered as a basis for further mastering the methods of quantitative and qualitative analysis of economic phenomena. Therefore, it is advisable to orient students to the solution of complex transdisciplinary tasks at

the very first stages of studying mathematical disciplines. It is very important as, in the future profession, the manager will not only research the problem and develop his/her solution, but he/she must also be able to listen to the objections of other participants in the discussion and justify and explain the objective advantages of his/her decision. So, the ability to work in a group can be considered one of the professional qualities of a manager. Therefore, as interactive techniques that will contribute to the formation of internal motivation for learning and the development of professional competences, group business games have been considered, with the content determined by the program of the discipline, while e-learning provides communication within the group of students and between students and the teacher independently from their location.

The choice of game mechanics used in the e-learning process should depend on the way of how this process is implemented. It should be noted that online learning is divided into two types: synchronous and asynchronous. Synchronous class takes place in real time, for example, using video conferencing or online chat to transmit voice, image or alphabet. It is important that interactions occur simultaneously. So, although such a class is virtual, it provides an opportunity for interaction between students and the teacher, as well as between students themselves in real time. With the asynchronous form of classes, the student has the opportunity at any convenient time to review the material that the teacher has prepared in advance. This form of the educational process organization to a large extent involves self-regulation of learning, so it requires greater efforts from the teacher to motivate students.

● MATERIALS AND METHODS

An analysis of the results of a pedagogical experiment on the introduction of game technologies and digitization into the educational process at Simon Kuznets Kharkiv National University of Economics has been carried out. In order to develop students' ability to think creatively, since 2008, the following forms of learning activation as debates, cases, business games, etc have been practised when teaching economic disciplines at S. Kuznets KhNUE. As a rule, they were used at trainings or while teaching minors to Master students. The effectiveness of this approach in studying mathematical disciplines was demonstrated by one of the authors by the example of teaching the discipline "Economic-Mathematical Models and Methods of Property Valuation" within the Master's Program 071 "Accounting and Taxation" [29; 30], taught by the Department of Higher Mathematics and Economic-Mathematical Methods. That is why, it was decided to apply this pedagogical experience in teaching mathematical disciplines to Bachelor students. The choice of game mechanics used in the e-learning process depended on how exactly e-learning was implemented.

It should be taken into account that the use of game methods in online learning involved communication in both synchronous and asynchronous modes. Interaction in the synchronous mode took place during the discussion of tasks (production stage), directly during the game (main stage) and discussion of its results (final stage) using video conferences. So, although such classes are virtual, they provide interaction between students and the teacher, as well as between students themselves. The asynchronous

form was used by students throughout the game to choose a strategy and discuss individual elements of the game between team members at any convenient time. The LMS Moodle platform and Zoom Video Communications were used to support both synchronous and asynchronous classes. The MS Excel spreadsheet processor was used for calculations. This is a software product used for homework and laboratory work in all disciplines of mathematics.

As part of the experiment, during the 2020/2021 and 2021/2022 academic years, students of the 1st and 2nd years (approximately 300 students participated in the experiment each year) were offered to perform transdisciplinary tasks. The task involved solving an economic problem using the mathematical apparatus mastered by students at this stage in accordance with the curriculum of the academic discipline. The experiment consisted of two parts. The first part was a business game, and the second part was an evaluation of the methods used in teaching mathematical disciplines. As an experiment, game methods were introduced when studying certain topics of such basic mathematical disciplines as "Higher and Applied Mathematics" (specialty 242 "Tourism"), "Probability Theory and Mathematical Statistics" (specialties 122 "Computer Science" and 075 "Marketing"), "Operations Research and Optimization Methods" and "Econometrics" (specialty 076 "Entrepreneurship, Trade and Stock Market Activity"). For this, one of the topics of the discipline was chosen, which corresponded to the curriculum of the discipline and reflected the use of mathematical methods in real studies of economic processes and phenomena. Practical classes on this topic were conducted in the format of a business game. Thus, in the discipline "Higher and Applied Mathematics" when studying the topic "Function of Several Variables", students were offered the business game "Optimal Composition of a Mixture". In the discipline "Theory of Probability and Mathematical Statistics" when studying the topic "Basic Theorems of Probability Theories", students of specialty 122 were offered the business game "Think Like Bayes", and students of specialty 075 – the business game "Paradoxes of Probability Theory". In the discipline "Operations Research and Optimization Methods" when studying the topic "Transport Problem" students were offered a business game "Appointment to a Position". In the discipline "Econometrics" when studying the topic "Multifactor Model" students were offered a business game "Is this Sample Population Homogeneous?". The content of the tasks, the structure of the game, the rules of its implementation are the author's developments.

In general, as any implementation of *design thinking*, the scheme of the game consists of five consecutive stages (see Fig. 1). At the *empathy* stage, students receive a task, i.e., a topic on which they have to develop their own project, statistical data (in part) and, overall, criteria that this project is to meet. At the stage of *analysis and synthesis*, students analyse the received information, propose and clarify the project evaluation criteria and create a scale by which this evaluation will be carried out. They determine what additional statistical data they need and search for these data. When making the rating scale, students proceed from the fact that the business game is considered as an independent creative task and is rated at 8 points. The stage *generation of ideas* involves direct work on the project. During

this stage, students search for the necessary information and process it using the necessary mathematical apparatus. If desired, the task can be performed either by each student individually or by a group of 4-5 people. These subgroups were offered either to choose for themselves the direction of research or take the one proposed by the teacher, or find their own direction that corresponds to the topic of the game. At the *prototyping* stage, students present their projects. These projects are discussed within the academic group. The *storytelling* stage involves summarizing. The students of the academic group themselves determine the compliance of the projects with the requirements that were formulated by them during the discussion of evaluation criteria at the *analysis and synthesis* stage. And they also evaluate the effectiveness of the application of the business game in the educational process. At the same time, the teacher acts as a facilitator.

The second part of the experiment on the introduction of business games in the educational process (the final stage) was the study of students' opinion regarding teaching methods. This was done through a questionnaire in which students defined the most effective, from their point of view, types of classes and ranked them. Both classroom and online learning takes place in the conditions of a traditional lecture-workshop system, using individual and group work. According to the method of analysis of hierarchies, developed by Thomas Saati [31], students themselves determined the ranks of the following classes: lectures (a_1), workshops (a_2), laboratory work (a_3), homework (a_4), business game (a_5), writing a scientific article as an independent creative task (a_6). According to the method of analysis of hierarchies, a pairwise comparison of all alternatives is carried out and the result is recorded in the form of a matrix $A=(a_{ij})_{n \times n}$. According to the scale of relative importance, the maximum score of 9 means the absolute preference of the alternative written in the row of the matrix over the one written in the column after the cell (i, j) . For the elements of this matrix, the condition is fulfilled: $a_{ij} \cdot a_{ji} = 1 (\forall i, j)$. Based on the matrix of pairwise comparisons, the vector of priorities $W=(w_1, w_2, \dots, w_n)$ is determined, and the consistency of the matrix A is checked. For this, the geometric mean (1) is calculated for each row of the matrix A :

$$\bar{w}_i = \sqrt[n]{\prod_{j=1}^n a_{ij}}, \quad i = \overline{1, n}, \quad (1)$$

where a_{ij} ($i = \overline{1, n}, j = \overline{1, n}$) are the elements of the matrix A .

And after normalization, components of the priority vector (2) are defined:

$$w_i = \frac{\bar{w}_i}{\sum \bar{w}_i}. \quad (2)$$

The consistency of this reasoning has been verified. To do this, the consistency index and the consistency ratio were determined. First, the maximum eigenvalue λ_{max} of the inverse-symmetric matrix of pairwise comparisons is calculated according to formula (3):

$$\lambda_{max} = \sum_{j=1}^n w_j \cdot (\sum_{i=1}^n a_{ij}). \quad (3)$$

Then the coherence index (4) is found:

$$CI(A) = \frac{\lambda_{max} - n}{n - 1}. \quad (4)$$

And the consistency ratio (5) is calculated:

$$CR(A) = \frac{CI(A)}{RI}, \quad (5)$$

where RI is a random preference consistency index, the value of which depends on the size of the matrix of pairwise comparisons and is determined according to the reference table [31].

● RESULTS AND DISCUSSION

Let us consider the results of the first part of the experiment, namely, the expediency of using a business game in the study of mathematical disciplines. We emphasize once again that although within different mathematical disciplines, business games were conducted on different topics and involved the use of different mathematical apparatus, in general, the rules for all games were determined according to the same principles. According to the scenario of the business game, the solution of a real problem was supposed to be solved with the help of economic and mathematical methods taught within the framework of the discipline. For example, in the discipline "Operations Research and Optimization Methods", when studying the topic "Transport Problem", the business game "Appointment to a Position" was conducted. The assignment problem is one of the basic problems of combinatorial optimization. The name of the task comes from a situation common in work of HR managers, when it is necessary to select such specialists among applicants for positions that would bring the greatest efficiency to the company. The mathematical model of this problem is also widely used in the optimization of the distribution of indivisible resources: machines, buildings, containers, vehicles as well as performers of certain work. Such a problem is reduced to the transport problem, where the criterion of efficiency is the overall efficiency of the organization, and comprehensive evaluations of applicants for positions play the role of tariffs in the classic transport problem. The objective function of such a problem is studied to the maximum.

At the first stage (the empathy stage), students were asked to consider the offers of several consulting agencies for recruiting personnel for a company that sells household appliances. Students searched for this information independently using Internet resources and taking into account their own experience and common sense. Next, the stage of analysis and synthesis was carried out, where students had to process the received information and, if necessary, find additional information about the requirements that applicants for the position should meet. So, in the process of discussion, students first chose the positions that had to be filled and then formulated a list of requirements that applicants for these positions should meet. Then the selection of parameters was carried out, according to which the applicants should be evaluated. Then, according to the results of the survey of applicants for each position, whose roles were played by students from other subgroups, the degree of their compliance with a certain position was defined. When forming the list of questions that were asked to applicants for positions, students relied on data from consulting agencies. At the idea generation stage, the students had to use the acquired information to build a mathematical model of the task of appointing applicants for the position and with the help of the MS Excel software

environment, determine the optimal plan for this task. At the prototyping stage, students presented the optimal plan for the distribution of applicants by position with the help of which the company can achieve the highest efficiency under the given initial conditions. At the final stage (story-telling), each subgroup presented its vision of the problem, defended its version of the solution and critically analysed the proposals of other subgroups. Therefore, while analysing such a transdisciplinary problem, students not only mastered the principles of building mathematical models of optimization problems and methods of solving them according to a ready-made scheme, but also put forward their own ideas and demonstrated creativity. Although the algorithm for solving problems of this type is known, the students came to their own conclusions when working on the problem. In fact, for them it was a manifestation of design thinking. It can also be noted that the principle of conducting such business games is close to a workshop that always involves collective work on a problem, and the emphasis is on active cooperation within the group and a joint search for a solution to a complex problem. The final result is considered to be the construction of a managerial decision model in a certain specific situation.

It has been given an example of business game implementation for only one of the mathematical disciplines. For other disciplines, the structure of the game was the same, and the choice of the topic of the game was determined by the mathematical apparatus studied within this discipline.

The most difficult to solve are the so-called “wicked problems” that do not have obvious (unequivocal) solution algorithms. Problems of this type were offered to the most

successful students of the second year of study. These students have already acquired a certain amount of knowledge in economics and management and could use it to analyse the algorithm for building mathematical models. They chose “wicked problems” voluntarily and their choice fully coincides with the theory of Abraham Maslow [32], who is considered the father of research into human potential and self-actualization. Thus, according to the hierarchy of needs proposed by him, self-actualization is the highest level of Maslow’s pyramid. As an example of tasks of this type multi-criteria optimization tasks, a transport task with intermediate points, dynamic programming can be mentioned. These topics are included in the program of the discipline “Operations Research and Optimization Methods”. “Wicked problems” in the discipline of “Econometrics” include, for example, building an econometric model in the presence of multicollinearity between external variables.

The second part of the experiment on the introduction of a business game as an element of *design thinking* in the educational process consisted in studying the opinion of students regarding the attractiveness of various methodological elements of education from the point of view of their effectiveness. The student survey, whose purpose was to rank teaching methods according to their cognitive properties, was conducted within each academic group. The analysis of the results of the ranking showed that there are two opposite principles according to which students choose the most convenient learning method for them. Some students (almost 30% of all respondents) prefer academic teaching methods. An example of pairwise comparisons matrix for this subgroup of students is given in Table 1.

Table 1. Matrices of pairwise comparisons according to the preferences of students who consider academic teaching methods attractive

| | a_1 | a_2 | a_3 | a_4 | a_5 | a_6 | w_i |
|---|-------|-------|-------|-------|-------|-------|-------|
| a_1 | 1 | 1/5 | 3 | 6 | 4 | 7 | 0.227 |
| a_2 | 5 | 1 | 6 | 6 | 5 | 9 | 0.472 |
| a_3 | 1/3 | 1/6 | 1 | 4 | 4 | 7 | 0.143 |
| a_4 | 1/6 | 1/6 | 1/4 | 1 | 1/5 | 4 | 0.044 |
| a_5 | 1/4 | 1/5 | 1/4 | 5 | 1 | 7 | 0.092 |
| a_6 | 1/7 | 1/9 | 1/7 | 1/4 | 1/7 | 1 | 0.022 |
| $\lambda_{max}=7, CI(A)=0.205, CR(A)=0.165$ | | | | | | | |

For the matrix of pairwise comparisons given in Table 1, by formulas (1) and (2) the values of the components of the priority vector are calculated. They are listed in the last column of the Table 1. According to these values, there are the following arrangement of alternatives (6):

$$a_2 > a_1 > a_3 > a_5 > a_4 > a_6 . \tag{6}$$

Thus, this part of students preferred traditional forms of education, i.e. workshops, lectures, laboratory work, and creative tasks they ranked in the last place.

Let us check the consistency of this reasoning. To do this, using formula (3), the maximum eigenvalue is

calculated, which for the matrix given in the Table. 1, is equal to λ_{max} and by formula (4) the consistency index 0.205 is calculated. According to the reference table [31], it is found that for a matrix of order $n=6$, the random consistency index is equal to $I=1.24$. So, according to formula (5), $CR(A)=0.165$ is found. Since $CR(A)=0.165 < 0.2$, the judgment of students who prefer academic teaching methods does not contain internal contradictions.

The rest of the students (approximately 70% of all respondents) are interested in learning methods that give more space for creativity. An example of pairwise comparisons matrix for this subgroup of students is given in Table 2.

Table 2. Matrices of pairwise comparisons according to the preferences of students who prefer creative teaching methods

| | a_1 | a_2 | a_3 | a_4 | a_5 | a_6 | w_i |
|--|-------|-------|-------|-------|-------|-------|-------|
| a_1 | 1 | 3 | 1/5 | 3 | 1/7 | 4 | 0.108 |
| a_2 | 1/3 | 1 | 1/5 | 2 | 1/9 | 2 | 0.060 |
| a_3 | 5 | 5 | 1 | 4 | 1/5 | 2 | 0.199 |
| a_4 | 1/3 | 1/2 | 1/4 | 1 | 1/9 | 1/5 | 0.034 |
| a_5 | 7 | 9 | 5 | 9 | 1 | 5 | 0.531 |
| a_6 | 1/4 | 1/2 | 1/2 | 5 | 1/5 | 1 | 0.068 |
| $\lambda_{max}=6.78, CI(A)=0.157, CR(A)=0.126$ | | | | | | | |

In this case, the following ranking results (7) were obtained by the components of the priority vector:

$$a_5 > a_3 > a_1 > a_6 > a_2 > a_4. \tag{7}$$

Students of this subgroup preferred those learning methods that provided an opportunity to show independence in searching for information and creativity in solving tasks. These students willingly accepted a business game learning format. They were active at all stages of the game and showed leadership qualities at the stages of decision-making and discussion of results. It should be noted that for this subgroup consistency ratio is $CR(A)=0.126 < 0.2$, that is, the judgments of these students do not contain

internal contradictions and are even more logical than those of students who prefer academic learning.

The correlation between subgroups of students with different opinions on teaching methods may be different for different academic groups. In groups where the average score in mathematical disciplines is 7 points or higher (on a 12-point scale), the second type of alternatives arrangement dominates.

A more detailed analysis showed that students' preferences regarding the forms of education are correlated with their attitude to education and with their success. For most academic groups, the distribution of students by academic performance can be considered bimodal (Fig. 2).

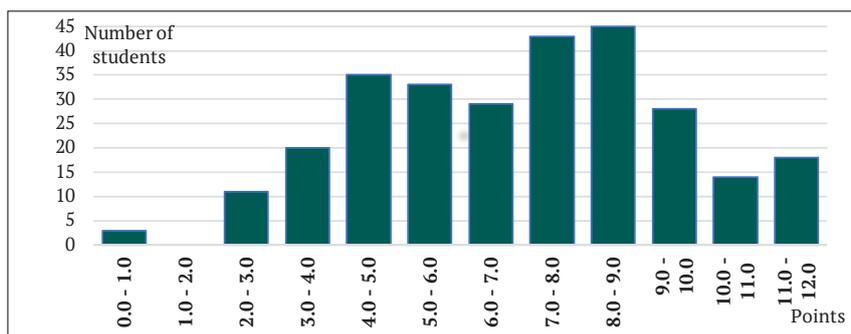


Figure 2. Distribution by academic performance of students who participated in the business game

For the part of students who prefer tasks that require creativity, the average score is high enough. So, Figure 2 shows that the mode of success distribution for this subgroup is equal to 8 points on a 12-point scale. These are students who perform creative tasks that include writing a scientific article or participating in scientific conferences, they play leading roles in business games, and in the 2021/2022 academic year they also take part in the Coursera educational project. So, they are not only more motivated to study, but

also prone to independent acquisition of knowledge. On the contrary, students of the subgroup for which the mode of success distribution is 4.5 points have a tendency to use ready-made algorithms, that is why they prefer lectures and workshops. Such students do not seek to perform creative tasks and are passive when conducting business games.

Just to compare, let us make a success analysis of the 2018/2019 students who were not offered business games when studying mathematical disciplines (Fig. 3).

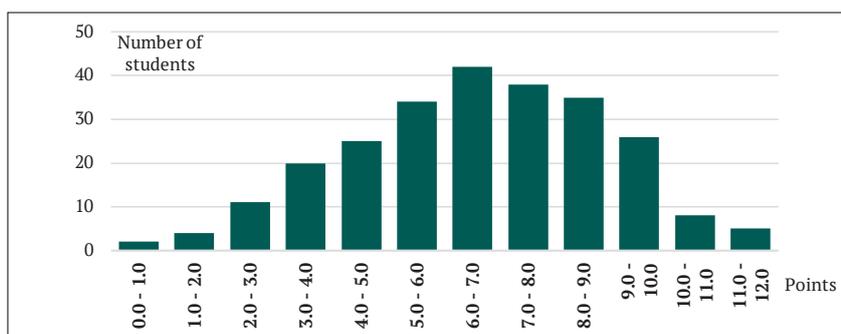


Figure 3. Distribution by academic performance of students who did not participate in the business game

Figure 3 shows that the law of distribution can be considered close to normal. The mode of success distribution of such students is approximately equal to 6.5 points. This fact can be explained by the following. Students who are prone to a creative attitude to learning, capable of generating creative ideas, do not have the opportunity to show these qualities in the conditions of academic teaching methods. So, the realization of such qualities during the business game is another positive outcome of the application of business games in studying mathematical disciplines.

A comparison of these results with the data of other studies [33] shows that business games can be easily adapted to the requirements of different specialties, that is why their application in the process of training future managers is more effective than that of cases or tests. It should be noted that the business game in the format developed by the authors involves active cooperation of the participants, but this does not mean that it can be used only when teaching in the classroom, i.e., in face-to-face communication. Skype, video conferences and other simultaneous electronic forms of communication can be used to organize communication. In the modern world, where people are used to using gadgets, this form of communication does not affect the quality of the educational process. In addition, the digital literacy that a student acquires in the context of e-learning not only improves academic performance, but also contributes to better employment [34].

It is emphasised once again that among the requirements that project managers must meet, most sources list both “hard skills” and “soft skills” at the same time. “Hard skills” presuppose the presence of professional knowledge and skills, which include knowledge of certain software, the understanding of mathematical apparatus on which these programs are based, and the ability to use it in solving economic problems. On the other hand, “soft skills” include: skills for solving transdisciplinary problems; teamwork; adaptability and flexibility when looking for managerial solutions; the ability to perceive feedback. It was for the purpose of forming these “hard and soft skills” that the business game was used as an element of the curriculum in mathematical disciplines studied by future economists and managers. The use of gamification elements of *design thinking* in the educational process when teaching mathematical disciplines allows students to acquire not only “hard skills”, but also “soft skills”. Therefore, the analysis of the peculiarities of the development of human potential caused by the introduction of interactive technologies into the educational process testifies about the effectiveness of the application of *design thinking* concept and its implementation in the format of a business game aimed at solving real tasks of the economy. These results correlate with the proposals made by the authors of the work [9] in which they emphasized the need to focus the educational process on solving real economic problems, and the formation of knowledge acquisition skills was regarded as a productive force. All these will allow such a specialist to occupy a higher socio-economic level in the future.

The obtained results are also well consistent with the concept [35], according to which the mastery of instrumental methods of education and the integration of differently oriented tasks contribute to the formation of future specialist’s readiness to deepen his/her knowledge

and improve his/her skills. This concept is gaining particular popularity in Eastern European developed countries. Adapting the provisions of this concept to the modern needs of society and strengthening it with gamification elements of *design thinking* will allow building a model for training a new generation of specialists in economics. And *design for learning* is regarded as a concept of the educational process primarily focused on training specialists in those fields of knowledge that require a research approach, and is a methodology of the 21st century [36].

A business game as an implementation of design thinking is a powerful addition to the recommendations outlined in the study [37]. The study has reviewed practical teaching and analysed the impact of collaboration, group work, and problem-based approaches that use interactive activities to increase student engagement. The format of the business game can also develop the approach outlined in the work [38], where the authors evaluated the effectiveness of information, communication and electronic technologies integration in teaching and learning. Although there is also the opinion that studies of the effectiveness of training methods based on the concept of *design thinking* are just emerging and their number is insufficient to draw final conclusions [39].

Therefore, the results of the conducted experimental research show that the *design thinking* technology provides the principles of goal orientation, activity, person-oriented, situational and competence approaches in the process of learning mathematical disciplines and is a powerful factor in the development of human potential. Innovative forms and methods of *design thinking* contribute to the improvement of the quality of learning mathematical methods, the development of cognitive activity, the skills and abilities of critical understanding of a problem, the acquisition of experience in independent processing of educational material, search work, i.e., those qualities that are necessary for further self-education and self-realization. The competent component of human potential in the form of motivational-value, operational-cognitive and emotional-volitional components of *design thinking* makes it possible to reflect not only the formation of knowledge, abilities and skills necessary for future economic activity, but also is important for the formation of motivational, cognitive, strong-willed and adaptive personality.

● CONCLUSIONS

In the context of the development of human potential, the analysis of the features of the implementation of interactive educational technologies based on the concept of *design thinking*, as well as the impact of these technologies on the formation of the internal motivation of students of economic specialties to study mathematical disciplines, allows us to draw the following conclusions:

- it is expedient to enlarge the use of applied transdisciplinary tasks in the study of mathematical disciplines,
- the use of a business game that employs *design thinking* technologies makes it possible to encourage students to participate in solving applied problems and stimulates better interaction between students and the teacher,
- teamwork of students when developing a project on the topic of a business game ensures the acquisition of communication competences and stimulates the ability to

generate own ideas, analyze them, be critical of comments and find optimal ways to solve transdisciplinary tasks,

– the active use of modern information technologies, in particular the LMS Moodle environment, in the implementation of *design thinking* technology tools allows students to create their own learning environment and provide them with an access to learning in synchronous and asynchronous modes.

Since real economic problems were chosen as the topic of the business game, their solution helped students to find out the feasibility of applying mathematical methods in their future practical activity. This increases their interest not only in studying the topic on which the game is conducted, but also in the possibilities of using the mathematical apparatus as a whole. Therefore, the introduction of a business game into the learning process increases students' motivation to study mathematical disciplines. The results show that the use of elements of gamification as one of the technologies of *design thinking* in teaching mathematical disciplines allows students of economic specialties not only to acquire certain competences of professional

training, but also to create prerequisites for their further self-development while working at enterprises, organizations, establishments, institutions.

It should be noted that our experience with the application of a business game in the educational process testifies about the rapid effect of the implementation of such a method to improve the process of learning a certain discipline. However, more research is needed to analyze the long-term effect of this technique.

In the future, it is planned to introduce elements of the business game not only when studying one of the topics of a mathematical discipline, but also to extend this approach to conducting laboratory work and workshops in mathematical disciplines. Therefore, the content of the individual and independent work of students should be the solution of professionally oriented and innovative tasks that will contribute to the formation of practical skills of how to apply mathematical apparatus to solving real managerial tasks, acquiring the ability for creative thinking and communicative competence in future economists.

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Розвиток людського потенціалу: дизайн-мислення як спосіб удосконалення професійних компетентностей економістів

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Анотація. У постіндустріальному суспільстві якість професійної освіти стає провідним фактором формування людського потенціалу. Одним із шляхів забезпечення ефективності цього процесу є використання інноваційних освітніх технологій, які спрямовані не лише на формування професійних компетентностей, але й на розвиток креативності, що в подальшому сприятиме пошуку нестандартних шляхів розв'язання реальних завдань. Метою роботи є дослідження впливу інтерактивних освітніх технологій, що базуються на концепції *design thinking*, на успішність студентів економічних спеціальностей та їх внутрішню мотивацію до вивчення математичних дисциплін. У якості методу реалізації концепції *design thinking* обрано формат ділової гри, яка передбачала побудову математичної моделі реальної економічної проблеми та використання математичного апарату для її розв'язання. Для оцінювання ефективності гейміфікації визначався розподіл студентів за успішністю, а також за допомогою метода аналізу ієрархій студенти здійснювали ранжування видів занять за уподобаннями. Досвід впровадження ділових ігор, який продемонстровано на прикладі дисципліни "Дослідження операцій та методи оптимізації", підтвердив ефективність застосування цієї техніки у процесі вивчення дисциплін математичного циклу саме завдяки підвищенню внутрішньої мотивації студентів. Порівняно з традиційними методами навчання формування професійних компетентностей студентів було збагачено досвідом розв'язання трансдисциплінарних завдань. Результати дослідження дозволяють зробити висновок, що професійні компетентності майбутніх економістів суттєво удосконалюються завдяки використанню у процесі навчання ділової гри, в якій реальна економічна проблема адаптована до теми навчальної дисципліни

Ключові слова: економіка знань, жорсткі та м'які навички, активізація навчального процесу, трансдисциплінарні завдання, технології навчання, ділова гра, гейміфікація

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