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Offshoring as a Threat to the National Economic Security: Causes and Ways to Counteract

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Abstract. The volume of capital outflows from Ukraine to offshore jurisdictions has become quite large and poses a threat to the economic security of the state, however, measures to de-offshorise the economy are not effective. Therefore, this study is aimed at identifying factors that affect the level of offshoring of the economy, in addition to the state's tax policy, and at developing measures to de-offshorise the state economy. The study used general and special methods of cognition, economic, mathematical, and statistical analysis, the method of deduction and theoretical generalisation. A theoretical analysis of offshoring as an economic category is carried out, the scale of offshoring of the world economy and its impact on the economic security of the state is determined, which substantiated the relevance of the chosen research topic. The main factors influencing the level of offshoring of the economy, except for tax evasion, are highlighted. A methodology and algorithm for determining the total amount of capital outflow are proposed and calculations of the total amount of capital outflow from Ukraine for 2013-2019 are carried out. A correlation analysis was carried out to determine the level of influence of certain factors on the offshoring level of the Ukrainian economy. A mathematical model of the influence of these factors is constructed ($x_1, x_2 \dots x_n$) at the level of offshoring of the economy (y), which allowed identifying the factors that most contribute to the increase in the volume of capital outflows from Ukraine. A comparison of the level of corporate raiding, the coefficient of offshoring and the volume of capital outflow from Ukraine is carried out, and a conclusion is made about their stable interdependence. Based on the results of the study, the main ways of de-offshoring of the Ukrainian economy in the process of creating and forming the Bureau of Economic Security of Ukraine are developed. It is proposed to create a division within the specified bureau that will perform the functions of countering raiding and violation of property rights of business entities. It is assumed that these measures would contribute to the de-offshoring of the economy and ensure the economic security of the state. The findings of the study can be used to form legislative and institutional support for de-offshoring and ensure the economic security of the state. In particular, based on the results, it is recommended to form the main directions of work and functions of the newly created Bureau of Economic Security of Ukraine

Keywords: offshore, capital outflow, investment, de-offshoring, corporate raiding, security

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Introduction

Modern business is characterised by the movement of financial and economic operations and capital from national economic systems to so-called offshore companies, which led to the emergence of a phenomenon – the offshoring of the economy. The main reason for this phenomenon is the desire of business representatives to reduce the tax burden by using offshore jurisdictions, where tax conditions are much more favourable. The movement of capital and a reduction in the amount of taxes paid has a negative impact on the economic security of the state. However, reducing the level of taxation and providing preferential business conditions for national business entities is not the key to reducing the level of offshoring of the economy. Firstly, because the level of taxation in offshore jurisdictions is quite low or taxation is limited to a fixed annual payment [1], which in any case is more favourable conditions for business than moderate tax rates in national jurisdictions. Secondly, reducing the tax rate can have a very negative impact on the economy and on the economic security of the state, which in turn will encourage business representatives to withdraw capital to more reliable "harbours", that is, to offshore companies.

Thus, it is necessary to explore ways to reduce the level of offshoring of the economy, which do not require a radical change in the level of taxation and tax policy of the state. Therefore, it is necessary to establish a wider range of reasons that affect the level of offshoring of the economy, in addition to tax policy, and investigate them. Based on the results of such an analysis, it would be possible to develop a system of measures to eliminate the main causes of offshoring and ensure the economic security of the state. All this determines the relevance of the subject matter.

According to this, there is a need to reveal the theoretical content and essence of the process of offshoring of the economy, to find out the nature of the impact of this phenomenon on the state economy. It is also necessary to find ways to minimise the negative impact of offshoring on the economy, which would contribute to ensuring the economic security of the state. It is worth noting that the current volume of capital outflows to offshore companies is rather impressive. According to the analysis, about 10% of the world's capital is concentrated in offshore companies and more than 50% of world trade takes place using offshore jurisdictions [2], the total amount of assets placed in offshore companies is approximately USD 20-30 trillion [3], about a third of the capital is placed offshore in the form of bank deposits [4].

The vast majority of leading multinational companies in the United States and the EU have their representative offices in offshore jurisdictions. As for the post-Soviet countries and Ukraine, most of the capital is returned back to the parent countries in the form of *round-trip* however, the amount of accumulated capital in offshore companies is significant. Notably, about 40% of business capital from the former Soviet Union is located in offshore companies [5]. In recent decades, Ukrainian businesses have been most actively using Cyprus to reduce the tax burden and withdraw capital. According to experts, the capital placed in Cyprus reaches about USD 30 billion [6], and since the beginning of the Russian aggression and military operations in eastern Ukraine, assets worth more than UAH 500 billion have been withdrawn to Cyprus [4; 7].

Such a movement usually occurs at the expense of transfer pricing, which allows distributing funds between the structural divisions of the parent companies. However, in practice, such actions are only a legal way to withdraw capital to offshore companies and reduce the tax burden [8]. That is why the analysis of offshoring and the causes of capital outflow is an urgent area of scientific research. Especially the development of recommendations for de-offshoring of the economy.

The purpose of the study is an identification of factors that affect the level of offshoring of the economy, in addition to tax policy, and the development of measures to de-offshorise the economy. Therefore, the main *tasks* are the following: 1) formation of a methodology for calculating the total volume of capital outflows and establishing the level of offshoring of the state economy; 2) identification of the main factors affecting offshoring, except for tax policy; 3) establishment of the level of influence of these factors; 4) development of recommendations to minimise the negative impact of offshoring of the economy and ensure the economic security of the state.

Literature Review

A significant number of papers by Ukrainian and foreign scientists are devoted to the problems of offshoring of the economy and capital outflow. In particular, Ukrainian scientists studied the economic content and essence of offshoring, the scale and consequences of capital outflow from the economy, the main schemes of capital movement and money laundering, considered the state and main problems of offshoring of the Ukrainian economy [2]. The role and scale of offshoring and its impact on the Ukrainian economy were also investigated, and a number of measures were proposed to encourage the return of previously exported capital to Ukraine [4]. Some scientists have studied offshoring as a separate economic category, analysed the effectiveness of the method for calculating the coefficient of offshoring of the economy and its impact on the economic security of the state [9].

The main reasons for capital outflows and the movement of financial transactions outside national jurisdictions are excessive tax burden compared to offshore jurisdictions. In accordance with this, the researchers studied the essence and main causes of tax evasion, and proposed an alternative theoretical substantiaton for the relationship between tax evasion and the level of inflation in the country [10]. Scientists have also studied the causes and scale of offshoring of the economy, the impact of offshore capital on the development of national economies and political situations in different countries [11]. The impact of offshoring of the economy and its shadowing on economic growth and development of the state in the long term were investigated, the main directions for legalising the economy were developed [12].

Interrelation of the level of offshoring of the economy and its shadowing, the impact of criminal structures and corruption on these processes [13].

Notably, globalisation and liberalisation of economic policies played an important role in the process of offshoring of economic systems, and especially the global economy. The establishment of open markets, the liberalisation of capital and investment movements also contributed to the activation of offshoring of economic systems and the global economy. Therefore, foreign scientists have studied the relationship between e-commerce and corporate social responsibility and, in particular, the impact of e-commerce on the taxation of employees' wages [14].

In general, a significant number of scientists have addressed the problems of offshoring of the economy, capital outflow, tax evasion, establishing the cause of these problems, their scale and trends [10; 12; 15]. Causes and consequences of capital outflows and foreign direct investment from national economies and ways to counteract these processes [16]. The impact of offshoring on the banking system and financial markets, the impact of offshoring on the shadowing of the banking sector, and ways to prevent this process were also investigated [17].

Studies by Ukrainian researchers [6; 18; 19] are also devoted to the problems of offshoring of the Ukrainian economy and the causes of capital outflow. In addition, the problem of offshoring of the economy is relevant today due to the impressive volume of capital outflows to offshore companies [20]. The relevance of the problem is confirmed by data on the annual movement to offshore companies of an average of 9.8% of the world's wealth, and the maximum value of this indicator is 65-70% [19]. However, despite a significant amount of studies on this topic, a number of issues remain poorly understood. In particular, the reasons for the offshoring of the economy are not related to the state's tax policy and the desire of entrepreneurs to avoid tax payments. This refers to other factors that contribute to the process of offshoring of the economy in general and in Ukraine in particular.

Materials and Methods

This study is based on the use of general scientific and special methods of cognition, which are used to determine the reasons for the offshoring of the economy, the degree of their influence on this process, and the search for ways to ensure the de-offshoring of the state economy. In particular, the synthesis was used to calculate the coefficient of offshoring of the economy and the methodology for calculating the total amount of capital outflow from the state, which allowed assessing the level of offshoring of the economy. Using the hypothetical assumption, a hypothesis was formed about the existence of a significant number of factors contributing to the offshoring of the state economy, in addition to the state's tax policy, and the neglect of these factors is the reason for the inefficiency of state measures to de-offshorise the economy. Through the use of empirical analysis and generalisation, an exhaustive list of factors contributing to the offshoring of the Ukrainian economy has been established.

The use of correlation analysis determined the level of influence of the established factors (x_1, x_2 ... x_n) on the dependent variable (y), which characterises the level of capital outflow. Based on the analysis, using the mathematical modelling, a model of the influence of various factors on the level of offshoring of the state economy is constructed and the factors that have the greatest impact on this process are determined. The use of the method of elementary theoretical analysis allowed forming a conclusion about the existence of a significant impact of the level of corporate raiding on the level of capital outflow. To ensure the validity of the findings, structural and genetic analysis and induction established the dependence of the level of offshoring on a number of other factors. In particular, empirical studies of the stable dependence of offshoring on the presence of political risks in countries are taken into account [21]. The study of the influence of moral and ethical norms of entrepreneurs, the level of social responsibility and trust in the government on the level of offshoring of the economy and the volume of tax revenues is also taken into account [15]. These results would allow the study to establish and confirm the hypothesis of a significant impact on the offshoring of the Ukrainian economy of factors that are not related to the state's tax policy.

Using the graphical method and structural approach, the relationship between the level of capital outflow from Ukraine, the level of offshoring and the level of corporate raiding is established. Using the formalisation methods and the recommendation method, a number of measures have been developed to de-offshorise the Ukrainian economy, based on neutralising the influence of the considered factors in the process of implementing the BEPS plan declared by the government (*Base Erosion and Profit Shifting*) [22] and the creation of the Bureau of Economic Security of Ukraine. The information base of the study consists of scientific papers and other publications of Ukrainian and foreign scientists, data from [23-25] and other sources of statistical data.

Results and Discussion

Offshoring has become a real phenomenon of the modern economy. Therefore, the study of its scope, causes and counteraction measures is an urgent and very important area. First of all, in the course of the study, the coefficient of offshoring of the Ukrainian economy was calculated. The calculation of the specified coefficient is carried out according to the methodology that provides for the following equation (1):

$$K = \frac{CO}{GDP} \quad (1)$$

where: CO – capital outflow; GDP – gross domestic product.

To ensure the reliability of the results of calculating the offshoring coefficient and to calculate the total amount of capital outflow, it is necessary to determine the level of outflow of hidden capital. This includes payments for imported goods and services that were not actually received under the terms of the contract, payments for fictitious

operations with securities, and so on. In accordance with this, the total capital outflow is calculated using the equation (2):

$$TCO = \sum_{i=1}^{n} D + \sum_{i=1}^{m} FDI + \sum_{i=1}^{l} PI + \sum_{i=1}^{k} HCO - \sum_{i=1}^{j} RT \quad (2)$$

where: TCO – total capital outflow; D – deposits abroad; FDI – foreign direct investment; PI – portfolio investments abroad; HCO – hidden capital outflow; RT – *round-trip* investments.

The results of calculating the volume of capital outflow and the offshoring coefficient are presented in Table 1.

Table 1. Results of calculating the total volume of capital outflow and the coefficient of offshoring of the Ukrainian economy

Indicator, billion USD	2013	2014	2015	2016	2017	2018	2019
Deposits	11.793	6.099	15.748	8.040	6.246	10.731	10.170
FDI	3.001	2.108	2.208	5.223	5.780	4.830	5.329
Portfolio investments	0.172	0.216	0.188	0.121	0.126	0.161	0.172
Hidden capital outflow	0	2.150	0.250	2.800	1.400	2.400	2.448
Round-trip investments	1.055	-1.038	-0.162	0.134	0.270	0.485	1.046
Total capital outflow	13.911	11.611	18.556	16.050	13.282	17.637	17.073
GDP	183.3	131.8	90.6	93.3	112.15	130.8	153.8
Offshoring coefficient, %	7.59	8.81	20.48	17.20	11.84	13.48	11.10

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

According to the results of the calculation, it can be concluded that the Ukrainian economy is characterised by quite significant amounts of capital outflow and a high level of offshoring of the economy. Taking into account the results of the analysis and the negative dynamics of capital outflows and the offshoring coefficient, it can be concluded that state measures to counteract offshoring are ineffective. Therefore, the study of the process of offshoring of the Ukrainian economy should be carried out in more detail.

The next stage of the study is to analyse the degree of influence of various factors on the volume of capital outflows. To perform this analysis, the correlation analysis was used, which will provide for an assessment of the influence of various factors ($x_1, x_2 \ldots x_n$) on the dependent variable (y). Among the factors that can affect capital outflows is the dependent variable (y), selected the following: budget deficit (x_1), GDP (x_2), external debt (x_3), inflation level (x_4), raiding of enterprises (x_5) and the level of public confidence in the banking system of Ukraine (x_6), *round-trip* investments (x_7). The results of the analysis are presented in Table 2.

Results of constructing a mathematical model of the influence of various factors ($x_1, x_2 \ldots x_n$) on the level of capital outflow (y) and the scale for assessing this impact are shown in Table 3.

Table 2. The amount of influence of established factors ($x_1, x_2 \ldots x_n$) on the volume of capital outflows (y)

	y	x_1	x_2	x_3	x_4	x_5	x_6	x_7
y	–	0.1285	-0.3033	-0.4224	0.57704	0.81254	-0.3771	0.36884
x_1	0.1285	–	-0.4152	-0.3019	0.73139	0.17404	-0.0926	0.10771
x_2	-0.3033	-0.4152	–	0.81365	-0.7246	-0.1849	0.53034	0.55183
x_3	-0.4224	-0.3019	0.81365	–	-0.4238	-0.6063	0.90677	0.24996
x_4	0.57704	0.73139	-0.7246	-0.4238	–	0.21599	-0.0921	-0.2746
x_5	0.81254	0.17404	-0.1849	-0.6063	0.21599	–	-0.711	0.38048
x_6	-0.3771	-0.0926	0.53034	0.90677	-0.0921	-0.711	–	-0.0537
x_7	0.36884	0.10771	0.55183	0.24996	-0.2746	0.38048	-0.0537	–

Source: developed by the author based on data from [23-25]

Table 3. Results of calculating the influence of factors ($x_1, x_2 \ldots x_n$) on capital outflow (y)

Indicator value	Impact level	Factor
0.1-0.25	Minor or no impact	x_1
0.25-0.5	Weak dependence	x_2, x_3, x_6, x_7
0.5-0.8	Dependence is above average	x_4
0.8-0.99	Significant impact	x_5

Source: developed by the authors

Based on the results of the analysis and the constructed mathematical model a significant level of influence and dependence of the factor was established x_5 (0.81254), which is identified as the level of corporate raiding in Ukraine. In accordance with this, it can be concluded that one of the most important reasons affecting the volume of capital outflow, in addition to the state's tax policy, is the high level of raiding. Using the graphical method, the study presents the dynamics and level of relationship between the level of raiding in Ukraine and the coefficient of offshoring of the Ukrainian economy (Fig. 1).

The relationship between the level of raiding in Ukraine and the volume of capital outflow from Ukraine is shown in Figure 2. Thus, it can be concluded that the level of raiding has a significant impact on the volume of capital outflow and on the coefficient of offshoring of the Ukrainian economy.

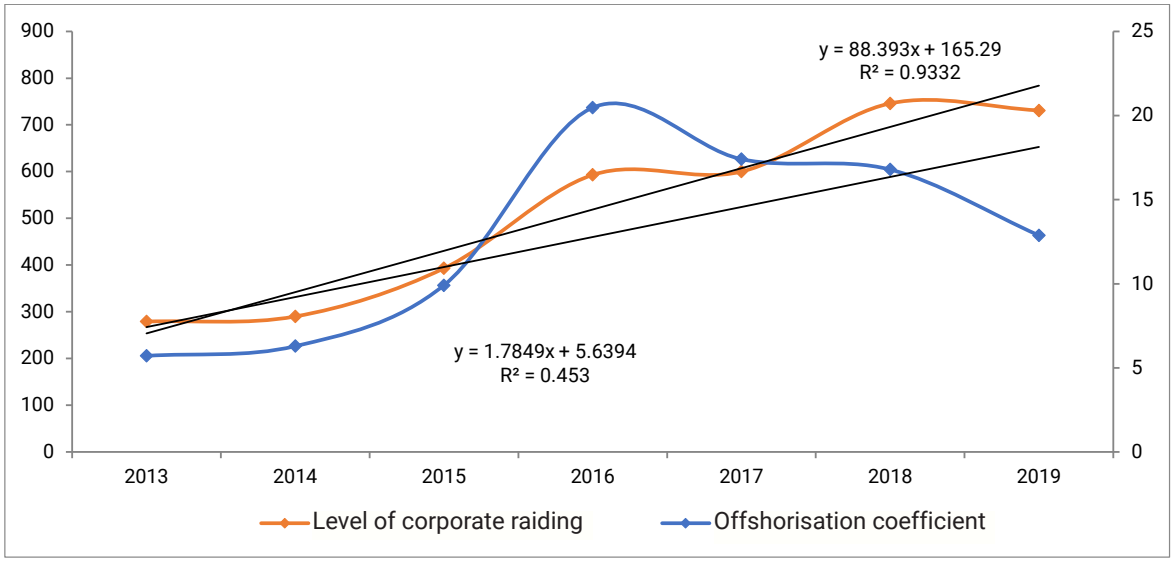

Figure 1. Relationship between the level of corporate raiding in Ukraine and the offshoring coefficient of the economy
Source: developed by the authors

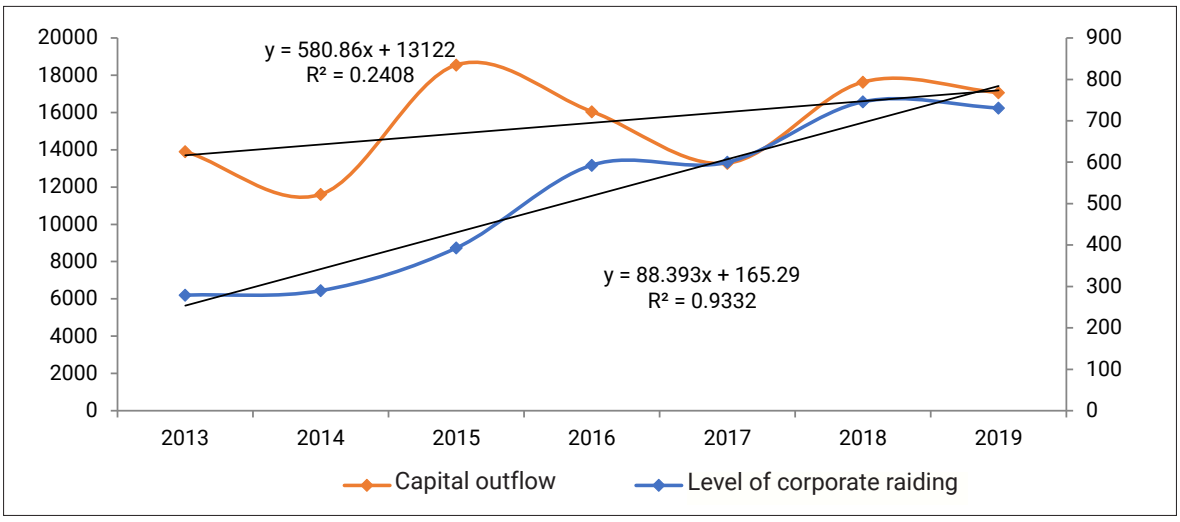

Figure 2. Relationship between the level of corporate raiding in Ukraine and the volume of capital outflow
Source: developed by the authors

In general, the level of corporate raiding significantly affects the outflow of capital from Ukraine and the level of offshoring of the Ukrainian economy. In addition, it is necessary to take into account the findings of empirical studies on the relationship between political risks and capital outflows, which were carried out for a significant number of developing countries [21]. The results of the analysis show that there are stable relationships and a significant level of influence of political risks on the volume of capital outflows, especially for developing countries (in this case, for Ukraine), since in most cases there is a relatively strong correlation. These empirical calculations are also confirmed by the analysis of the number of established enterprises in offshore companies from 1992 to 2016 [24]. According to this, the largest number of offshore companies was registered during the crisis, especially during the periods of institutional crises in 1999 and 2007 [20; 24]. According to this, the reasons for capital outflows and offshoring of the economy are also the desire to protect property rights that are violated and cannot be fully secured by the state.

In Ukraine, in particular, there is a significant level of regulatory and political influence on Business, a high level of corruption, a significant amount of harassment and raider seizure of business, especially in 2001-2015 [7; 24]. Therefore, one of the important reasons for the offshoring of the Ukrainian economy is an attempt to protect the business from these threats. It can be assumed that the neglect of these threats and the lack of measures to counteract them caused the inefficiency of measures to de-offshorise the economy.

Taking into account historical aspects and current trends, offshoring should be considered not only as a process of tax evasion, but also as a process of optimising economic activity, which to a certain extent contributes to economic development. According to researchers [15], the number of tax payments and the amount of tax asymmetry are influenced not only by tax rates and the amount of fines for non-payment of taxes, but also by the dominant moral and ethical values, the level of social responsibility of business and the level of its trust in the government. The level of trust implies the belief that tax revenues are used to improve the well-being of the population, and are not the object of corruption activities. A high level of social responsibility and trust in the government contributes to the establishment of a tax culture of business. As a result, the volume of tax revenues increases and the level of tax asymmetry decreases. But the low level of trust in the government and social responsibility of business contributes to the offshoring of the economy. These research results and conclusions are particularly relevant for the Ukrainian economy.

Summing up the results of the analysis, it should be noted that the urgent problem is the need to de-offshorise the economy to ensure the economic security of the state. It is estimated [20] that annual capital leaks from Ukraine amount to about USD 11 billion. In accordance with this, an equally important area of activity is to facilitate the return of previously withdrawn capital to Ukraine, which would boost economic development, reduce external debt, and increase GDP. Notably, in Ukraine, the amount of capital withdrawn significantly exceeds the amount of external debt of the state. In particular, this ratio (capital outflow/external debt) is 1.29 [1]. That is, the amount of capital withdrawn is 29% higher than the amount of external public debt. In accordance with this, creating favourable conditions for de-offshoring of the economy and the return of previously withdrawn capital would have a significant impact on GDP growth and the well-being of the population.

It is worth noting that offshoring has become a threat not only to the Ukrainian economy, but also to the economy of many countries and the global economy as a whole. That is why the OECD has developed a plan in 2013: *BEPS* – a plan to counteract the erosion of the tax base and the withdrawal of profits from taxation [26]. Its main task is to prevent the outflow of capital to offshore jurisdictions. More than 100 countries, including Ukraine, have joined the plan, which has declared a number of measures and intentions to combat the offshoring of the economy. Notably, active work is underway to form the Bureau of Economic Security of Ukraine and transfer to it all functions related to the de-offshoring of the economy. All these circumstances once again confirm the relevance of the findings, since their use in the implementation of the *BEPS* plan and the establishment of the main functions and activities of the Bureau of Economic Security would contribute to improving the effectiveness of measures to de-offshorise the economy. Therefore, to effectively combat offshoring, it is necessary to direct all efforts to protect property, intellectual and other rights that are not provided in Ukraine, namely, protecting businesses from corporate raiding, access to effective and reliable financial instruments on the international market, and so on. Therefore, based on the findings of the study, it is appropriate to introduce a number of measures to de-offshorise the Ukrainian economy.

Firstly, it is necessary to improve the institutional and legal support for de-offshoring. The implementation of these measures is possible by creating a department for combating corporate raiding and protecting the economic rights of citizens within the Bureau of Economic Security of Ukraine. It is necessary to give this division a wide range of powers to monitor, prevent and counteract raiding, promote the protection of property and intellectual rights of citizens, legal entities, and foreign investors. These measures should be based on the relevant legal norms.

Secondly, to improve the market business environment and investment climate. Such measures should be systematic and include increasing the transparency of the judiciary, developing financial infrastructure, restoring the authority of the government and state institutions, and increasing the investment attractiveness of the economy by eliminating political risks. In particular, it is necessary to exercise strict control over the amount of external debt, the size of which in relation to GDP significantly exceeds the recommended limit (60% of GDP), which significantly reduces the investment attractiveness of the state and indicates the existence of a significant number of risks for investors.

Thirdly, at this stage, practical efforts to counteract offshoring should also be aimed at developing effective mechanisms for asset recovery and legalisation and capital amnesty. Since the need to take into account the sustainable relationships between FDI and *round-trip* investments and their impact on the economic security of the state in the process of forming measures to de-offshorise the economy.

Conclusions

The study is devoted to the characterisation of offshoring as an economic phenomenon inherent in the modern economy. Its relevance is conditioned by the stunning scale of the offshoring of the Ukrainian and global economy as a whole. Offshoring of the economy is a negative phenomenon for the state economy, as it significantly increases the size of the shadow economy and affects the economic security of the state. However, the increase in the level of offshoring is caused not only by the desire of businesses to reduce or avoid paying taxes, but also by a number of other reasons that have been identified and considered.

A methodology for calculating the total volume of

capital outflow from the state economy is proposed, which provides for calculating the amount of deposits in foreign banks, the volume of FDI in the economy of foreign countries, the volume of portfolio investments abroad and the amount of hidden capital outflow abroad minus the volume *round-trip* investments. Thus, it became possible to more reliably calculate the coefficient of offshoring of the Ukrainian economy.

A list of the main factors affecting the level of offshoring of the state economy, except for tax policy, is compiled. These factors include: the state of the economy, the level of raiding, the protection of property and corporate rights, investment guarantees and the level of investment risk, the level of public confidence in the banking system, the level of corruption, and the volume of round-trip investments.

As a result of the analysis and mathematical modelling, a significant impact of the level of raiding on the level of offshoring of the state economy has been established. It is concluded that the inefficiency of measures to de-offshorise the economy is the reason not only for tax policy, but also for a significant level of raiding, violation of other property rights of business entities, excessive administrative pressure from fiscal authorities and political pressure on business, a high level of corruption and distrust of the government and the banking system. In accordance with this, the development of a system of measures to counteract these factors would contribute to the de-offshoring of the economy and ensure the economic security of the state.

It is proposed to use the results of the study of factors influencing the offshoring of the Ukrainian economy in the creation of economic policy and de-offshoring of the economy. In particular, it is recommended to create a department for combating corporate raiding and protecting the economic rights of citizens within the Bureau of Economic Security of Ukraine. It is also recommended to direct practical efforts to counteract offshoring to the establishment of effective mechanisms for the return and legalisation of assets.

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Офшоризація як загроза економічній безпеці держави: причини та шляхи протидії

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Анотація. Обсяги відтоку капіталів з України в офшорні юрисдикції стали доволі масштабними та становлять загрозу для економічної безпеки держави, натомість заходи щодо деофшоризації економіки не є ефективними. Тому, дослідження спрямоване на встановлення чинників, що впливають на рівень офшоризації економіки, окрім податкової політики держави та на розробку заходів щодо деофшоризації економіки держави. У дослідженні використовувались загальні і спеціальні методи пізнання, методи економічного, математичного і статистичного аналізів, метод дедукції та теоретичного узагальнення. Здійснено теоретичний аналіз офшоризації як економічної категорії, визначено масштаби офшоризації світової економіки, її вплив на економічну безпеку держави, що обґрунтувало актуальність обраної тематики дослідження. Виділено основні чинники впливу на рівень офшоризації економіки, окрім уникнення та ухиляння від сплати податків. Запропоновано методику та алгоритм визначення загального обсягу відтоку капіталу та здійснено розрахунки загального обсягу відтоку капіталу з України за 2013–2019 роки. Проведено кореляційний аналіз для встановлення рівня впливу визначених чинників на рівень офшоризації економіки України. Побудовано математичну модель впливу зазначених чинників ($x_1, x_2 \dots x_n$) на рівень офшоризації економіки (y), що дала змогу визначити чинники, що найбільше сприяють збільшенню обсягів відтоку капіталів з України. Проведено порівняння рівня рейдерства, коефіцієнта офшоризації та обсягів відтоку капіталу з України та зроблено висновок про їхню стійку взаємозалежність. Ґрунтуючись на отриманих результатах дослідження розроблено основні шляхи деофшоризації економіки України в процесі створення та формування Бюро економічної безпеки України. Запропоновано у складі зазначеного бюро створити підрозділ, що виконуватиме функції протидії рейдерству та порушення майнових прав суб'єктів підприємництва. Передбачається, що ці заходи сприятимуть деофшоризації економіки і забезпеченню економічної безпеки держави. Результати дослідження можуть бути використані для формування законодавчого та інституційного забезпечення деофшоризації і забезпечення економічної безпеки держави, зокрема, на основі результатів дослідження рекомендується сформувати основні напрями роботи та функцій новоствореного Бюро економічної безпеки України

Ключові слова: офшор, відтік капіталу, інвестиції, деофшоризація, рейдерство, безпека

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Enterprise Integration Models: Advantages and Challenges of Implementation in the Context of the COVID-19 Pandemic

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Abstract. The relevance of the study of the choice of enterprise integration model is related to the need to solve various problems faced by Ukrainian enterprises in the context of the COVID-19 pandemic, including: reduction in profitability, reduction in investment, increase in the level of costs for ensuring the protection and safety of employees, the transition to environmental and savings production, and others. The purpose of the study is to analyse the existing Ukrainian and foreign business models based on synergy and integration, which allows creating a business structure. The theoretical and methodological basis of the study is general scientific and specific methods used to solve the problem of operation, integration, and development of enterprises in the context of the COVID-19 pandemic. The paper summarises the problems faced by Ukrainian enterprises amid the COVID-19 pandemic. It is proposed as one of the ways out of the crisis of Ukrainian enterprises after the COVID-19 pandemic, the transition to business models based on synergy and integration with the formation of a business structure. For this purpose, Ukrainian and foreign models of creating business structures based on synergy and integration are summarised. The following models developed by Ukrainian researchers are identified: the model of a horizontally integrated business structure; the model of a vertically integrated business structure; the model of a globally integrated business structure; the model of a conglomerate-integrated business structure. The following models developed by foreign researchers are also summarised: a model for quantifying the impact of enterprise integration on the results of its activities; an information model; a model for designing and implementing an integrated enterprise system; a "three-lens" model; a business case model; a model for inter- and intra-organisational cooperation

Keywords: business structures, business models, system approach, coronavirus disease, supply chains

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Introduction

The COVID-19 pandemic has led to the suspension of business around the world due to the introduction of a lockdown. The largest losses were suffered by industries that depend on political factors, trade disputes between countries and other geopolitical changes, namely: metallurgy, mechanical engineering, light industry. Since the beginning of the pandemic, the volume of industrial output in Ukraine has decreased by 8%, and more than 20% of enterprises have closed [1]. According to data of Centre for Applied Research [2], only in Kyiv, more than 35% of enterprises stopped working, 16% of staff was reduced.

The main problems faced by Ukrainian enterprises in the context of the COVID-19 pandemic were:

1. Reduced profitability and reduced investment. In order to survive the lockdown, Ukrainian enterprises are forced to suspend programmes for the modernisation of fixed assets, and investments are reduced by 10-16 %. "Analysing the activity of producers in the conditions of previous crises, this indicator may fall to 32-35%" [1]. The situation is aggravated by a significant decline in market demand, falling prices for products, which leads to a reduction in the net profit of enterprises.

2. Increase in the level of costs for ensuring the protection and safety of employees. Starting from the end of 2020, enterprises were forced to increase the level of costs for ensuring the protection of personnel's health (purchase of personal protective equipment and temperature screening systems, carry out disinfection of premises, organise work taking into account social distance and other anti-epidemic measures). In order to reduce the spread of the pandemic, public transport was used to transport personnel to their place of work. All this led to an increase in the cost of labour protection measures, which increased by 18-27% in 2020 [1].

3. Implementation of the principles of environmental and savings production. The pandemic has increased the need for more rational use of resources, due to a significant increase in their price (especially energy carriers) and supply disruptions. The introduction of savings production measures would allow the company to reduce the cost of production, integrate into global production and sales chains, compensating for financial losses due to lockdown.

4. Supply chain protection. The failure of supply chains has not greatly affected the functioning of Ukrainian enterprises, as they are just joining global supply chains, gradually starting to export products with high added value. Ukrainian enterprises of the agro-industrial complex and the pharmaceutical industry are more active in this direction.

5. Digital transformation of the business. The pandemic has accelerated the digital transformation of businesses. The introduction of electronic resource planning systems, automation of production processes, the transition of personnel to remote work and other measures helped to maintain the efficiency of business processes of Ukrainian enterprises during quarantine. According to a study conducted in 2020 by the Association of Employers of Ukraine on the topic "Business and COVID-19: survive cannot die" [3], it was found that the most serious problems of functioning of enterprises in quarantine conditions are that: business partners of the enterprise have been negatively affected by quarantine restrictions and do not carry out normal economic activities (74% of respondents), suppliers are not able to ensure timely deliveries (49%) and insufficient working capital to pay staff and operations (34%). Therefore, 53% of business managers do not have a plan to ensure continuous work in the context of a pandemic. "An assessment of the safety margin of enterprises under quarantine conditions shows that a third of the surveyed enterprises would be able to survive from 2 to 3 months. Almost a fifth believes that their business would only be viable for 1-8 weeks, while another fifth expects their business to survive for 3-6 months. Only 6% of respondents were not affected by the coronavirus" [3]. This indicates that the crisis of business activity caused by COVID-19 has slowed down business growth.

The complication of business conditions has led to the need to restructure traditional business processes, change economic priorities and solve a number of new problems faced by enterprises. At the same time, the COVID-19 pandemic has provided a unique opportunity to overcome the traditional attitude of enterprises to products, personnel and technologies as separate components and combine their capabilities into a new development model based on synergy and integration with the formation of integrated business structures – business structures.

The purpose of the study is an analysis and systematisation of business models based on synergy and integration with the creation of a business structure. According to the established goal, the objectives of the study are: generalisation of Ukrainian and foreign business models based on synergy and integration; identification of advantages and disadvantages of implementing these models on business structures in the context of the COVID-19 pandemic.

Literature Review

Given the multifaceted problems of enterprise integration and various aspects of the creation of business structures in a pandemic COVID-19, this issue is considered by Ukrainian scientists, including U.Z. Vatamanyuk-Zelinska [4], V.M. Horbatov [5], N.V. Zakharchenko [6], I.I. Kryshtopa [7], N.D. Maslij [8], I.M. Miahkykh [9], O.M. Nifatova [10], A.A. Pylypenko [11], I.V. Strutynska [12], N.S. Skopenko [13] and many others. In their studies, the problems of integration of enterprises at the micro level are considered from different aspects, namely: taking into account in the process of integration of enterprises of the business environment and the development of special mechanisms of integration of enterprises [4]. Development of a model of competitive interactions between integrated structures in the strategic economic zone, based on the theory of interspecies competition and assessment of the competitiveness of integrated structures [5]. Issues of the integration development of high-tech industrial enterprises in the context of the implementation of the model of high-tech economic growth [6].

Construction of strategic accounting of integrated business from the standpoint of systems theory and the use of a set of risk management tools [7]. Identification and calculation of the compatibility potential of enterprises of the integrated structure by choosing a business partner, based on the analysis of socio-cultural, scientific and technological, organisational, financial and economic, territorial and legal aspects of the potential business partner [8]. Management of economic development of integrated enterprises (for example, airlines), which includes reflected by the relevant classes of models of the relationship between performance indicators for each of the selected potentials, determines the stages of economic development and is a system of interrelated tasks of enterprise identification in the integrated business structure, that provides their ability to establish factors of influence and organise a gradual process of formalisation of the behaviour of the enterprise as an economic system, according to the selected optimal of the developed scenarios [9]. Assessment of the potential of the intellectual synergy of the integrated business structure on the basis of branding [10]. Study of institutional regulation of processes and relationships between integrated enterprises focused on the regulation of norms and rules of conduct of locally optimised organisational systems with the allocation of strategic accounting functions [11]. Development of a polystructural approach to the definition of the Index of digital transformation of business structures and the algorithm of road maps of digital transformation of business structures [12]. Analysis of integration processes taking into account the key goals of integration activities, the stage of the integration life cycle and a set of methods of the four-level system of analytical procedures to the retrospective, operational, and forecast assessment of financial, economic, investment and integration activities of enterprises in the process of tactical integration [13].

Ukrainian scientists focus on considering the processes of creation, functioning, and development of enterprises as integrated business structures. The study is aimed at solving certain problems that would contribute to the integration interaction and development of enterprises, namely: building strategic accounting in the strategic management system of integrated business structures; features of functioning, development and interaction of locally organised integrated associations of industrial enterprises; the digital transformation of Ukrainian business structures; competition between integrated business structures in a new highly concentrated economy; the formation of professional associations, professional compliance, institutional capacity and corporate social responsibility as the basis of collective economic and food security of integrated structures; the establishment of mechanisms for integration interaction of enterprises taking into account the business environment and many others. The object of most studies is the enterprises of the agricultural sector and food industry of Ukraine, since they are the most economically active.

In the works of foreign scientists, the problems of enterprise integration at the micro level are studied in the context of integration management, as a long-term process in which not only integrated enterprises can participate, but also auxiliary consulting companies [14]. All integration entities operate according to the "Pathfinder" or "Circle of Fortune" model, which determines a clear sequence of actions of enterprises that want to merge. The symbiotic integration model is considered in the study [15]. The author suggests a slow evolutionary unification of enterprises by preserving the culture of subsidiaries and developing the relationships necessary to achieve the goals set for the new structure. However, today the issues of choosing a model for the creation of integrated business structures – business structures – remain new and, accordingly, not sufficiently studied.

Materials and Methods

The methodological basis of the research is scientific works and publications of leading Ukrainian and foreign scientists and specialists on the problems of functioning, integration and development of enterprises and business structures in the context of the COVID-19 pandemic. The study uses a monographic method – during the analysis of published papers by foreign and Ukrainian scientists on the features of enterprise integration in the context of the COVID-19 pandemic; qualitative analysis and synthesis – to determine the main directions of enterprise integration and the creation of business structures caused by different degrees of environmental influence in the context of the COVID-19 pandemic. Based on methodological principles (unity, theory and practice, historical approach to the study of the problem, objectivity, comprehensiveness, systematic methodological requirements for conducting scientific research) and a systematic approach, the analysis of the problems of operation of Ukrainian enterprises in the context of the COVID-19 pandemic is carried out. When studying the problems of enterprises' activities amid the COVID-19 pandemic, methods of scientific observation, reverse analysis, and generalisation were used.

The study is based on a systematic method of cognition of processes and phenomena in their interrelation and development, used in the generalisation of enterprise integration models, as well as data obtained by the author in the course of specially organised research and surveys of specialists of Ukrainian enterprises. Models of integration of Ukrainian business structures have been developed using the modelling method. During the analysis of Ukrainian and foreign models of enterprise integration, the advantages and disadvantages of each model were identified using SWOT, PEST, and SNW analysis methods. The most productive way is to consider the model of enterprise integration from the standpoint of a systematic approach, which helps to study the integrity of the business structure as an object that functions at different levels of the integration system in the structure of the national economy, in which each element has a specific functional purpose.

Using the SWOT analysis method, the advantages and disadvantages of each integration model were identified;

the vision of prospects for the development of business structures in the context of the COVID-19 pandemic was formed based on the results of PEST and SNW analyses; the choice of the optimal integration model was based on the methods of system analysis, synthesis and generalisation.

Results and Discussion

According to the optimistic scenario, it is planned to activate multilateral cooperation and integration processes as one of the directions of global economic recovery after the end of the COVID-19 pandemic. This is confirmed by the historical experience of humanity's reaction to global shocks, which resulted in the creation of various integration associations (UN, NATO and others) and integrated enterprises in the form of transnational corporations (TNCs). Negotiations are already actively underway to eliminate trade duties between the two countries, search for ways to in-depth sectoral cooperation localisation in target markets, technological and industrial integration [16].

Under the influence of the COVID-19 pandemic, a new economic model of development is being formed, called the "post-COVID19 economy", the main directions of development of which are:

1. "Nationalisation" of the economy, integration and concentration of critical production chains within economies, limiting or reducing the share of global trade operations [16].

2. "Virtualisation" of business and economy, such as transfer a significant amount of business activity to the virtual world. Today, 39% of business leaders surveyed suggest that the COVID-19 pandemic has significantly accelerated the digital transformation of their business. This allowed transferring some employees to remote work and reduce the number of office space [17; 18].

3. Changes in the work of staff. With the transition to remote work, there was an increase in the share in the service sector where personal contact is not required, the introduction of strict sanitary and epidemiological standards and measures where it is impossible to abandon personal contacts, an increase in the robotisation of production processes, and so on. However, despite the transition of employees to remote work, 68% of managers believe that communication with employees has improved during the crisis [17; 18].

3. Restrictions and the mass transition of enterprises to non-cash operations.

4. Increasing the role of the state, nationalisation or purchase of problematic or critical enterprises, enterprise integration, and so on. Despite "falling economic indicators in Ukraine, 72% of managers expect their organisations' profits to grow in the next 3 years" [3]. This directly depends on how quickly it is possible to make the necessary changes to the existing business model after the pandemic.

One of the directions of recovery of Ukrainian enterprises from the crisis after the COVID-19 pandemic is the transition to business models based on synergy and integration with the creation of a business structure. A business structure is a voluntary integration entity that can include several enterprises and, if necessary, freelancers as separate business entities [19]. Models of creation of business structures (BS) based on synergy and integration, developed by Ukrainian researchers are as follows (Fig. 1):

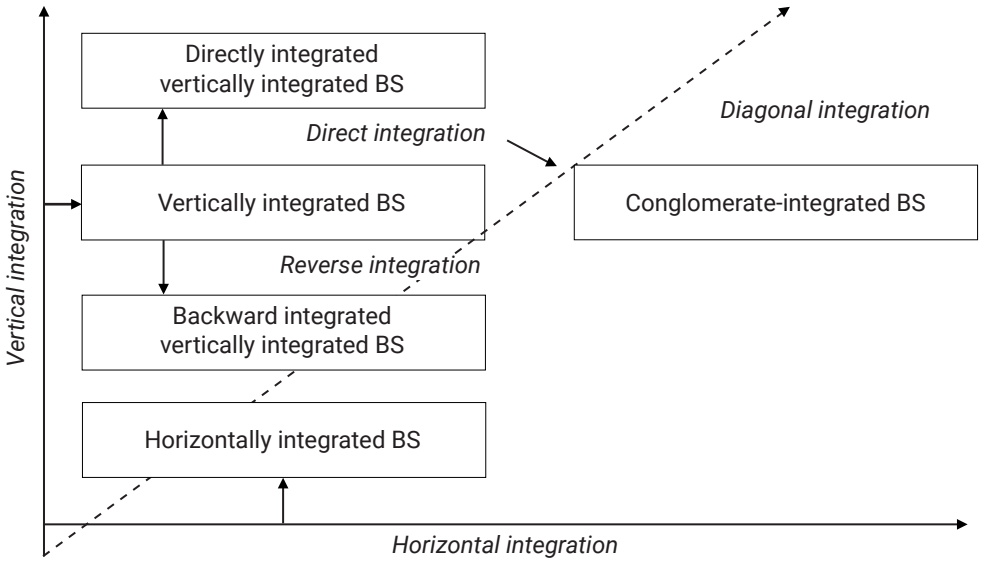

Figure 1. Models of creation of business structures

Source: developed by the author

Horizontally integrated business structures are formed as a result of the influence of the horizontal integration process. This method combines enterprises within the same industry that operate at the same stage of the production process. Horizontal integration, as noted by G.V. Ortin, provides for the "integration of enterprises at the same stages of production, operating and competing in one market segment, in one industry and specialising in the production of the same or similar products or the provision of the same or similar services" [20]. The advantages and disadvantages of creation horizontally integrated business structures in the context of the COVID-19 pandemic are shown in Table 1.

Table 1. Advantages and disadvantages of crating horizontally integrated business structures in the context of the COVID-19 pandemic

Model of BS	Advantages of BS	Disadvantages of BS
Horizontally integrated	• Building the capacity of an integrated enterprise; • Increasing market share; • market leadership; • Reducing market competition by combining competing businesses; • Savings on production scale	• Monopolisation of the industry; • Creating barriers to new businesses entering the market; • Price wars; • Reducing the product range

Source: developed by the authors based on [19]

As a result of the development of horizontal integration processes within the industry, integrated associations (horizontally integrated business structures) are formed, which "are most often understood as a set of enterprises (both from one industry and from different industries) that operate as a single system and have a common management goal. Along with this, enterprises that are part of the integrated structure are integral financial and property complexes that can independently perform production and commercial operations, effectively carry out economic and financial activities and be competitive in the market" [21].

The creation of a vertically integrated business structure occurs due to the vertical integration of enterprises and can be carried out in two directions: forward and reverse. For direct vertical integration (*forward integration*) there is business development in the supply chain and the production process is controlled. Directly integrated business structures are formed as a result of the integration of enterprises upwards, that is, by establishing integration ties with the consumer enterprise of products (services). For example, a car manufacturer teams up with a distributor of automotive spare parts, or buys a car dealership to sell its own cars. This provides the business structure with more revenue and brings it closer to the consumer. During reverse vertical integration (*backward integration*) there is a combination with an enterprise that operates in the supply chain and produces raw materials and/or products for the production of products of the buyer's enterprise. Backward-integrated business structures are formed as a result of the integration of enterprises downwards, that is, by establishing integration ties with the enterprise-supplier of products (services). The advantages and disadvantages of creating vertically integrated business structures in the context of the COVID-19 pandemic are presented in Table 2.

Table 2. Advantages and disadvantages of creating horizontally integrated business structures in the context of the COVID-19 pandemic

Model of BS	Advantages of BS	Disadvantages of BS
Vertically integrated	• Association with suppliers of raw materials (materials, components); • Obtaining uninterrupted supplies of raw materials (materials, components); • Entering new commodity markets; • Refusal of intermediaries and contractors' services; • Increasing market share; • Monopolisation of the industry	• Refusal of services from suppliers who are not part of the business structure; • Loss of flexibility of the business structure; • Weak reaction to changes in market conditions; • Focus on the chosen field of activity; • Creating barriers for other enterprises to access raw materials

Source: developed by the authors based on [19]

The creation of a business structure through vertical integration can also be carried out through internal expansion of activities, mergers or acquisitions. The business structure is vertically integrated only when it controls two or more stages in the supply chain. Conglomerate-integrated business structures are formed as a result of conglomerate integration, as a process that involves combining enterprises that are included in an unrelated business. The conglomerate integration model allows building integration links with an enterprise that is not adjacent, but is included in a technological chain that includes potentially adjacent enterprises. Advantages and disadvantages of creating horizontally integrated business structures in the context of the COVID-19 pandemic are presented in Table 3.

Table 3. Advantages and disadvantages of creating horizontally integrated business structures in the context of the COVID-19 pandemic

Model of BS	Advantages of BS	Disadvantages of BS
Conglomerate-integrated	• Less dependent on the influence of the external environment; • More competitive due to the integration of all chains from supply to sales	• Loss of flexibility of the business structure; • Weak reaction to changes in market conditions; • Complexity of BS management processes

Source: developed by the authors based on [19]

The creation of a globally integrated business structure is the result of the manifestation of integration processes at the enterprise level on a global scale [20]. Such business structures are called transnational corporations (TNCs). The advantages and disadvantages of creating vertically integrated business structures in the context of the COVID-19 pandemic are shown in Table 4.

Table 4. Advantages and disadvantages of creating horizontally integrated business structures in the context of the COVID-19 pandemic

Model of BS	Advantages of BS	Disadvantages of BS
Globally integrated	• Monopolisation of global industries; • Transfer of production to "third" world countries with cheap raw materials and low cost of human resources; • Minimisation of customs tariffs and taxation; • Access to new technologies is not restricted; • Creating new jobs in different countries	• Influence on the government of the countries where TNC branches are located; • Withdrawal of assets of branches located in other countries to the parent company or to offshore zones; • Creating barriers for other businesses to enter global sales markets; • Transfer of environmentally hazardous industries to the "third" world countries

Source: developed by the authors based on [19]

According to the "Fortune Global 500" rating, which is maintained by the American Business magazine Fortune, since 1995 there have been 500 transnational corporations operating in the world. Such business structures are multi-level and are structured in different directions, that is, "corporate associations and individual enterprises can be part of inter-country business structures" [22]. Foreign scientists offer the following models of forming business structures based on synergy and integration, which are relevant in the context of the COVID-19 pandemic, which include:

1. *Model of quantitative assessment of the impact of enterprise integration on the results of its activities* [23]. The model is based on the implementation of data coverage analysis (DCA) and the microeconomic concept of marginal rates. DCA data coverage analysis is used to assess the marginal benefits of enterprise integration. This allows measuring and comparing the production efficiency of integrated enterprises, in particular by correlating the benefits obtained with the resources consumed in the process.

2. *Information model* [24]. An information model based on representations for enterprise integration into processing industries, which divides the subject area space into 16 subgroups, organised as 4 components of the subspace: essence, behaviour, tasks and contractor, and 4 types of models: data, behaviour, activity, and contractor. The analysis carried out using such an enterprise integration model allows obtaining information about the vertical relationships between different levels of model decomposition, which is the key to enterprise integration. The model presents a specification of 4 types of components (models) that are used in the enterprise integration project, which is carried out on the example of traditional Chinese medicine.

3. *Model of design and implementation of an integrated enterprise system* [25]. This model includes various technological, human, and organisational elements. Several different reference architectures have been proposed to build the model. It is mainly a structure consisting of a step-by-step methodology, reference models and a set of auxiliary tools that would allow creating an integrated enterprise. The model was used as a research project for reference architectures on enterprise integration of the IRIS group from the University of Haume I Castellon.

4. *"Three-lens" model* [26]. The model provides a new perspective for enterprise integration and improvement programmes. The three-lens model is based on a methodology for synthesising different approaches to BPR (*Business Process Reengineering*), which included examples of consulting organisations and developed methodologies of large companies and consists of several stages: strategy development; identification of key processes; analysis of existing processes; process redesign; implementation. Each lens describes one of the key aspects of the enterprise's activities: "Technology", "Product", "Discipline" and helps to choose approaches to integration and improvement of enterprises by systematically considering all three lenses.

5. *Business case model* [27]. The model is based on a business case methodology with case studies to illustrate aspects of using business cases and blue printing in enterprise integration technologies and increasing ROI or investment to create shareholder value that is achieved in the enterprise integration process.

6. *Model of Inter-and intra-organisational cooperation* [28]. Modern global markets lead to the emergence of large integrated enterprises that unite various companies located in many countries of the world. Management and decision-making in such organisations mainly depend on the availability and usability of information used by different enterprises and should be equally perceived and understood by each enterprise. The use of corporate technologies and technologies of internal organisational integration of the model helps to get a general idea of information coming from different sources.

An enterprise that intends to integrate and form a business structure independently chooses a partner and integration model, taking into account its own strengths and weaknesses, threats and opportunities for further development in the context of the COVID-19 pandemic. The

effectiveness of using various models of forming business structures based on synergy and integration for the exit of Ukrainian enterprises from the crisis caused by the COVID-19 pandemic is confirmed by research conducted by the USAID Small Business Index [17], which revealed that a business that belongs to any business associations has significantly higher performance indicators in sales, access to resources and profitability. This indicates that if there are business associations on the territory of the community or the community cooperates with business structures, there is a positive impact on the development of the business as a whole.

Conclusions

In order to get Ukrainian enterprises out of the crisis caused by the COVID-19 pandemic, it is proposed to step up the integration process at enterprises and form business structures. A business structure is understood as a voluntary integration entity, which can include both several enterprises, and, if necessary, freelancers, as separate business entities. The creation of a business structure is possible through the transition of enterprises to business models based on synergy and integration. At the same time, the creation of business structures occurs in the process of integration of several enterprises, depending on their goals and objectives, which are defined by enterprises, and has different forms in space and time, which is amplified and accelerated by the global processes of globalisation and the impact of the COVID-19 pandemic.

The study summarises the integration models developed by Ukrainian researchers, namely: horizontal integration model; vertical integration model; conglomerate integration model; global integration model. Among the integration models developed by foreign researchers, models of quantitative assessment of the impact of enterprise integration on the results of its activities were selected; information model; model of design and implementation of an integrated enterprise system; model of "three lenses"; model of business cases that are most relevant in the context of the COVID-19 pandemic. Each integration model has its own advantages and disadvantages, which should be taken into account when choosing directions and forms of integration of enterprises and forming business structures. The creation of business structures is one of the most effective areas that would help Ukrainian enterprises overcome the crisis caused by the COVID-19 pandemic, restore functioning, obtain additional working capital and investment funds, take a large share of the competitive market, increase sales, increase the level of training of management personnel and profitability of the enterprise. Further research in this area will be aimed at evaluating and developing performance indicators for each business model based on synergy and integration with the development of a business structure.

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Моделі інтеграції підприємств: переваги та проблеми реалізації в умовах пандемії COVID-19

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Анотація. Актуальність дослідження питання вибору моделі інтеграції підприємств пов'язана з необхідністю вирішення різноманітних проблем, які постали перед українськими підприємствами в умовах пандемії COVID-19, серед яких: зниження прибутковості, скорочення інвестицій, підвищення рівня витрат на забезпечення захисту та безпеки працівників, перехід до екологічного та ощадного виробництва та інші. Мета статті полягає в аналізі наявних українських і закордонних моделей бізнесу, заснованих на синергії та інтеграції, які дають змогу сформувати підприємницьку структуру. Теоретико-методологічною основою дослідження є загальнонаукові та специфічні методи, за допомогою яких вирішується проблема функціонування, інтеграції та розвитку підприємств в умовах пандемії COVID-19. У статті узагальнено проблеми, з якими стикнулися українські підприємства в умовах пандемії COVID-19. Запропоновано як один із напрямів виходу українських підприємств із кризи після пандемії COVID-19, перехід до моделей бізнесу, заснованих на синергії та інтеграції з формуванням підприємницької структури. Для цього узагальнено українські та закордонні моделі формування підприємницьких структур, заснованих на синергії та інтеграції. Виокремлено такі моделі, що розроблено українськими дослідниками: модель горизонтально-інтегрованої підприємницької структури; модель вертикально-інтегрованої підприємницької структури; модель глобально-інтегрованої підприємницької структури; модель конгломератно-інтегрованої підприємницької структури. Також узагальнено такі моделі, які розроблено закордонними дослідниками: модель кількісної оцінки впливу інтеграції підприємства на результати його діяльності; інформаційна модель; модель проектування та впровадження інтегрованої системи підприємств; модель «Трьох лінз»; модель бізнес-кейсів; модель між- та внутрішньоорганізаційного співробітництва

Ключові слова: підприємницькі структури, моделі бізнесу, системний підхід, коронавірусне захворювання, ланцюги поставок

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Investment in IT as a Priority Area of Economic Development in Ukraine

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Abstract. In modern economic realities, information technologies are considered the main resource of technological and socio-economic development of the country, because they are used in all spheres of society and the state, and directly affect the overall national situation. Therefore, the study and analysis of the conditions for their attraction are relevant both in Ukraine and around the world. The purpose of this study is to identify the features of attracting investment in information technologies and search for methods to improve the investment environment for this industry. For the furtherance of this goal, the following methods were used: analysis and synthesis, induction and deduction, comparison, scientific abstraction, and modelling. Within the framework of this study, an interpretation of the concepts of "investment" and "information technologies" are provided and their role and functions at the macro and micro economic levels are highlighted; the main aspects of financing and attracting money in the field of IT are considered; the main problems and prospects of investing in this area in Ukraine are identified; the dynamics of attracting investment in information technologies are analysed; methods for improving the investment environment in the field of IT are proposed. The study also analysed the financial sources of attracting investment, listed the advantages and disadvantages of each type of financing, considered the dynamics and structure of innovation at industrial enterprises of Ukraine in 2019, and established the relationship between the volume of attracted monetary investments and the introduction of innovations. In the course of the study, methods for evaluating the effectiveness of investments in the IT field were also considered, the essence, advantages and disadvantages of each of the methods were identified. The practical significance of the work lies in the fact that the results of the study can be used to develop a plan and methods for improving the investment climate in the industry, based on the analysis of its strengths and weaknesses

Keywords: economic development, information products, investment projects, public and private investments, venture capital investments

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Introduction

Information technologies in the 21st century play an important role in all aspects of human activity, and their introduction in all areas: economics, law, medicine, communications, etc., is becoming a new condition for human existence in the global information society. Further development of information technologies is possible only if they are sufficiently funded. Therefore, the leading states actively invest in this area, which in turn leads to an increase in the level of economic development and its competitiveness at the macro level. The development of IT is also a lever for the emergence of new forms of integration into the global economic space, a gap in the levels of financial and economic development between countries in the world, and strengthening the state of competitiveness from micro to macro levels of the state.

Today, IT investment is a promising area of capital investment, as it is constantly developing and its popularity and demand among the population continue to grow. Potential investors with the goal of generating income are interested in placing their own free capital in the IT field. It is generally accepted that the maximum effect of investing in IT technologies is manifested in such economic areas as pricing and sales, logistics, inventory and reserve management, optimisation of production processes such as cost reduction and profit maximisation, growth of labour productivity, and so on.

The issue of attracting investment in the field of information technology has formed the basis of scientific research for many foreign and Ukrainian scientists. Thus, A.V. Katrenko and O.V. Pasternak studied the systemic aspects and characteristics of investing in the IT industry, the state of the IT market in Ukraine and the main priorities of its development and proposed financial methods for evaluating investments in general [1]. A.G. Lyzanets and S.V. Nesterov studied the impact of IT on the development of the labour market, analysed the general features and conditions of the virtual labour market in Ukraine and offered their own recommendations for the legal regulation of such a market [2]. The object of study by D. Dobiya, K.M. Klimchak, N. Roztotsky and H.R. Weistroffer was the reaction of the stock market on the announcement of investments in IT, in particular – in Poland, these scientists analysed the relationship between the reaction of investors and shares of IT companies offered to them by the stock exchange [3].

Of particular interest is the paper by E.V. Chmyreva "Attractiveness of investment projects in the field of information technology", in which the author considers how IT affects business and offers an adequate methodology for evaluating investments in IT projects [4]. B.L. Santos, K. Pefers and D.K. Mauer identified the impact of IT investment on company performance and market response to innovation announcements [5]. Among other world scientists who have studied this issue of IT, the studies by E.F. Fama, L. Fischer, M.S. Jensen, R. Roll [6], V.I. Averchenkov [7], I.P. Malik [8], V. Davidov [9], S.S. Yurchenko [10], A.L. Ryzhko, N.M. Lobanova, N.A. Ryzhko, Ye.O. Kuchynska [11] can be emphasised.

All of the above scientists have achieved significant results in the study of information technologies and their impact on the economic situation of the country, they have proposed important methods for assessing the effectiveness of investment in the field of IT, developed a significant theoretical and practical base for studying the venture investment process. Scientific research by foreign scientists is the basis for the theoretical teachings of Ukrainian researchers, but it is important that when studying IT investment in Ukraine, it is the economic, political, social and legal status of the state that should be taken into account. However, despite a number of developments on this issue, there are still unsolvable tasks, among which the following can be highlighted: the main problems of investing in IT in Ukraine, the reasons for the unsatisfactory investment climate in this area and methods for improving it, the accuracy of calculations of the return on such investments. Analysis of the available literature shows that scientific developments on this issue require updating and systematisation of methods for assessing investment attractiveness, identifying weaknesses and strengths of the country's information sphere. The existence of a number of unresolved aspects was the main reason for studying the topic.

The impact of IT on the life of a person and society as a whole is difficult to overestimate. As noted earlier, now no field of human activity is complete without the use of IT products, and therefore investing capital in the development of such products would have a positive impact on all sectors of the Ukrainian economy. For more effective attraction of funds to IT, the state should create all the necessary conditions for this: regulatory support, investment climate and environment, a system of state standards, grants, subsidies, support startups, finance scientific, technical and innovative activities, and so on.

The *purpose of this study* is to identify the features of attracting investment in IT and search for methods to improve the investment environment for this industry. For the furtherance of this goal, it is necessary to solve the following *tasks*: a theoretical definition of the essence of the concepts of "investment", "venture investment" and "information technology"; determine the role and importance of investing capital in the IT field and the main aspects of investing in IT; suggest methods to improve the investment climate in this industry; analyse several Ukrainian investment projects related to the IT, problems and prospects associated with them; an overview of indicators and dynamics of IT investment over the past few years in Ukraine.

Materials and Methods

The subject of a comprehensive study is the IT investment, and the objects are investments (in particular, venture), information technologies, IT projects and products, the investment climate and environment. To achieve the goal and solve the outlined problems, this study is based on a two-way analysis of the subject matter. On the one hand, the study includes an analysis of previous publications and literature devoted to this issue. On the other hand, to provide

more detailed and up-to-date coverage of the selected topic, the latest available statistics were analysed. The main stages of the study are: collecting the necessary theoretical base, summarising the main aspects and achieving the tasks that form the research goal, putting forward own proposals, summarising and summing up the results.

The tasks set in this paper were solved using a complex of specific and general scientific methods of cognition. Thus, the following methods were used: analysis and synthesis, induction and deduction, comparison, scientific abstraction, and modelling.

The *analysis method* was chosen to reveal the essence of investments, their classification and theoretical substantiation, in particular – for venture investments, and the *method of synthesis* – to combine aspects of investments in IT to study their role in the economic development of the country.

Induction as a method of transition from knowledge of individual facts to knowledge of general information was used in this study to find optimal solutions to improve the investment environment of the industry and to analyse the weaknesses and strengths of IT investment in Ukraine. The *deduction method* as a transition from general patterns to individual facts was used when evaluating the prospects of investment projects.

The *comparative method* is appropriate in the case of interpretation of theoretical concepts, it allows evaluating the definition of scientific concepts by different researchers, find out the patterns and differences between the opinions of scientists and have a broader understanding of the subject under study. Summarisation of conclusions was carried out using the method of *scientific abstraction*.

Modelling methods were used to assess the dynamics of attracted investments to take a more detailed look at their changes over time. This method includes the construction of tables, graphs, and formulas, which indicates a visual interpretation of the results obtained and statistical data. Calculations and construction of models, analysis of statistical data, graphical representation of the results obtained were performed using MS Excel.

The set of materials for writing the article turned out to be quite wide, it included scientific developments of foreign and Ukrainian scientists, papers, books, periodicals, state websites with statistical data (State Statistics Service), and online platforms for investors. The main criteria for evaluating the literature on which the authors relied were: relevance, content, informative content, expediency, compliance with the topic and truthfulness. A *system approach* to the selection of scientific sources for the paper, the definition of the subject and purpose of study, a clear definition of goals and justification of conclusions allowed covering as many aspects of the issue under study as possible.

Results and Discussion

To determine the role of IT investment in economic development, it is necessary to define the concepts of "investment" and "information technology". According to the law of Ukraine "On investment activity" [12], investments are all types of property and intellectual values invested in objects of entrepreneurial and other types of activities, as a result of which profit(income) is generated and/or a social and environmental effect is achieved. According to the specified law, such values can be: funds, targeted bank deposits, shares and other securities (except bills of exchange); movable and immovable property; intellectual property rights; a set of technical, technological and commercial types of knowledge, issued in the form of technical documentation, skills and production experience necessary for the organisation of a particular type of production, but not patented ("know-how"); rights to use land, water, resources, buildings and structures, and other values [12].

A separate type of investment is considered to be "venture capital investments", which is advisable to mention in the context of investments in it. The term "venture" can be interpreted as "risk". Thus, venture capital investments are risky investments in developing companies. The concept of "venture capital investment" is somewhat different in Europe and the United States. American scientists interpret this concept only as an investment in "high" technologies, while in Europe this concept is somewhat broader and includes investments in both IT and objects with a low degree of novelty, but which have a high chance of commercial success [13]. Next, the study considers the meaning of the concept of "information technologies" from the standpoint of several researchers, which will allow for a more accurate formulation of its meaning (Table 1).

Table 1. Interpretation of the concept of "information technologies" by various scientists

Names of scientists	Approaches to the definition
Yu.Yu. Gromov, I.V. Didrich, O.G. Ivanov M.A. Ivanovsky, V.G. Odnodolko	Information technology – a complex system that covers a diverse range of prob-lems, phenomena, and approaches, the specifics of which consist in the intellectual nature of work, the variety of the range of products/services produced is small compared to industrial volumes of products and services of the same name [14]
V.V. Bespalov	Information technology – a broad class of disciplines and areas of activity related to data management and processing technologies, as well as data creation, in par-ticular using computer technologies. Recently, this term is increasingly understood as computer technologies [15]
P.G. Ragulin	Information technology – a set of methods and techniques for obtaining, pro-cessing, and presenting information aimed at changing its state, form, and content, which is carried out in the interests of users. The purpose of IT is to use information for its analysis by a person and make decisions based on it with the performance of certain actions [16]
N.G. Serebryakova, O.L. Sapun, R.I. Furunzhiev	The essence of "information technologies" is formed by two concepts: "technology" and "information". The term "technology" is a set of methods, processes, and materials used in any field of activity, as well as a description of typical methods of technical production using modern methods and tools. The concept of "information" is evidence of something, depending on the forms of their representation [17]

Source: compiled by the authors based on [14-17]

Based on the definition of the concepts of "investment" and "information technology", this study provides a definition of the concept of "IT investment". Thus, IT investment is a type of investment of tangible and intangible values in the development of special systems and complexes for receiving, processing, and presenting information for the purpose of its further analysis and making economic decisions. IT investments can be classified as venture investments, since most of them are risky, but have a high degree of profit in the future. As an economic category, investment performs a number of important functions, without which the development of the economy would be impossible. Speaking about the importance of investments, it is worth dividing their role and impact at two levels – at the macro and micro levels (Fig. 1). Thus, investment is a driving force for economic development and a means of increasing the country's productive potential.

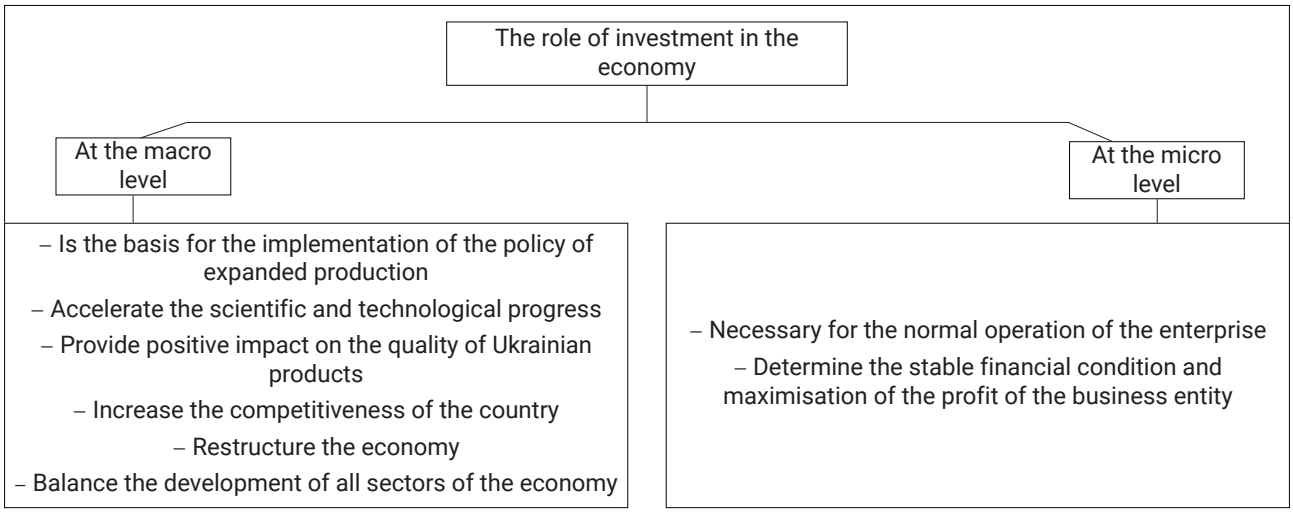

Figure 1. The role of investment in the economy at different levels
Source: compiled by the authors based on studies by I.M. Vorobyova and A.M. Ponomarev [18]

Therefore, taking into account the role of investment in the economy, it can be noted that IT investment is quite an important lever for regulating the economy, is a priority direction for achieving its development and financial stability. The development of the IT field would have a positive impact on the economic side of the country's activities, including on the related areas: legal, social, scientific, etc. Investments in IT are characterised by certain aspects and rules, among which the following can be distinguished:

– decisions about investing in the IT sector are made based on considerations of financial benefits, as well as in other areas of business;

– development of IT should take place based on the needs of the enterprise in terms of managing the organisation. It should also be taken into account that the needs of an organisation should never be determined only by the need to introduce modern information technologies;

– employees of the IT department should have a good knowledge of business needs;

– the consequence of investment in it is the availability of modern information products that create real competitive advantages in the competition for qualified personnel and resources [19];

– it is known that assessment of the investment attractiveness of IT projects is more difficult than assessment of projects in other industries. Furthermore, the cost of assessment of investment attractiveness can significantly exceed the planned costs of the project itself;

– this type of investment is rather risky and intuitive [20].

Currently, the main types of investments in it in Ukraine are: loans, investors' own funds, seed capital (SC), venture investment, and stockholder capital [1]. Table 2 shows the main advantages and disadvantages for each type of investment.

Table 2. Comparative characteristics of investment financing

Type of investment	Advantages	Disadvantages
Own funds	No need to pay interest; fairly high speed of receipt and freedom in decision-making	Small amount of investment; lack of external expertise and consulting support
Loans	The owner does not share the property (as-sets) with the investor	Need to pay interest; lack of material guarantees; bureaucracy
Seed financing	Operational activities are managed by inves-tors with significant experience; develop-ment of an operational plan for entering the market	The project is accompanied only at the launch stage
Venture capital investment	Provision of funds for a long period of time; material collateral is not required, the possi-bility of joint investment	Control of investors in decision-making; availability of intellectual property rights and a completed business plan
Stockholder capital	Significant amount of financial capital; strengthening the company's reputation	Long process of receiving funds; the need to publish "internal" information

Source: compiled by the authors based on study by A.V. Katrenko and O.V. Pasternak [1]

Next, the study analyses the indicators of attracting investment in IT in dynamics over the past few years (Table 3); the structure of innovation introduction and sources of funding for innovative activities of industrial enterprises.

Analysing the data obtained in the IT field, during the study period, the volume of capital investments in professional, scientific and technical activities had a positive tendency to increase (Fig. 2). Thus, in 2019, the largest share in the volume of IT investment was occupied by the following industries: communication systems, activities in the fields of law and accounting, architecture and engineering, technical testing and research. Investment in information and telecommunications has a less positive growth value, the "peak" year for this area was 2018, but the volume of investment decreased the following year.

Table 3. Volume of capital investments in the IT sector in Ukraine, in mln. UAH

Sphere	2014	2015	2016	2017	2018	2019
Information and telecommunications, of which:	8175.1	22975.0	15651.2	18395.2	29884.9	21063.4
– publishing, radio broadcasting, television	1840.8	2304.3	2820.9	3567.8	4744.6	5766.4
– communication systems (telecommunication)	5664.0	19536.4	10705.4	12776.8	21317.8	11734.4
– computer programming and provision of other information services	670.3	1134.3	2124.9	2050.6	3822.5	3562.6
Professional, scientific and technical activities, of which:	2921.5	4065.2	6579.4	7965.3	10798.2	11912.4
– activities in the fields of law and accounting, architecture and engineering, technical testing and research	2314.8	3244.4	4965.6	5562.1	7751.7	8301.6
– research and development	375.4	518.2	758.3	1110.2	1511.4	2057.6
– other professional, scientific and technical activities	231.3	302.6	855.5	1293.0	1535.2	1553.2

Source: data from the State Statistics Service of Ukraine [21]

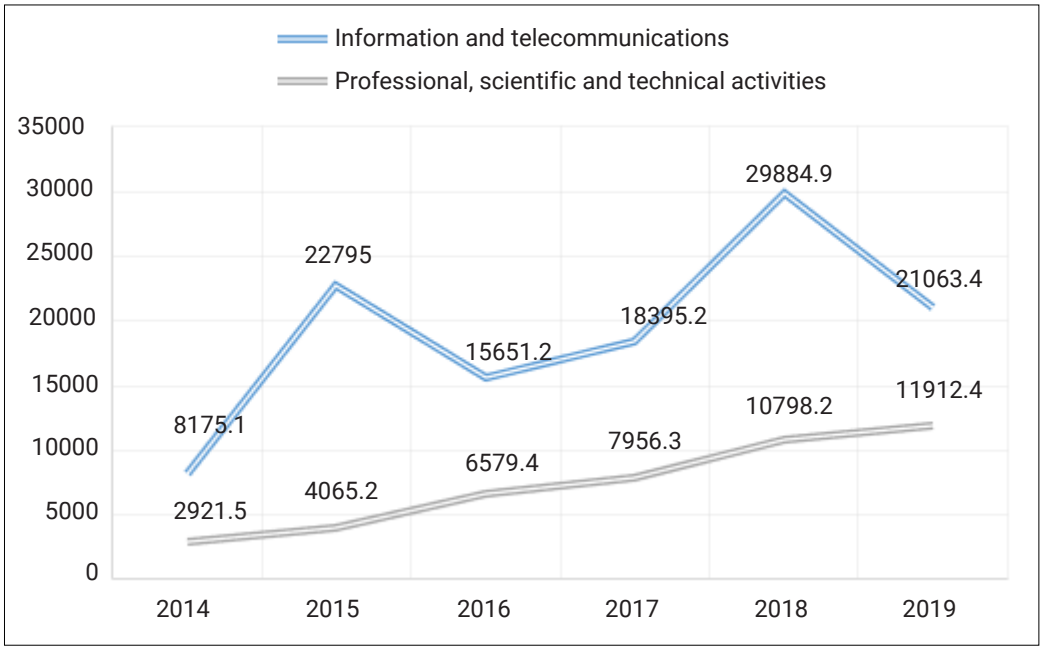

Figure 2. Dynamics of attracting investment in the IT sector in 2014-2015, in mln. UAH
Source: compiled by the authors based on the data from the State Statistics Service of Ukraine [21]

The dynamics show a gradual but steady increase in professional, scientific and technical activities, despite higher indicators of information and communication systems, which are accompanied by instability of dynamics. Next, the study considers the structure of innovation implementation at industrial enterprises in recent years (Fig. 3).

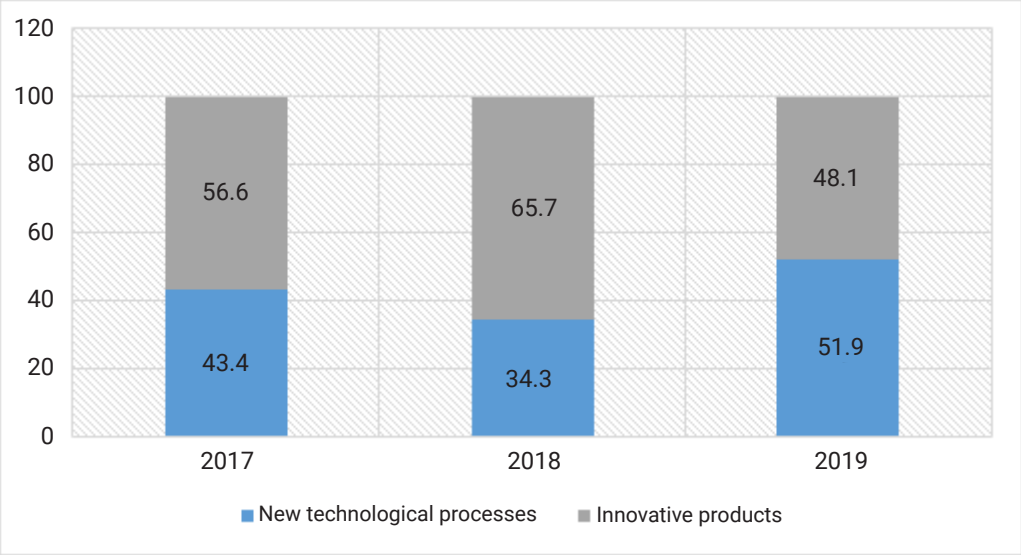

Figure 3. Structure of innovation at industrial enterprises of Ukraine
Source: compiled by the authors based on the data from the State Statistics Service of Ukraine [21]

According to the State Statistics Service, the introduction of innovations at industrial enterprises took place in two directions – the introduction of new technological processes (significantly improved low-waste resource-saving technological processes) and the second – the introduction of innovative products (goods/services) and new types of machinery and equipment. Structural analysis revealed that in 2017, a large share of innovations was occupied by innovative products, and in 2019 – by new technological processes.

Furthermore, according to the State Statistics Service on the total volume of IT investment and the introduction of IT technologies at enterprises in the period from 2017-2019, the authors calculated the correlation coefficient to establish the relationship between these indicators. Thus, using MS Excel, the correlation coefficient was calculated – 0.94, which indicates a strong direct relationship between the two indicators under consideration. And this once again confirms the thesis that IT investments do not indirectly affect the quality of products, the financial condition of the enterprise in general and competitiveness in particular. Regarding the sources of funding for IT activities of Ukrainian enterprises, it was found that the largest share (88%) is occupied by enterprises' own funds (Fig. 4).

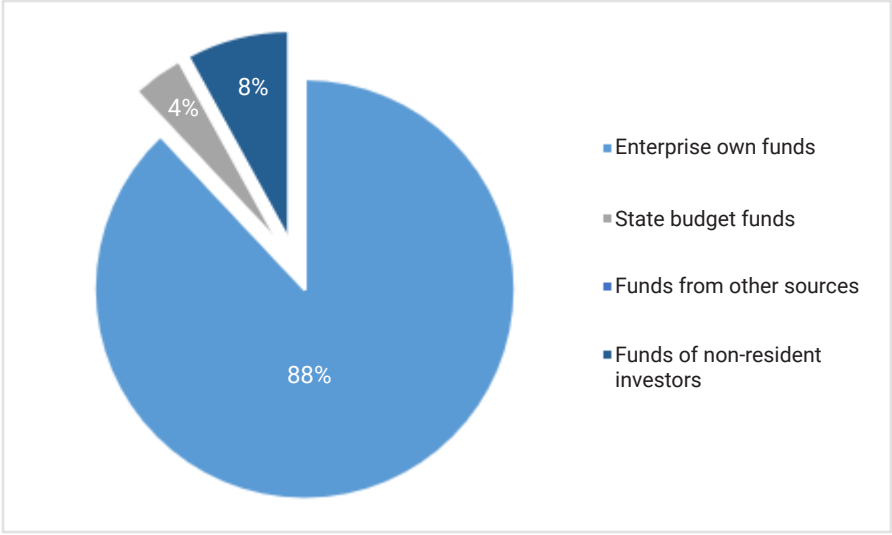

Figure 4. Sources of funding for IT activities of industrial enterprises in 2019
Source: compiled by the authors based on the data from the State Statistics Service of Ukraine [21]

Notably, a special feature of specialists in IT industry in Ukraine is their young age (about 22-30 years). Thus, support for the IT field can be considered not only as an economic prerogative, but also as a strategy to support the labour force and prevent its outflow abroad. The most popular positions in IT companies in Ukraine are: software engineers, senior and junior engineers, software testers, project managers, and HR specialists [22].

Despite these positive trends in the introduction of IT investments in Ukraine, there are a number of unresolved

issues and problems regarding their attraction, namely:

– lack of desire among investors to invest in IT projects that are at the development stage (so-called start-up) until they "start earning money on their own". Accordingly, this allows for the conclusion about the underdevelopment of venture capital in Ukraine, which is a factor in accelerating the development and scaling of business around the world. Of particular note is the problem of financial information disclosure, the lack of a transparent start-up ecosystem, which negatively affects the investment climate in Ukraine;

– imperfect legislation in the field of investment in venture projects;

– high level of corruption in the country;

– low level of preparedness of the business environment for changes;

– the complexity of risk assessment and intangible benefits for this type of investment and the high level of material costs for assessment and its complexity [20].

The Ukrainian market of IT services is at the stage of active development and is increasing its share in all economic processes with the help of the latest information support and new equipment that expands access to the Internet. For the sustainable development of the modern information industry in Ukraine, it is necessary to: increase in the level of qualification among IT specialists and customer companies; provide a more adaptive approach to the choice of information technologies, taking into account future development; provide transparency in the economic environment due to the development of IT, which contributes to investment attractiveness [23]. Currently, the most common methods for evaluating IT investments are net present value, Internal rate of return, payback, and information economics. A detailed overview of the essence of each of these methods is provided in Table 4.

Table 4. Overview of methods for evaluating IT investments

Method name	Abbreviation	The essence of the method	Disadvantages of the method
Net Present Value	NPV	Determines the most effective IT investment option – selects one of the possible investment alternatives without the need to directly assess the economic effect of each of them. The result of the calculation is a positive or negative NPV value for the investment project in question. If the value is negative, the project is unambiguously rejected, but a positive value does not mean that the project should necessarily be accepted	Assuming the same level for all investment options
Internal Rate of Return	IRR	Allows one to determine the interest rate, rather than the absolute value, which is then compared with the payback rate, which already takes into account the risks of the project. If the calculated payback exceeds the risk-based payback, then the investment can be considered justified, but if not, the project is rejected. IRR allows for more accurate comparison of project options, especially if the projects differ significantly from each other	Relative complexity of calculations, as well as the inability to identify conflicting conditions, which would not allow getting the result or it may be negative
Information Economics	IE	Involves directing resources in the sector where they will bring the greatest benefit. The idea is to force the information service and business managers to set priorities and provide objective conclusions about the strategic value of individual projects for business to further direct investment in the most important areas for business. The result is a relative rating of each investment project in the portfolio	Relatively low reliability of the results obtained
Payback	–	Allows calculating the period during which the initial investment should pay off, and this indicator is considered the main one	It does not take into account the division of payback into long- and short-term, that is, the future value of money. As a result a separate application of the method may give a wrong idea of the true effect of the investment

Source: compiled by the authors based on study by A.V. Katrenko and O.V. Pasternak [1]

The IT industry is quite promising, it ranks the third in Ukraine among export-oriented industries, second only to farmers and metallurgists. 12 Ukrainian IT companies were included in the Global Outsourcing 100 rating of the best outsourcing service providers. This shows that the Ukrainian IT market is competitive and has opportunities

for further development. Simultaneously, according to experts from the consulting company "PricewaterhouseCoopers", the IT services industry in Ukraine would grow in any case [23].

According to State of European Tech analysts, 184,700 software developers worked in Ukraine in 2018. There are three times more such specialists in Ukraine than in Belarus – 54,200 people, but less than in Poland – 279,800 people and in Germany – almost 851,000. Notably, Ukraine has entered the top 10 European countries in terms of the number of software developers. In total, there are 4 thousand IT companies in Ukraine. Most offices of IT companies are located in Kyiv city, Kyivska, Kharkivska, Lvivska, Dnipropetrovska, and Odeska Oblasts. Most Ukrainian IT companies implement a business model of software development commissioned by foreign clients, in which all intellectual rights are the property of the customer (outsourcing development). This is primarily conditioned by the low effectiveness of Ukrainian legislation on intellectual property protection, and therefore the low attractiveness of the Ukrainian market and the use of mainly imported software in Ukraine [23].

As part of the investment, the current, promising and most necessary areas are: the creation of online lending and insurance platforms, the creation of new business models, the introduction of aggregator platforms, the development of cybersecurity software, the development of digital identification/verification and biometrics, the use of artificial intelligence and marketplaces.

Next, the study considers several investments in 2020 in the field of IT. Among them is the American-Ukrainian project "Very good security" (VGS), for which the total investment amounted to 60 mln. USD. This project specialises in cybersecurity. Visa is a partner of this project, so VGS customers will be able to issue bank cards without having to see their numbers and check their personal data without having to store their passport and individual tax data. VGS is currently working on a technology that allows companies to use important and sensitive information data without the risk of loss and responsibility for its storage. Another interesting project is a Ukrainian English language school for children, with a total investment of 5 mln. USD. The money is planned to be used for further introduction of AI in the educational process and the launch of group classes to reduce the cost of one lesson. In 2020, a mobile application with a virtual teacher was launched, which conducts additional classes and communicates with students [24].

The total amount of funding raised on the Liki 24 platform in 2020 was 6 mln. USD. This project combines offers from thousands of Ukrainian pharmacies and facilitates the process of finding medicines for customers. The company has developed its own software that successfully integrates with the ERP systems of pharmacies, analysing prices and availability of medicines, as well as developing optimal routes for couriers. The service was launched at the end of 2017 and now has more than 5,000 pharmacies. According to the latest data, this project is planned to be distributed on the territory of EU countries [24].

Rentberry – Ukrainian real estate startup that is currently available in more than 40 countries, in the United States, Europe, and Asia. During the whole time, the project raised 13 million USD in investment funds [24]. The Rentberry itself is a platform for long-term rental housing. All processes: inspection of the apartment, signing contracts and monthly payment of rent take place online. The feature of the project is that the site allows one to suggest own price for an apartment, literally turning the rental process into an auction.

Also quite interesting is the Ukrainian project of IT specialists called Raccoon. Recovery – Ukrainian rehabilitation platform that allows building the entire process of medical rehabilitation at a distance – without waiting for weeks for free dates from specialists and the need to visit a rehabilitation centre several times a week. This project cooperates with insurance and rehabilitation institutions and during its existence 900 thousand EUR were invested in it. This project has demonstrated its convenience, especially during an outbreak of coronavirus infection [24].

Every year, the number of interesting projects increases, because the need of enterprises and society for innovation and IT increases. Thus, investment in IT technologies is a fairly broad concept, because information technologies are used in all sectors: economics, education, science, medicine, insurance, and so on. The conducted study allows formulating several options to increase the investment attractiveness and investment climate of the IT field:

1. Develop the infrastructure that would ensure the emergence of new technologically innovative enterprises in the scientific and technical sphere of Ukraine and the development of existing fast-growing technologically innovative enterprises that can become a potential object of direct venture investment.

2. Pay attention to the lack of domestic capital in the venture industry of Ukraine as one of the factors of the attractiveness of the country for foreign investors.

3. Develop the stock market, as it is an important tool for the free exit of venture funds from invested enterprises.

4. Provide sufficient and high-quality information about investment conditions to business entities.

5. Train personnel capable of professionally managing venture funds.

Conclusions

Thus, this study analysed the features of attracting investment in IT and described methods of positive impact on the investment climate of this field in Ukraine. A theoretical definition of the concepts of "investment", "venture investment" and "information technology" was given; the role of investment in the field of IT and the main aspects of such investment was determined; methods for improving the investment climate in this industry were

proposed; Ukrainian investment IT projects, problems and prospects associated with them were analysed; indicators of the dynamics of investment in IT over the past few years in Ukraine were considered.

The analysis showed that the IT field is developing rapidly, confirmed the prospects and positive dynamics of attracted investments in IT, Ukrainian IT specialists were recognised as one of the best in the world. In recent years, there have been positive developments in the IT field, but along with the development of IT in Ukraine, a number of unresolved issues related to them remain. Investment in IT is a promising line for the development of the modern economy, since today all the leading countries of the world are focused on the use of new "smart" technologies in all spheres of human activity. Modern technologies make life easier, increase the country's competitiveness, positively affect the production and quality of manufactured products, and, in the end, no modern business can be imagined without using the latest technologies. Therefore, it is important to create the necessary conditions for attracting investment in the IT sector.

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Інвестиції в інформаційні технології як пріоритетний напрям розвитку економіки України

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Анотація. У сучасних економічних реаліях інформаційні технології вважаються основним ресурсом технологічного та соціально-економічного розвитку країни, адже вони використовуються в усіх сферах діяльності суспільства та держави та прямо впливають на загальне національне становище, тому вивчення та аналіз умов їх залучення є актуальними як в Україні, так і в усьому світі. Відповідно до цього, метою цього дослідження є виявлення особливостей залучення інвестицій в інформаційні технології та пошук методів покращення інвестиційного середовища для даної галузі. Для досягнення поставленої мети авторами було використано такі наукові методи, як аналіз та синтез, індукція та дедукція, метод порівняння, наукову абстракцію та методи моделювання. У даній статті надано трактування понять «інвестиції» та «інформаційні технології» та виділено їх роль і функції на макро- та мікроекономічному рівнях, розглянуто основні аспекти фінансування та залучення грошових коштів у сферу інформаційних технологій, визначено основні проблеми та перспективи інвестування в цю сферу в Україні, проаналізовано динаміку залучення інвестицій в інформаційні технології та запропоновано методи покращення інвестиційного середовища в галузі ІТ. Також авторами було проаналізовано фінансові джерела залучення інвестицій, перелічено переваги та недоліки кожного з видів фінансування, проведено аналіз динаміки та структури провадження інновацій на промислових підприємствах України за 2019 р. та встановлено взаємозв'язок між обсягом залучених грошових вкладень та впровадженням інновацій. У ході дослідження також було розглянуто методи оцінки ефективності інвестицій в ІТ-сферу, виявлено суть, переваги та недоліки кожного з методів. Практична цінність роботи полягає в тому, що за результатами дослідження можна керуватися під час розробки плану та методів з покращення інвестиційного клімату в галузі, опираючись на проведений аналіз його сильних та слабких сторін

Ключові слова: економічний розвиток, інформаційні продукти, інвестиційні проекти, державні та приватні інвестиції, венчурні інвестиції

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The Role of Economic Diplomacy in the System of Modern International Economic Relations

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Abstract. The modern globalised world is characterised by economic independence, which is a component that measures the level of relations between countries, the content, direction and intensity of which has begun to be influenced by economic dependence. In other words, economic relations have become central to diplomatic activity, which determines the relevance of the subject matter. The purpose of this study is to determine the role of economic diplomacy in the system of modern international economic relations, to compare the theoretical model of economic diplomacy and the practice of its implementation. This paper uses the following methods: scientific abstraction; monographic, dialectical, historical-logical; structural-logical; abstract-logical; methods of regression analysis; synthesis; problem-oriented method; statistical and graphic methods. The author used a Scatter plot model and performed a regression analysis to determine which free trade area (Ukraine-EU, Ukraine-Canada, or Ukraine-Israel) affects Ukraine's GDP growth. The study model confirms the positive relationship between Ukraine's GDP growth and the growth of foreign trade turnover (FTT) between Ukraine and the EU. The linear model explains that a 1% increase in FTT affects an average 5% increase in Ukraine's GDP. At the same time, the regression model shows the opposite trend in terms of FTT between Ukraine and Canada, Ukraine and Israel. Thus, the dynamics of Ukraine's FTT with these countries does not have a significant impact on GDP. Only the growth of FTT between Ukraine and the EU indicates the effectiveness of bilateral cooperation. The practical significance of the results obtained lies in the fact that the theoretical foundations, conclusions, and recommendations obtained and formulated by the author can serve as a basis for further study of issues of economic diplomacy and for the development of such a concept of economic diplomacy, which should take into account the positions of stakeholders to balance the interests of ensuring the national economic security of the state

Keywords: economic diplomacy, economic security, national interests, free trade area

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Introduction

The international environment is constantly changing, it is not static, but has a dynamic character, so it offers significant opportunities and creates problems for conducting economic diplomacy. It is during periods of upheaval that new principles are created to regulate relations between countries, which, in turn, can help strengthen the overall international economic system [1]. In addition, there is a growing number of international organisations and forums to meet growing economic needs. Another trend is that contradictions between economic superpowers are growing more and more, and the international economic order requires reforms, so there is an obvious need for a new global order. It is "soft power" and economic diplomacy that can become the key not only to effective policy but also to the rejuvenation of the global economic system [2]. In addition, the role of the economy will continue to strengthen due to the dynamics and trends of international relations, and at the same time difficulties in using economic instruments would increase. With this in mind, states should develop appropriate strategies for implementing economic diplomacy to maintain their relevance in the dynamic international arena.

The next trend is virtual globalisation, which is taking over the world. Virtual (digital) diplomacy began to take shape quite a long time ago, developing along with social networks. This is especially true for political and public diplomacy, while the creation of digital economic diplomacy is beginning only now [3]. Therefore, a strong knowledge base and understanding of the dimensions, opportunities and consequences of economic diplomacy is an invaluable asset for effective inclusive approach strategies leading to successful interaction. Given the above, the practical implementation of economic diplomacy requires innovation, adaptation and a multidisciplinary approach, given that the line between domestic and foreign policy is narrowing, becoming more and more blurred and combined with a large number of participants [4].

To achieve efficiency and success in implementing foreign economic activity, it is necessary to clearly understand what economic diplomacy implies. Therefore, the first step towards achieving appropriate economic diplomacy is to conceptualise it. Taking into account the above, the study of economic diplomacy is relevant among both foreign and Ukrainian researchers.

Issues of economic diplomacy are constantly at the centre of attention of foreign researchers. Thus, Wolcock [5] and Okano-Heijmans [6] suggest that economic diplomacy deals with international economic relations. According to Defbry Margiansyah [7, p. 15], modern economic diplomacy is aimed at "ordinary" commercial diplomacy, but at the same time, it restricts the development of a new economy due to the lack of a concept that supports the functioning of innovation-oriented economic diplomacy. D. Mlinaric, T. Peric, J. Matejas [8, p. 165], suggest that the study and understanding of economic diplomacy require three elements: political influence, economic assets and relations, as well as ways to consolidate the appropriate climate in the political and international environment.

Other researchers, Dubravko Radoshevich and Sanja Radolovich [9] conclude that states that do not have a well-established concept of economic diplomacy cannot play an active role in relations with other countries, but become the object of economic diplomacy of these countries. Carron de la Carriere suggests that diplomacy uses economic weapons to achieve its goals [10]. Kishan Rana believes that economic diplomacy has bilateral, regional, and multilateral dimensions, each of which is important [11].

M. Chaziza [12, p. 26], examining China's economic diplomacy, notes that the concept includes the full range of economic and financial activities, including trade, investment, and all forms of economic cooperation, including public and military diplomacy, along with any other policy that promotes economic gain for China. V. Chohan Usman [1], concludes that all countries should pay at least some attention to economic diplomacy as an international phenomenon, given their institutional assets and capabilities.

In the studies by Ukrainian scientists: V.A. Vergun [13], O.M. Sharov [14], O.E. Likhachev [15], V.D. Shchetinin [16], K.A. Flissak [17], sufficient attention has been paid to the issue of economic diplomacy and its importance in the system of modern international economic relations. However, the development of such a concept of economic diplomacy, which takes into account the position of stakeholders to balance national economic security is a prospect for further research and emphasises the relevance of this study.

The purpose of the study is to determine the role of economic diplomacy in the system of modern international economic relations, compare its theoretical model and practice of implementation, and investigate a wide range of aspects of the implementation of economic diplomacy and the economic interests of countries.

Literature Review

Despite the rapid development of economic diplomacy and its key role in the system of modern international economic relations, the study of the above-mentioned problems in recent years is relevant both among foreign and Ukrainian scientists who study the issues of protecting national strategic and economic interests of the state, the establishment of favourable conditions for promoting Ukrainian goods and services to foreign markets using the tools of economic diplomacy.

As noted by Wolcock [5], economic diplomacy can be determined by the decision-making process and negotiations in international economic relations, in "key issues such as trade, investment and finance ... there are also topics such as environment and development that have significant economic implications for policy in these areas". According to Carron de la Carriere [10], the economic weapons of diplomacy ensure that the government uses the economic means of pressure at its disposal to achieve its goals (for example, financial assistance or customs privileges, sanctions or open hostility in the form of customs war, the introduction of an embargo or economic blockade, etc.).

Jeremy Garlick [18], studying China's economic

diplomacy, sees this concept as an attempt to achieve both political and economic goals in a coordinated manner through government initiatives that Chinese commercial entities use for national security purposes.

Ivona Peternel and Martin Gress [19] applied the gravity model of international trade, which presents empirical results of an analysis of Croatian economic diplomacy and its effectiveness in relation to Croatian exports of goods. The results of the study showed a positive correlation between GDP, the distance between countries, and diplomatic personnel in Croatia. The results confirmed the hypothesis that more economic diplomats engaged in diplomatic missions have a positive impact on exports.

Kishan Rana [11] defines economic diplomacy as the process by which countries struggle with the outside world in order to maximise their national benefits in all areas of activity, including trade, investment and other forms of economically profitable exchanges, where they enjoy comparative advantages. Okano-Hejmans [6], studying the features of economic diplomacy at the intersection of international relations, economics and diplomatic studies, concludes that it is a foreign policy practice and strategy based on the premise that economic/commercial interests and political interests reinforce each other, and therefore they need to be considered together.

Economic diplomacy, according to Pierre-Bruno Ruffini [20], is a method or process by which states use the advantages of cross-border economic activity to implement their national interests. The author notes that economic diplomacy also consists in establishing links between corporate players who export or invest abroad and diplomats who represent the state in the international arena and implement geopolitical decisions. Another researcher, U.W. Chohan [1], suggests that economic diplomacy is a multilateral process that uses economic means to achieve diplomatic goals, and vice versa, through the joint creative involvement of international government managers and other important stakeholders. Among Ukrainian authors, the following issues of economic diplomacy are studied:

V.A. Vergun [13] analyses economic diplomacy in the system of factors of Ukraine's international competitiveness. Economic diplomacy, as noted by the researcher, is a multilateral activity that "develops in modern conditions on a bilateral and multilateral basis, and also functions at the mega-, macro-, meso-, micro levels, respectively reflecting the material interests of international economic and monetary-financial organisations, regions, states, branches of the national economy, multinational corporations, economic associations, enterprises".

Of particular note is the position of O.Ye. Likhachev, who under the term "economic diplomacy" implies the joint activities of the state, social, and business circles to implement national economic interests in the world economy, which uses the tools of traditional and modern diplomacy, a set of Ukrainian foreign economic institutions, regional and multilateral structures, its goal is to increase the country's international competitiveness [15, p. 3].

K.A. Flissak [17] considers the place of economic diplomacy in the modern international economy and international economic relations; issues of economic security of Ukraine and organisation of activities of economic units of diplomatic missions. The author pays considerable attention to the organisation of diplomatic negotiations, the technology of their conduct and the protocol component.

It is also worth mentioning O.M. Sharov [14, p. 8], who in his study on economic diplomacy concludes that its task "is to achieve economic goals through diplomacy, regardless of whether it uses economic levers to achieve them".

V.D. Shchetinin [16, p. 15] argues that that "economic diplomacy is an alloy of economics and politics, brought to the level of making and implementing managerial decisions, with the help and through which cooperation and rivalry is carried out in the modern world, forms and methods of development and improvement of the market economy are determined, which becomes an important factor in social development and the solution of key problems of economic and social progress".

Materials and Methods

The information base of the study were materials published in periodicals, scientific papers of Ukrainian and foreign authors, official materials of the State Statistics Committee of Ukraine (in particular, data on foreign economic activity for the period 2017-2020), electronic resources presented on the Internet, analytical calculations performed in the course of the study.

Achieving this goal provided for the use of a set of general scientific and special principles, methods and approaches at the empirical and theoretical levels of research, in particular: scientific abstraction – to determine the theoretical essence of economic diplomacy; monographic, dialectical, historical-logical – to thoroughly study and consider the theoretical and methodological foundations of the implementation of economic diplomacy; structural-logical – to determine the tasks of economic diplomacy; methods of theoretical generalisation, abstract-logical – to determine the features of the development of economic diplomacy in Ukraine, for theoretical generalisations and conclusions; methods regression analysis – to determine which free trade area – Ukraine-EU, Ukraine-Canada or Ukraine-Israel – affects the GDP of Ukraine; synthesis – to build a regression model; problem-oriented method – to determine the mission of economic diplomacy; statistical and graphical methods – to process and summarise statistical data and their further illustration in tables and graphs for greater clarity.

The study builds a Scatter plot model using Excel, it is a mathematical diagram used to display the values of two variables for a data set.

A regression analysis of the impact of the free trade zone between Ukraine and the EU, Canada, and Israel on Ukraine's GDP was carried out. This method is used to display the state of the relationship between the economic indicators under study. To do this, it is necessary to plot a

graph in a rectangular coordinate system, and indicate the value of the resulting attribute along the ordinate axis y, and along the abscissa axis – the value of the factor attribute *x*. The set of points of effective and factor features is a correlation field. Taking into account the correlation field, it is hypothesised that the relationship between all possible values *x* and y has a linear character. A linear regression equation has the form $y = bx + a$ [21, p. 68].

To calculate the regression parameters, a calculation table (Table 1) of communications was constructed.

Table 1. Calculation of parameters of regression analysis of the impact of the free trade zone between Ukraine and the EU on Ukraine's GDP

x	y	x^2	y^2	$x \times y$
38.3	112.1	1,466.89	12,566.41	4,293.43
43.4	130.9	1,883.56	17,134.81	5681.06
45.8	153.9	2,097.64	23,685.21	7,048.62
42.1	151.5	1,772.41	22,952.25	6,378.15
169.6	548.4	7,220.5	76,338.68	23,401.26

For the given data, the system of equations has the form (1-2):

$$4a + 169.6b = 548.4 \quad (1)$$

$$169.6a + 7220.5b = 23401.26 \quad (2)$$

By multiplying equation (1) of the system by (-42.4), a system that can be solved by algebraic addition is obtained.

$$-169.6a - 7191.04b = -23252.16$$

$$169.6a + 7220.5b = 23401.26$$

Obtain:

$$29.46b = 149.1$$

From where $b = 5.0611$

Next, it is necessary to find the coefficient *"a"* from equation (1):

$$4a + 169.6b = 548.4$$

$$4a + 169.6*5.0611 = 548.4$$

$$a = -77.4906$$

Thus, empirical regression coefficients: $b = 5.0611$, $a = -77.4906$ are obtained. Regression equation (3):

$$y = 5.0611\,x - 77.4906 \quad (3)$$

The regression coefficient $b = 5.0611$ demonstrates how the performance indicator changes *y*, if the value of the factor *x* increases or decreases by one. In the above example with the magnification of *x* per 1 unit *y* increases by an average of 5.061.

Coefficient $a = -77.4906$ demonstrates the predicted level *y*, but only if $x=0$ is located next to the sample values. If $x=0$ is far from the sample values *x*, then a literal interpretation may lead to unreliable results.

By substituting the corresponding values into the regression equation x, the provided values of the effective indicator *y* (*x*) for each observation are determined. The relationship between y and x defines the sign of the regression coefficient b (if $b>0$ – direct connection, $b<0$ – inverse relationship), [22, p. 121]. In this example, the connection is direct.

Multiple determination coefficient R^2 indicates how much the obtained observations confirm the model. $R^2 = 0.6545$, that is, in 65.45% of cases of changes in *x* lead to a change *y*. In other words – R^2 indicates a close relationship between the indicators.

By analogy, a regression analysis of the impact of the free trade zone between Ukraine and Canada, Ukraine and Israel on Ukraine's GDP is carried out.

Results and Discussion

Economic diplomacy: Theoretical foundations

Today, economic diplomacy occupies a proper place in the system of international economic relations, since it performs specific functions that are unique to it. That is why economic diplomacy is studied and analysed by both foreign and Ukrainian researchers. Based on the generally accepted definitions of diplomacy, it can be stated that the concept of "economic diplomacy" is understood as the science of international economic relations and a means of implementing the foreign economic policy of the state, where economic non-military practical measures, techniques, methods and tools are combined and prevail over political ones. Thus, according to A.M. Sharov, "the criteria for economic diplomacy belong to the sphere of international economic relations, the sphere of foreign economic policy of the state; the use of negotiations as the main tool for arranging Interstate economic relations by peaceful means; the presence of the institution of civil servants-diplomats who directly negotiate and perform all other functions provided for by the charter of the diplomatic service of each state" [23, p. 66].

Therefore, the concept of "economic diplomacy" is often used by researchers in a broad and narrow sense. A broader meaning covers not only the international exchange of goods and services, but also other components of international economic relations, such as the international movement of capital and labour, as well as activities leading to the coordination or adoption of economic policies.

This study suggests that economic diplomacy, in a narrow sense, is a part of public service, a public body established abroad, based on written sources of international law in the form of foreign service, regulated by a national body, usually the Ministry of Foreign Affairs or the ministry responsible for foreign economic relations.

This study determines the essence of economic diplomacy by considering its functions. Thus, according to K.A. Flissak [17], the functions of economic diplomacy as specific activity of the state and relevant institutions are: protecting national interests; improving the competitiveness of the national economy; ensuring equal and non-discriminatory conditions for integration into the

world economy; stimulating exports and export expansion to foreign markets; stimulating effective investment partnership; resolving trade contradictions and trade disputes. The functions of economic diplomacy as a means or tool for implementing the tasks set and achieving strategic goals are: representative; informational; analytical; organisational; presentation; negotiation or communication; stimulating; preventive. The author refers to the functions of economic diplomacy as a separate branch of science in international relations and international cooperation as cognitive, methodological, normative, and predictive [17, p. 69-70].

Based on the analysis of Ukrainian and foreign publications on the subject, the study systematises the main tasks of economic diplomacy, in particular:

1) providing the state leadership with timely and reliable information on the economic situation abroad, foreign economic policy of foreign states, and the activities of international organisations;

2) protection of national strategic and economic interests of the state abroad;

3) improving the country's competitiveness in the world;

4) creating favourable conditions for successful integration of the country into the global economy;

5) creating favourable conditions for access and promotion of Ukrainian goods and services to foreign markets;

6) promotion of socio-economic development of the country;

7) ensuring national and economic security, etc. [14, p. 10; 17, p. 60-61; 24, p. 66-67].

The goal of economic diplomacy of any country is to create an "added" economic value, and this is ultimately the achievement of economic growth and well-being of the country [25, p. 669].

Free trade agreement as one of the instruments of economic diplomacy

The effective use of such a tool as economic diplomacy in the implementation of Ukraine's foreign policy is crucial, as for other countries of the world that are under the influence of modern world processes, such as economic globalisation [26, p. 34]. It is proposed to consider one of the results of economic diplomacy – cooperation on the basis of free trade area agreements (FTA), which is a common form of trade and economic relations between countries and regional associations. It is believed that FTA agreements have an impact on improving the well-being of countries participating in international cooperation. Free trade is also beneficial because there is an exchange of goods, technologies, access to a variety of products, and so on. Given this, many countries conclude FTA agreements [27, p. 89].

Currently, there are 16 signed free trade agreements in Ukraine, which apply to 45 countries. It is with the EU that Ukraine has concluded the broadest FTA. Other agreements are narrower. For example, Ukraine has signed a free trade agreement with Canada, which covers trade in goods and public procurement; agreements with Georgia and Macedonia relate to trade in goods; agreements with Montenegro – trade in goods and services. In addition, Ukraine has an FTA with the countries of the European Free Trade Association (Iceland, Liechtenstein, Norway, Switzerland) [28].

The association agreement between Ukraine and the EU is a new stage in the development of economic relations, which is aimed at creating a deep and comprehensive free trade area (DCFTA) and gradually integrating Ukraine into the EU internal market. After a lengthy ratification process, the EU-Ukraine Association Agreement entered into full force on September 1, 2017. The agreement provides for "the introduction of conditions for enhanced economic and trade relations that would lead to the gradual integration of Ukraine into the EU internal market, in particular through the creation of a deep and comprehensive free trade area, as defined in Section IV ("trade and trade-related issues") of this agreement, and to support Ukraine's efforts to complete the transition to a functioning market economy, in particular by gradually adapting its legislation to *acquis* EU (*acquis* EU is the property of European integration in the political, legal and economic spheres, which is based on European common values, that is, it is a set of rights and obligations of EU member states)" [29].

It is proposed to analyse the dynamics of Ukraine's foreign trade with the EU (Fig. 1).

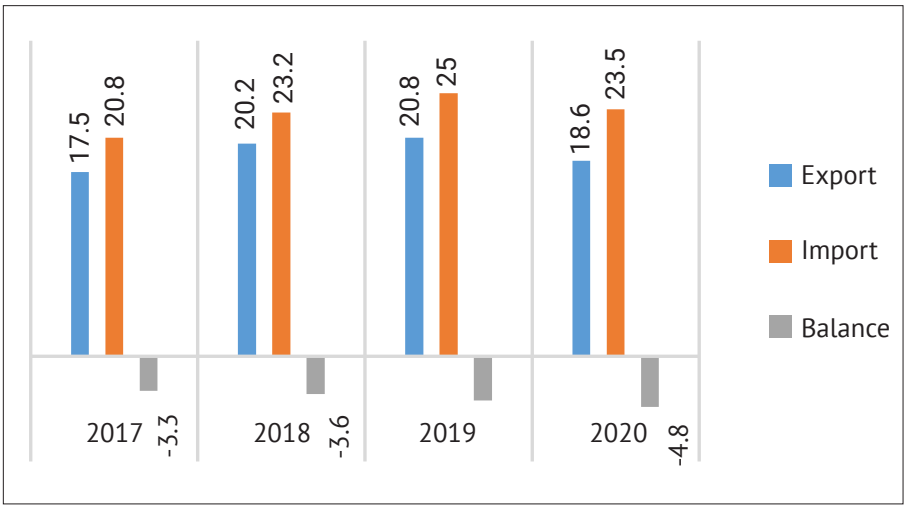

Figure 1. Foreign trade of Ukraine in goods with EU countries in 2017-2020, billion USD
Source: compiled by the author based on [30-33]

According to the Bulletin of the current state of trade relations between Ukraine and the European Union in 2019-2020, Ukraine has the closest trade ties with the EU. It is the EU that accounts for 40.7% of trade in goods and services from the total volume of trade in Ukraine in 2020 [30].

Figure 1 indicates that there is no stable dynamics in terms of the growth rate of export-import operations of Ukraine with the EU countries during 2017-2020 (the figure shows both the growth and reduction of indicators). Thus, according to the results of 2020, according to the State Statistics Service of Ukraine [34], the volume of exports of goods to the EU and imports of goods from the EU decreased by 10.6% and 6%, respectively. The trade balance with the EU in 2017-2020 remains negative for Ukraine, but increased to USD -4.8 billion (in 2019 the balance was USD -4.2 billion), which is largely due to non-compliance of Ukrainian goods with European standards, as well as lower quality of Ukrainian products and limited access to markets for certain goods.

The reduction in Ukraine's foreign trade with the EU countries in 2020 is the result of the fact that the total volume of foreign trade in goods of Ukraine decreased by 6.4% compared to 2019, which is associated with the crisis caused by the COVID-19 pandemic. The above-mentioned reduction occurred because imports of goods decreased by 10.3%, while exports of goods decreased by 1.7%. The WTO predicted that there will be a 9.2% reduction in global trade in goods in 2020. Consequently, the decrease in the total volume of foreign trade in Ukraine, in comparison with the forecasts of the service station, is at a better level [35].

This study agrees with [36], and suggests that the positive and negative factors hindering the growth of production and sales of Ukrainian export-oriented products in the EU markets are:

1. As part of increased competition and market liberalisation under the rules of the free trade zone "plus", the Ukrainian manufacturer is forced to look for alternative options for earning and obtaining additional profit, give preference to tolling production schemes, providing services for technological support of finished products, as well as a reorientation to a partial production cycle;

2. A significant obstacle to the activation of export operations is raw material dependence on foreign imports, which significantly increases the cost item in production and indicates that for the production of better products, it is necessary to have better material and raw material potential, which is not easy to get due to inflated supplier prices and transportation costs;

3. An important factor in the manufacturing of products for export is that together with the instability of the exchange rate, it is not easy to conclude a profitable foreign trade contract, since the fixed price will change within the dynamics of exchange differences and currency interventions in foreign markets, which will lead to an increase in the final cost of production;

4. The process of reforming the Ukrainian system of technical regulation and institutional transformations within the framework of the transition of production to EU international standards require an increase in financial resources for compliance and implementation of the quality parameters of export production in accordance with these requirements;

5. Reorientation of Ukrainian exports in favour of transit services for importing resources, materials and raw materials is necessary [36, p. 112].

However, the potential advantages of DCFTA for Ukrainian producers are: duty-free access to one of the most powerful and largest markets in the world for most Ukrainian products (from the first year of the agreement, the EU abolished import duties on most goods (99% of tariff lines); equal conditions of competition and increasing export volumes to the EU; improving the quality and safety standards of Ukrainian products, including in the national market; creating Ukrainian brands that would be easily recognised around the world; expanding the range of goods and services in the national market of Ukraine; increasing demand for Ukrainian products, including in the markets of third countries, in connection with the introduction of the improved structure of Ukrainian exports in the direction of reducing the raw material component and increasing the share of high-tech goods with a high share of added value produced in Ukraine [37].

One of the main economic events in 2017 was the signing of an agreement on the creation of a free trade zone between Ukraine and Canada [38]. This agreement is the first signed with a North American country and breaks off duty-free access to a new market for Ukraine, diversifies trade flows, and creates advantages for Ukrainian businesses. According to the agreement, it is planned to deepen trade and economic cooperation between the two countries on trade in goods, protection of intellectual property rights, public procurement, etc. It is planned that the agreement should open 98% of the Canadian goods market to Ukrainian exporters, while Ukraine is obliged to cancel tariffs for about 80% of imported goods from Canada [39].

The dynamics of bilateral trade between Canada and Ukraine in 2017-2020 is shown in Figure 2. An analysis of the dynamics of bilateral cooperation between Ukraine and Canada shows that over the past year there has been a decrease in imports and an increase in exports of goods from Canada (Fig. 2), which forms a negative balance of foreign trade for Ukraine. Thus, according to the results of 2020, according to the State Statistics Service of Ukraine [34], the volume of exports of goods to Canada decreased by 5.8%, while the volume of imports of goods from Canada increased by 3%. The trade balance with Canada in 2017-2020 remains negative for Ukraine, but increased to USD -12 billion (in 2019 the balance was USD -10.9 billion).

On January 1, 2021, the agreement on free trade in goods, signed by Ukraine and Israel in January 2019, has entered into force [40]. The agreement with Israel is a classic one, since it mainly concerns agreements on the reduction or abolition of import duties, which distinguishes it from the DCFTA with the EU, which concerns not only trade in goods and services, but also the protection of intellectual property rights [41].

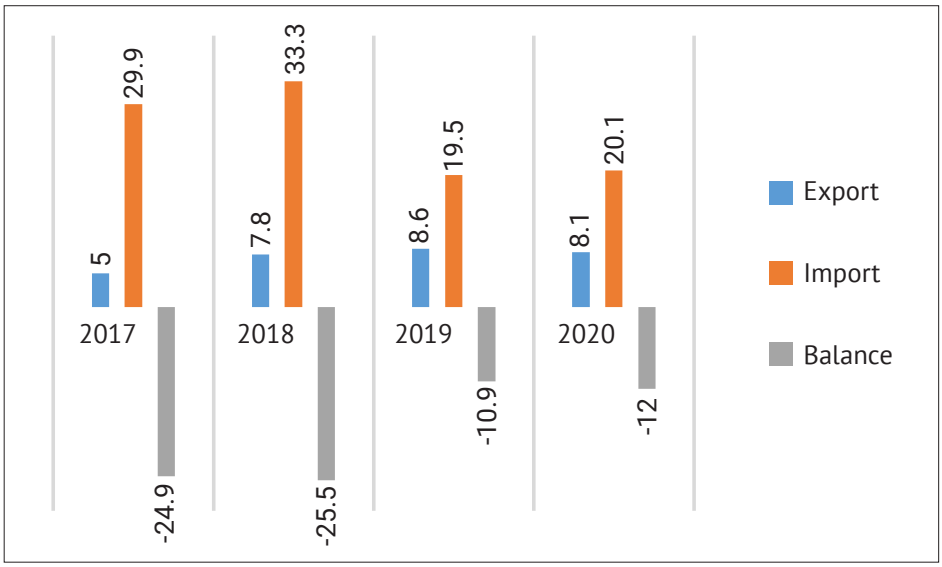

Figure 2. Foreign trade of Ukraine in goods with Canada in 2017-2020, billion USD
Source: compiled by the author based on [34; 37]

Figure 3 shows the dynamics of bilateral trade between Israel and Ukraine in 2017-2020. An analysis of the dynamics of bilateral cooperation shows that over the past year there has been a decrease in imports and exports of goods from Israel (Fig. 3), which forms a positive balance of foreign trade for Ukraine. Thus, according to the results of 2020, according to the state statistics service of Ukraine [34], the volume of exports of goods to Israel and imports of goods from Canada decreased by 9.7% and 19%, respectively. The trade balance with Israel in 2017-2020 remains positive for Ukraine, but decreased to USD 3.9 billion (in 2019 the balance was USD 4.2 billion).

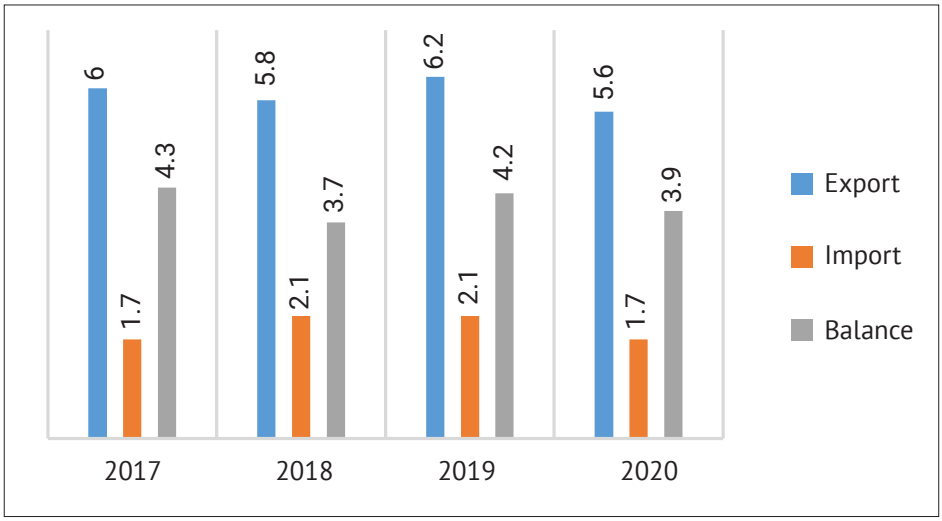

Figure 3. Foreign trade of Ukraine in goods with Canada in 2017-2020, billion USD
Source: compiled by the author based on [34]

As part of the free trade agreement, Israel will abolish approximately 80% of all duties against Ukrainian industrial goods and 9% of duties that are applied against agricultural goods. In return, Ukraine will also cancel approximately 70% of duties applied to Israeli industrial products and 6% of duties against agricultural products [41].

Scatter plot model of the impact of foreign trade turnover between Ukraine and the EU, Canada, and Israel on Ukraine's GDP

It is proposed to study the effectiveness of bilateral relations using the Scatter plot model. This model would allow studying the impact of foreign trade turnover (for goods) between Ukraine, the EU, Canada, and Israel on Ukraine's GDP (Fig. 4.). For analysis, annual data from 2017 to 2020 from the State Statistics Service of Ukraine was used [34]. Therefore, only the coefficient of determination of the FTT model between Ukraine and the EU confirms its adequacy, since $R^2=0.65$. Therefore, in the situation under study, 65% of the total GDP variability is explained by changes in the FTT. It can be argued that the growth of the FTT between Ukraine and the EU significantly improves the country's GDP.

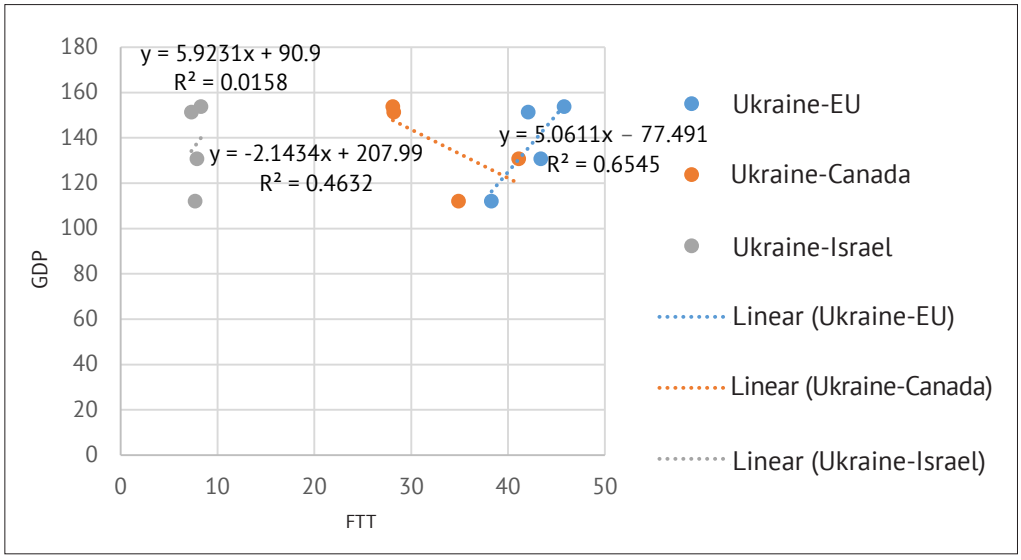

Figure 4. Impact of the FTT between Ukraine and the EU, Canada and Israel on Ukraine's GDP
Source: compiled by the author based on [34]

The regression coefficient *b=5.061* demonstrates the average change in the performance indicator (in units of measurement *in*) with an increase or decrease in the value of factor x per unit of measurement. In this case, with an increase in x per 1 unit y increases by an average of 5.061. Consequently, the increase in Ukraine's FTT by 1% is accompanied by a 5% increase in the country's GDP, which indicates the effectiveness of bilateral cooperation, primarily for the Ukrainian economy. The relationship between y and x defines the sign of the regression coefficient b (if *b>0* – the connection is direct if *b<0* – inverse relationship). In this example, the relationship is direct.

At the same time, as of today, the growth of FTT between Ukraine and Canada, Israel does not have a significant impact on Ukraine's GDP.

Summing up, it should be noted that Ukraine is trying to use as effectively as possible such a tool of economic diplomacy as the signing of free trade agreements, which contributes to the liberalisation of bilateral trade and the development of profitable relations with partners. The signing of 16 free trade agreements and the current negotiations with Turkey on the agreement indicate that Ukraine is moving in a positive direction. Integration of countries into the global network of trade flows helps to increase its competitiveness, create a favourable investment climate, increase export opportunities, and so on.

Conclusions

Thus, the main mission of economic diplomacy is to create and provide promising conditions for access and promotion of Ukrainian goods and services to the international arena, protect the national strategic and economic interests of the country in the world, as well as through the use of tools of economic diplomacy to improve the country's competitiveness in the region and the world, ensure national and economic security, etc.

Economic diplomacy forms an effective mechanism for managing global processes, both in the interests of individual countries and the international community as a whole. It is economic diplomacy, using a variety of tools, which allows balancing the results of world economic development for national economies, groups of states and entire regions, preventing the escalation of trade and economic conflicts, etc.

At the same time, economic diplomacy, which is based on significant financial, organisational, informational and other resources of the state, can become, in case of ill-considered use of it, a destructive factor for the world economy, which can disrupt its integrity and the existing stable interdependencies. Therefore, the most important task of modern economic diplomacy is to effectively integrate national interests into the overall context of ensuring the sustainable development of the regional and global economy.

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Роль економічної дипломатії в системі сучасних міжнародних економічних відносин

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Анотація. Сучасний глобалізований світ характеризується економічною незалежністю, яка є складовою, що вимірює рівень відносин між країнами, на зміст, напрям та інтенсивність яких почала впливати економічна залежність. Тобто економічні відносини стали центральними в дипломатичній діяльності, що визначає актуальність обраної тематики. Метою даної статті є визначити роль економічної дипломатії в системі сучасних міжнародних економічних відносин, порівняти теоретичну модель економічної дипломатії та практику її реалізації. У статті використані такі методи: наукової абстракції; монографічний, діалектичний, історико-логічний; структурно-логічний; абстрактно-логічний; методів регресійного аналізу; метод синтезу; проблемно-орієнтований метод; статистичний і графічний методи. Автором використано Scatter plot модель та здійснено регресійний аналіз для визначення яка зона вільної торгівлі (Україна-ЄС, Україна-Канада, чи Україна-Ізраїль) впливає на ріст ВВП України. Модель дослідження підтверджує позитивний зв'язок між зростанням ВВП України та зростанням зовнішньоторговельного обороту (ЗТО) між Україною та ЄС. Лінійна модель пояснює, що збільшення ЗТО на 1 % впливає на збільшення ВВП України в середньому на 5 %. Водночас, регресійна модель демонструє протилежну тенденцію щодо ЗТО між Україною та Канадою, Україною та Ізраїлем. Так, динаміка ЗТО України з цими країнами не здійснює значний вплив на ВВП нашої країни. Отже, лише зростання ЗТО між Україною та ЄС свідчить про ефективність двосторонньої співпраці. Практична цінність одержаних результатів полягає в тому, що теоретичні основи, висновки та рекомендації, отримані та сформульовані автором у процесі дослідження, можуть служити базою для подальших досліджень питань економічної дипломатії та для розробки такої концепції економічної дипломатії, яка має враховувати позиції стейкхолдерів для збалансування інтересів щодо забезпечення національної економічної безпеки держави

Ключові слова: економічна дипломатія, економічна безпека, національні інтереси, зона вільної торгівлі

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Public-Private Partnership in Healthcare and Pharmaceutical Sector of the Republic of Kazakhstan

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Abstract. Interaction between the state and business is one of the main ways to solve the social problems of modern states. The relevance of the subject matter is conditioned by the fact that the development of forms of public-private partnership provides an influx of investments from private entrepreneurs in the field of healthcare and pharmaceuticals in the Republic of Kazakhstan. The purpose of the study is to define the public-private partnerships and analyse international experience in implementing practises on specific projects. The methodological basis of the study consisted of the following methods: system, structural and functional, institutional, monographic, forecasting, tabular and graphical. In the course of the study, the theory and practise of public-private partnership in the healthcare and pharmaceutical sectors, the signs and principles of such partnership were considered. The classification was carried out, the most striking examples of the implementation of public-private partnerships were analysed. The differences between public-private partnership contracts were investigated, and attention was paid to the functions and content of such contracts, including the terms and expected risks. The advantages for each of the stakeholders in the public-private partnership were analysed: the private sector, the public sector, and consumers. The analysis of the current state of public-private partnership in the field of healthcare and pharmaceuticals in the Republic of Kazakhstan was carried out. The practical significance of the study lies in the development of recommendations for improving the forms of public-private partnership for the authorities to maintain state control and comply with the conditions for an adequate distribution of all risks, responsibilities and benefits among the participants of this type of partnership

Keywords: public-private partnership, pharmaceutical industry, partnership of the state and business, social sphere, PPP in healthcare

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Introduction

The concept "public-private partnership" (PPP) and "private-public partnership" may have different connotations associated with emphasising the status of the parties to the partnership. In the first case, the primary role belongs to the state in interaction with other economic actors of the market. In the second case, the equivalent status is granted to public organisations of various fields of activity. The term *public-private partnership* better correlates with European law and the content of the concept "public administration" as a system of public authorities that, in exercising their powers, carry out public administration exclusively in the public interest. An important aspect of this concept is its connection with the integration of public administration institutions, civil society, and the private sector for the development of *social community service projects* [1].

The detailed content of the concept of PPP is contained in the "UN Millennium Declaration" of 2000 [2] and in the doctrine of the "Monterrey Consensus" of 2002 [3]. These documents state that PPPs are measures of public infrastructure aimed at sustainable development, through project financing and implementation using private investment and on the terms of transferring risks from the public sector to the private sector. In the United States, the term "public-private partnership" (PPP) is mainly used as a denotation of joint state and private financing of educational programmes, public utilities, urban renewal, territorial infrastructure development, and social services [4]. A.M. Abdel-Aziz and A.D. Russell in their paper [4] developed the structure of state requirements in the "public-private partnership". According to this structure, the main components of the partnership are rights, obligations, and responsibilities. For the successful implementation of the "public-private partnership", it is necessary to define specific state requirements, which will significantly reduce energy and economic resources [4].

Public-private partnerships are arrangements between public and private sector enterprises to provide public infrastructure, utilities, and related services. Such partnerships are characterised by the distribution of investments, risks, responsibilities, and rewards among the partners. The reasons for creating such partnerships are very different, but mostly they include the financing, design, construction, operation, and maintenance of public infrastructure and services. An important conclusion, from the standpoint of the institutional approach, is that without state-owned enterprises (that is, public property), the PPP mechanism itself becomes impossible [5]. M.A. Vasilenko, N.A. Drozdov, Yu.A. Tagiltseva, E.L. Kuzina, M.A. Kuzina studied public-private partnership through the prism of a system approach [5]. Thus, in the Western countries, two terms are used to denote the PPP mechanism. Its essence is understood as a process that is based on the combination of financial, labour, intellectual and other resources of the state and business for the joint implementation of projects.

Notably, the use of the phrase "public-private partnership" in the law, in which "public" is in the first place, is not accidental. This indicates that the state is the initiator of the relationship, that the implementation of its interests has priority over the private structures. PPP is designed to increase the competitiveness of the public sector of the national economy, attract investment to the economy for the development of an extensive infrastructure of a settlement, city or region. This observation reflects an important aspect necessary for understanding the use of the term "private-public partnership", which also has a rational and logical explanation for the fact that in this case, the private party has priority [6].

V.I. Borshch, I.I. Maslennikov, V.I. Truba, L.M. Tokarchuk considered public-private partnership as a progressive form of innovation and investment mechanism in the health sector of Ukraine, taking into account the international experience of the USA, Great Britain, Canada, and other countries. The main principles of work and criteria for assessing the effectiveness of public-private partnerships were defined [6].

The purpose of the study is to analyse public-private partnership as an effective tool for attracting investments in the healthcare and pharmaceutical sectors of the Republic of Kazakhstan. The implementation of the stated objective is determined by a number of *tasks*: 1) to describe the essence of the concept "public-private partnership"; 2) to consider the main features and principles of PPP; 3) to determine the classification of public-private partnership, its advantages; 4) to analyse the international experience of the introduction of PPP in the health sector; 5) to elaborate recommendations for improving public-private partnership in the health sector in the Republic of Kazakhstan.

Literature Review

The adoption of the law on PPP was an absolute achievement for the Republic of Kazakhstan [7], which significantly accelerated the study of various issues of PPP: legal aspects of PPP; scientific definition of PPP and its features in the context of Kazakhstan; clarification of the influence of internal and external factors on PPP. The greatest attention was paid to this issue by scientists-economists [8]. The economic content of the concept of PPP was also considered [9]. On this basis, the priority for this study is the issues of public management related to the institutional aspects of PPP.

Public management practise demonstrates the gradual improvement of the economic, political and ideological institutions of society [10]. It is an indisputable fact that they are interconnected and interdependent. Their state is not always predictable, especially in the conditions of the modern globalising world, which is dependent on general economic crises. This dependence gives grounds for asserting that it is economic institutions that are decisive in the hierarchy of social institutions [11]. They are considered the basis of social harmony and justice, democracy, and freedom of people. Therefore, the latter primarily become the object and subject of both scientific and political discussions [12]. As a rule, ideological institutions are regarded as

secondary ones [13]. At the same time, the consequences of the functioning of the free market often need to eliminate the contradiction between the interests of public (state and municipal) and private owners. Market regulation is a function of the state [14]. But the state will only do this if its ideological institutions are focused on a balanced partnership with business [15]. This study searches for the criteria of balance between the economic, political, and ideological aspects of the institutional mechanism of PPP.

Scientific papers that cover PPP often rely on the documents adopted by the Commission of the European Community, the Directorate General of the European Commission for Regional Policy, as well as the UN European Commission (hereinafter referred to as the UN EC) for Europe [16]. These materials contain a description of the so-called international non-regulatory standards for creating a national organisational and legal framework, regulating the forms, methods that define the main criteria for creating a PPP infrastructure, and the principles of "*good governance*" in the field of PPP activities [17].

International standards affect the regulation of PPPs both at the level of domestic law (harmonisation and unification) and at the level of international law (codification). As a result, the legal space of PPP is unified [18]. In fact, common international approaches to PPP are being implemented in different countries. Some researchers define PPP with reference to international standards: public-private partnership is an institutionalised interaction of the public and private sectors in the economic sphere based on international norms and national legislation. Its purpose is to meet a specific public need, where the main partner is the state, which assumes responsibility to society and the key risk of possible non-implementation or improper implementation of the project [19].

Materials and Methods

The main source base of the study is international PPP standards [20]. They contain: methodology and principles of effective management in the field of PPP; conceptual approaches to take into account the interests of the state and business in the implementation of PPP projects; description of the recommended organisational and legal forms of partnership and justification for their application in a particular industry; recommendations on the financing model, the most rational distribution of risks between the state and the private partner; basic approaches to improving the regulatory framework; basic approaches to the tender procedure in the framework of PPP, and so on. International PPP standards are now widely distributed throughout the post-Soviet space through a large number of papers, methodological recommendations, and manuals.

International practise allows using the term PPP in a broad and narrow sense. To understand the pragmatics of this phenomenon, it is necessary to identify several approaches that are of practical importance. The derivation of the main provisions was based on the findings of studies [21-25]. The first approach implies that PPP is any use of business resources (capital, management experience, new technologies, innovations, know-how, etc.) to create a public good [21]. In this case, it refers to any official constructive interaction between public authorities and business in various spheres of public life – in the economy, education, and science. The structure of such interaction may include forms of medium – and long-term cooperation between public authorities and business [22-24]. In the second approach, PPP is usually understood as the interaction of business and state in the process of implementing projects of national or local significance. Sometimes, in a narrow sense, PPPs can be understood as cooperation on investments aimed at supporting innovative projects at the national, regional and local levels, in which partners pool resources and share responsibilities, risks and benefits [25].

The study of PPP is based on the system and structural-functional approaches, which were used to analyse the problems of relations between the state and business, the mechanisms for coordinating the economic interests of the main market participants and the state. Relying on international sources and international experience of PPP, this study combined the system and structural-functional approaches with concepts of economic theory, the norms of constitutional, administrative, and municipal law. With the help of the institutional approach, the relationship between the private entrepreneur and the state are studied. The use of the monographic method allows identifying and analysing PPP practises in the healthcare sector in European countries. The forecasting allows developing recommendations for improving PPP in the healthcare sector in the Republic of Kazakhstan. The graphical and tabular methods help to structure the collected material for visual display of the findings.

Results and Discussion

Public-private partnership: General meaning and principles

Drawing attention to the already established practise of applying the term PPP, the concept "public-private partnership" in the Ukrainian literature in translation acquires various interpretations as "public-private collaboration", "private-public partnership", in some cases "municipal-private partnership". The concept "public-private partnership" (PPP) is the most adequate for displaying the general content of the concept of interaction between the state, local self-government, the public sector and business at various levels of the territorial organisation of power. This approach expands the idea of public partners in relation to the existing approach implemented in the current legislation of the Republic of Kazakhstan [7]. In addition to the state and other public legal organisations, the author includes public law legal entities, namely: state scientific institutions and organisations, higher educational institutions of state and municipal ownership.

All variants of the phrase "public-private collaboration", "private-public partnership", "municipal-private partnership" are acceptable. If there is a need to reflect the

institutional participants of PPP, the researcher can apply any variant of the phrase to denote this phenomenon without losing scientific correctness. In general, the terms "public-private partnership" and "municipal-private partnership" can be used as synonyms in some cases, if there is no need to detail the institutional status of the partner. However, in any case, it should be borne in mind that the concept "public-private partnership" is generic in relation to the concept "municipal-private partnership".

It is the institutional paradigm that claims to cover all possible aspects of the PPP problem, reducing them to the institutional basis from which organisational, political, legal, economic and any other mechanisms of interaction between the state and business are built. This thesis is an argument in favor of applying the institutional paradigm to solve the tasks set in this study. It provides an opportunity to study the phenomenon of PPP in dynamics, including the fact of imperfect organisational and legal support in the context of constant institutional changes and transformations. The available research results mentioned above do not answer the question of why PPP in the Republic of Kazakhstan is an uncompetitive mechanism for cooperation between public administration and business. Institutional factors, such as mutual distrust between business and the state, the lack of a positive public position on the transfer of ownership and disposal of state and municipal property to the private sector, also have a significant negative impact on the implementation of PPP and the effectiveness of its functioning. The main features of PPP include contractual relations, limited time, limited space (Fig. 1).

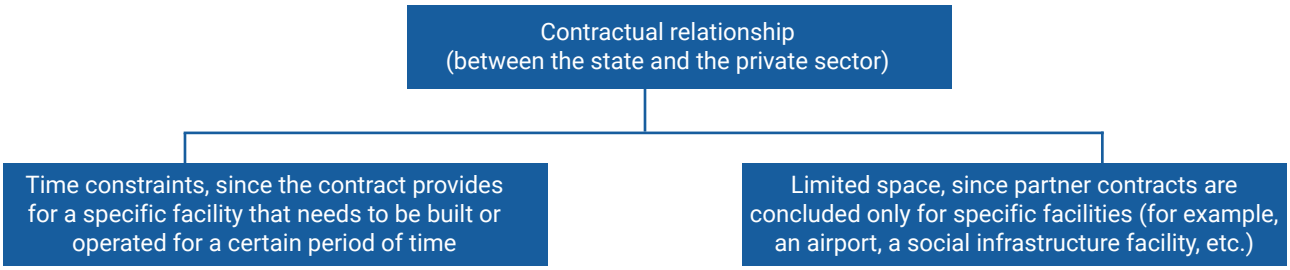

Figure 1. General features of public-private partnership

The international standards also formulate the main features of PPP, which must be taken into account to distinguish PPP from other forms of interaction between the state and business. In the EU Green Paper on Public-Private Partnerships and joint legislation on Public Contracts and Concessions, the main characteristics of PPPs include the following:

– relatively long-term cooperation between the private and public sectors;

– the existence of a number of agreements between different participants of cooperation on the method of project financing;

– defining the roles of the economic actors involved in the different stages of the project (design, completion, implementation, financing);

– the distribution of risks between public and private partners, according to which all the risks of the public sector can be transferred to the latter [20].

Notably, these features are also contained in the law of the Republic of Kazakhstan on public-private partnership [7]. Specifying the characteristic features of PPP, attention will be paid to such regulations, fixed in this law:

– established terms of partnership agreements (projects are usually developed for a specific object, which must be completed within the established time limit;

– cooperation is carried out on a voluntary and contractual basis (the private sector cannot be forced to agree);

– specific forms of distribution of responsibility between partners (the state determines the positions of public interests, cost and quality parameters, monitors the implementation of projects, and the private partner takes on the tasks of operational activities at different stages of the project – development, financing, construction and operation, management, practical implementation of services to consumers;

– specific forms of project financing (the project is financed by private investments supplemented by public financial resources, or by joint investment of several participants);

– risk sharing between the parties to the agreement on the basis of relevant agreements;

– specific forms of distribution of responsibility between partners: the state determines the project objectives from the standpoint of the interests of society and regulates the cost and quality parameters, monitors the implementation of projects;

– the state exercises the function of controlling the activities of the private sector in the management of state property.

As a tool of economic policy, PPP assumes that a thorough consideration of possible risks will be carried out, and they will be distributed among all participants of the PPP. Each party in a PPP is interested in the benefits. The feasibility of using PPP is determined by the most efficient spending of funds in comparison with conventional schemes. PPP is based on the following principles (Fig. 2):

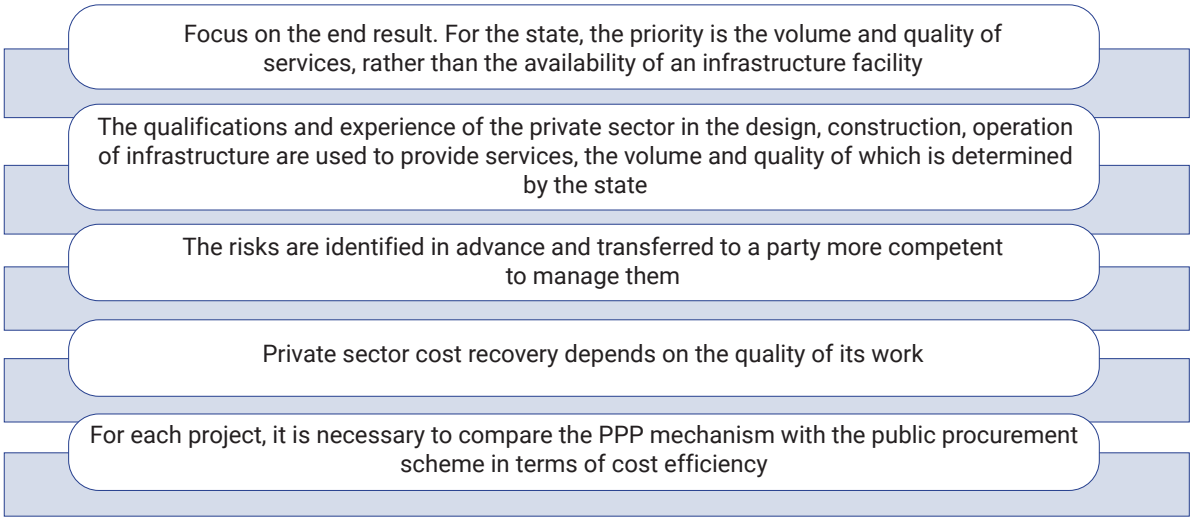

Figure 2. Principles of building relationships in PPP

Next, the study considers each principle separately. *Focus on the end result (services)*. Under the conventional financing scheme, the operator imposes requirements on the private contractor/supplier in terms of volume, timing, quality, and so on. In PPP, the state imposes a requirement for the provision of final services that are based on taking into account the consumer interests. *The dependence of cost recovery on the quality of services provided*. The operator of a PPP is the private sector, so the quality of services depends on it. The terms of the PPP contract ensure the operator's interest in the final result, since it reimburses its costs from the revenue received from the provision of services, or remuneration. In order to avoid reducing the operator's interest in the final result, state support should not be excessive.

Risk-benefit sharing. The transfer of some functions to the private sector does not mean the self-exclusion of the public sector. PPP provides for a thorough study and identification of possible risks, describing them in the Feasibility report. Possible risks are distributed among the project parties, and the party that will best cope covers the possible risk. The benefits of participating in the project are distributed accordingly. When developing PPP projects, the viability cycle of the future facility is taken into account, since the private sector must be confident of recovering costs and making a profit in the long run. The use of PPP is not an end in itself. The main thing is the efficiency of spending compared to the traditional approach. The form of the PPP determines what functions and risks the private sector assumes, and the duration of the PPP contract depends on the level of risks and obligations assumed. It should be noted that in the World Bank classification, "... a form of cooperation between the public and private sectors, in which all risks and responsibilities are assigned to one of the parties, is not a PPP" [26]. These types of cooperation include, for example, service contracts, in which the risks are almost completely covered by the state, as well as privatisation contracts, in which the risks are covered by the private sector.

Classification of the main models of interaction in PPP

Conventionally, all PPPs encountered in practise can be divided into three main groups (Fig. 3):

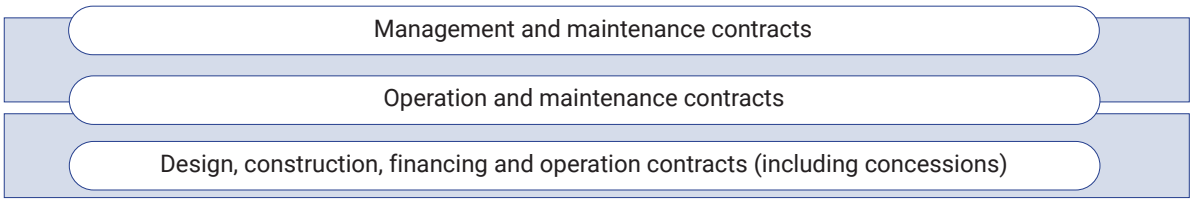

Figure 3. Classification of PPP forms

Management and maintenance contracts are those in which private sector entities perform functions for the management and maintenance of state-owned facilities, make administrative decisions in the current production and operational activities. Under these contracts, there is no implementation of institutional changes to the facility. The main goal of such contracts is to improve the internal management system and operational activities of the facility. For their management and maintenance services, private sector entities receive remuneration, which is determined during the competition. In most cases, the contract is given to the company that offered a more reasonable price for the

services. Notably, the actual payment of remuneration is tied to pre-defined performance indicators. Another feature of such contracts is that the public sector retains overall responsibility for the provision of services to consumers. The public sector is also responsible for the expansion, rehabilitation and major repairs of the facilities. Usually, such contracts are concluded for 3-5 years with minimal risks.

Operating and maintenance contracts are those in which production facilities are leased to the private sector. The private sector in this case performs the function of the operator, and is responsible to the consumer. When concluding such contracts, the goal is to increase operational efficiency, improve the quality of services provided, and attract funds from the private sector to finance the facility. The most common type of such contract is leasing: a private operator, depending on its performance indicators, receives remuneration for the operation and maintenance of the facility. On the other hand, the private operator pays the government a fee that is used for capital investments. The average duration of such PPP contracts is 7-10 years with medium risks.

Contracts for design and construction. In this case, the private sector assumes responsibility for the provision of all related services, which may include, for example, payment collection and public relations management. The public sector remains only a regulator. The main goal in this case is to reduce the costs and risks of the public sector, improve the quality of services, and expand opportunities for infrastructure development. An important aspect of concession contracts is the dependence of the amount of cost recovery of the concessionaire on the quality of the services provided by it, which are determined by the performance indicators of its activities. Concession contracts are usually concluded for a period of 20-30 years, the degree of risk of which is high. PPP implies a partnership between the state and the private sector and in the sharing of benefits and risks. The benefits for each of the stakeholders are clearly outlined in Figure 4.

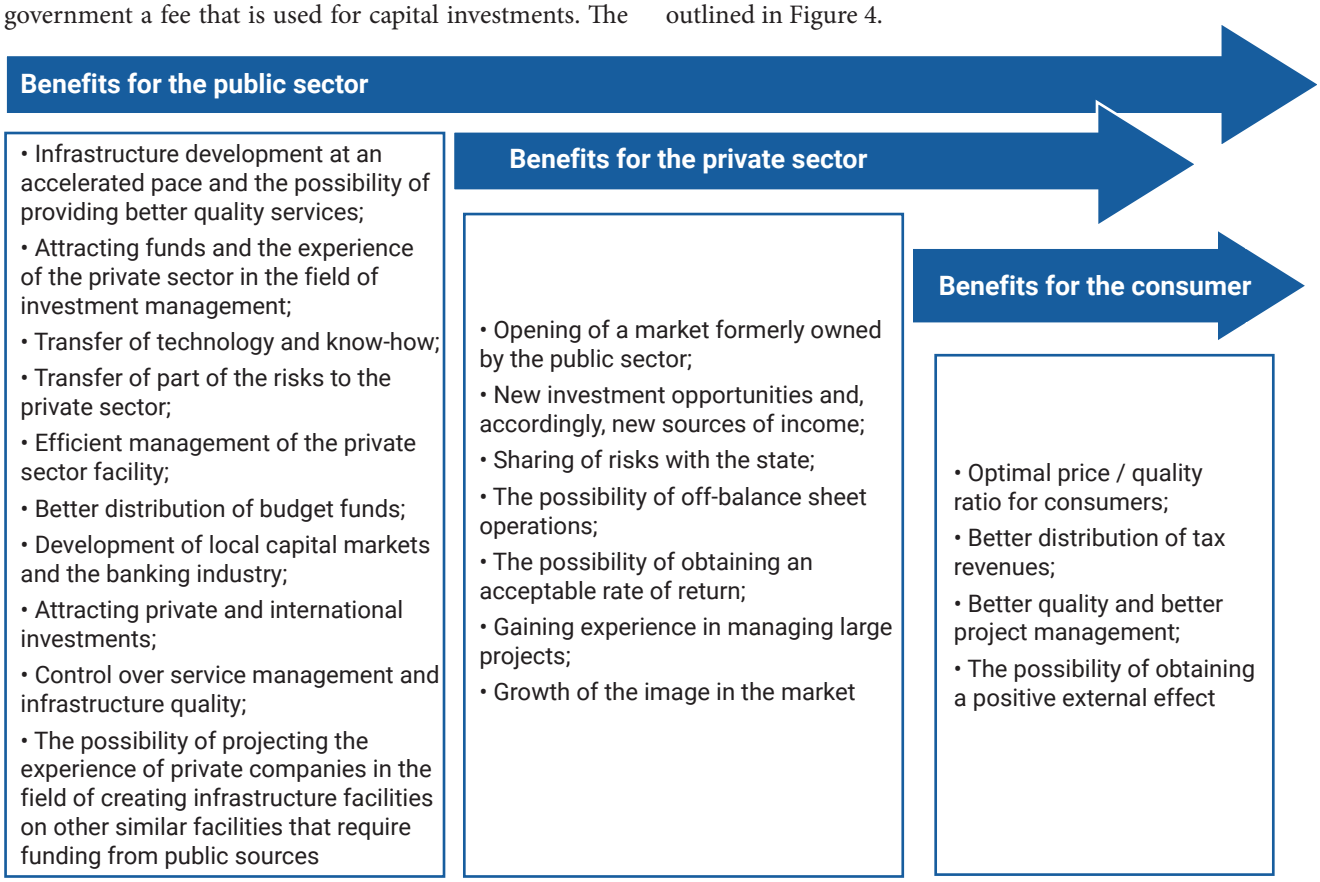

Figure 4. Advantages of PPP implementation for the subjects

Thus, the private sector assumes functions, risks and responsibilities depending on the type of PPP. At the same time, the duration of the PPP contracts depends on the degree of participation of the private sector, the level of accepted risk, responsibility, obligations, and financing.

International experience of PPP practise in the healthcare sector of the Republic of Kazakhstan

The world practise demonstrates the successful experience of PPP in highly developed countries of Western Europe and North America. In recent years, PPP has been developing significantly in China, India, and Brazil, but they are inferior in terms of the breadth of their application. In the Republic of Kazakhstan, the main strategic directions of the development of the health system are the modernisation of existing medical organisations and the construction of new health facilities. In 2022, six new PET centres (positron emission tomography) will be opened as part of the PPP, which, together with the existing PET, would allow the country to meet international recommendations (1 PET

per 1.5 million people) [27]. Thus, the Comprehensive Plan to Combat Cancer for 2018-2022 includes four areas:

– prevention and management of risk factors;

– development of highly effective early diagnosis;

– implementation of an integrated model for providing cancer care;

– development of human resources and science [28].

The main part of the equipment for the development of cancer services in the regions was purchased under the PPP. In 2019, the Republic of Kazakhstan began conducting molecular genetic research within the framework of the GOBMP (Guaranteed Amount of Free Medical Care), additional funding in the amount of 1.6 billion KZT was allocated for almost 100 thousand patients. CT (Computed tomography) and MRI (Magnetic resonance imaging) examinations in patients with suspected cancer. These measures will increase the diagnosis of early stages to 33% by 2022. The installation of PAX systems in 18 regions of the country was carried out within the framework of PPP projects.

PPP is actively developing in the North Kazakhstan and Turkestan regions. Thus, the akims of these regions signed PPP agreements with the Turkish company "YDA Holding" for the construction of large modern hospitals with a capacity of 500 beds [29]. The long-term plan for the development of healthcare infrastructure until 2025 determines the need for investments in healthcare of more than 1 trillion KZT, the main share of which is occupied by projects for the construction of 17 large multi-specialty hospitals. Six projects – priority ones:

1) united Uuniversity hospital with 1200 beds in Almaty at the Kazakh National Medical University named after S. Asfendiyarov;

2) multidisciplinary hospital with 300 beds in Almaty at the Kazakh National Medical University named after S. Asfendiyarov;

3) multi-specialty hospital with 300 beds in Karaganda Medical University;

4) multi-specialty hospital with 500 beds in Nur-Sultan;

5) multidisciplinary regional hospital with 500 beds in Petropavlovsk;

6) multi-specialty hospital with 600 beds in Turkestan.

These facilities are planned to be implemented under the PPP infrastructure model. The appearance of new high-quality and modernised hospitals will have a positive impact on the development of incoming medical tourism and will reduce the number of citizens travelling abroad for treatment [30].

As for pharmaceutical production, it is necessary to note the peculiarity of the national market: the growth dynamics over the past two years shows that the contribution of the pharmaceutical industry to the country's GDP is quite low due to the weak market base. In 2018, the pharmaceutical industry accounted for no more than 0.1% of GDP. Kazakhstan's pharmaceutical industry is significantly inferior in gross profitability to foreign companies, which occupy a dominant position due to the low technological and production capabilities of the local manufacturer. Today, the share of foreign products sold in the retail market is about 70% [31]. Thus, in 2018, the volume of the world market of medicines amounted to 1.174 billion USD [32]. The market share of the EAEU (Eurasian Economic Union) is less than 2.6%, and the share of Kazakhstan in the EAEU is 2.4% [33].

From 2010 to 2018, 30 projects were implemented in the pharmaceutical industry within the framework of PPP, the volume of investments – 45 billion KZT. For example, the Karaganda pharmaceutical complex, introduced as part of the industrialisation map, has been increasing the production of medicines since 2018, expanding the range of pharmaceutical products from antibiotics of the cephalosporin group to drugs for the treatment of cancer. Currently, there are 168 pharmaceutical enterprises operating in the Republic of Kazakhstan, of which 3 are large, 11 are medium-sized, and 154 are small. As part of the PPP, investors from Poland, Turkey, China and Russia have been attracted to the industry. According to the results of the first five-year plan, 24 new projects worth 28.8 billion KZT were implemented in the pharmaceutical industry with the creation of more than 3,000 permanent jobs. The most significant projects in this industry:

– increase in the production capacity of JSC "Himfarm" (Shymkent);

– modernisation of the pharmaceutical factory (Almaty);

– construction of the pharmaceutical plant "ELEAS" (Almaty Region);

– construction of the pharmaceutical plant "Sultan" LLP (Almaty region);

– expansion of the existing production with an increase in the range in accordance with the international standard ISO 13485-2003 "Merusar & K" LLP (Pavlodar Region) [34].

Unfortunately, according to the results of the first half of 2019, there is a sharp decline in investment in healthcare (Fig. 5). Thus, from January to May, investments decreased by 15%. Until 2018, such a reduction was observed annually, so in 2016, the decrease was 19.7%. However, in the first half of 2018, there was a record increase of 62% (Fig. 6).

This is conditioned by the attraction of private investment in solving problems with the wear and tear of buildings of medical organisations in the amount of 7.5 billion KZT for the construction of 67 medical facilities, and the construction of 165 medical buildings in 2018 [36]. The main reason for the decrease in the amount of investments in 2019 was a reduction in the investment of business' own funds, a decrease in infusions from local budgets. At the same time, banks' interest in the healthcare sector has significantly increased, as investments from borrowed funds and bank loans have increased 5.2 times over the year (Fig. 7).

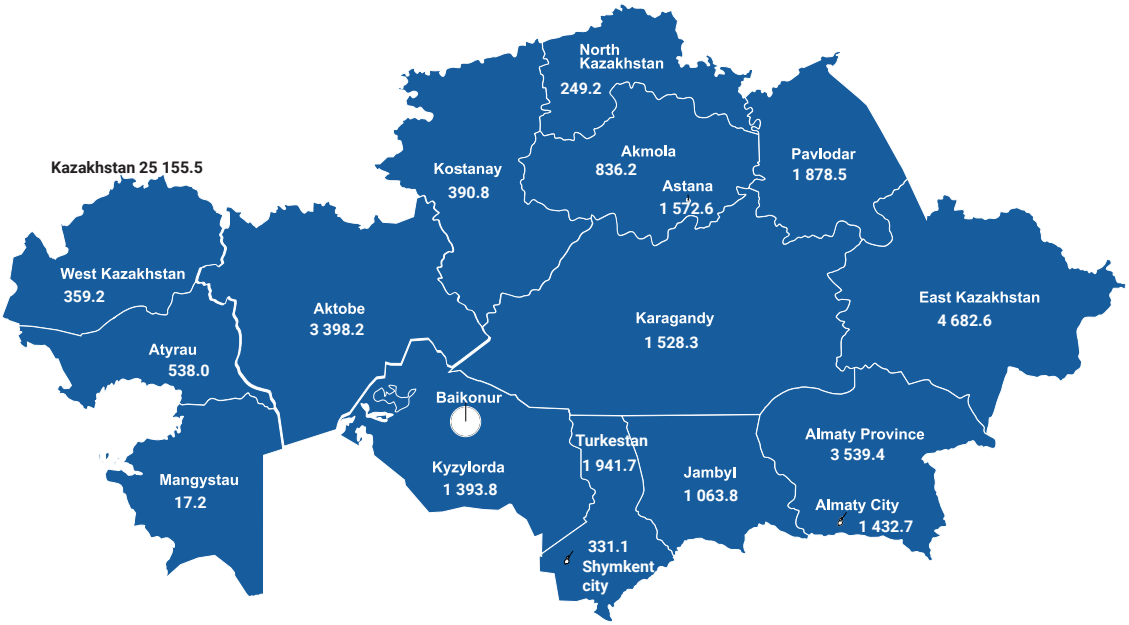

Figure 5. Investments in healthcare and social services in the Republic of Kazakhstan for the first half of 2019
Source: [35]

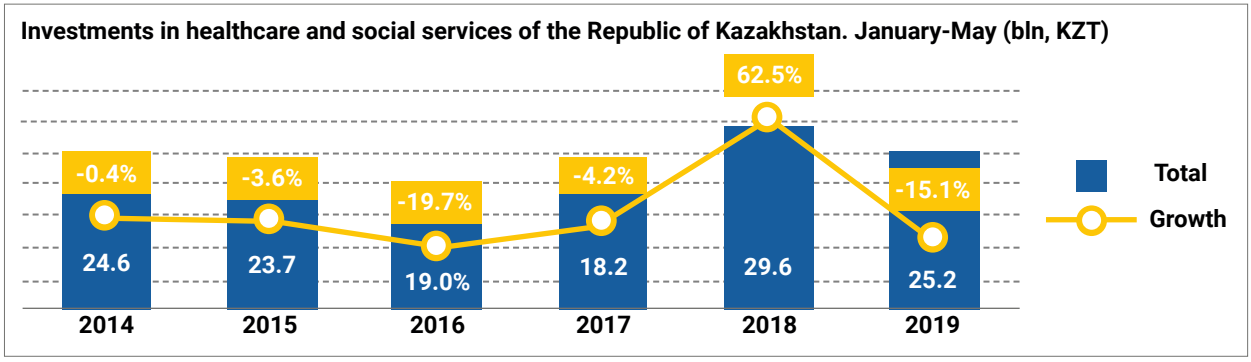

Figure 6. Investments in healthcare and social services in the Republic of Kazakhstan for the first half of 2014-2019
Source: [35]

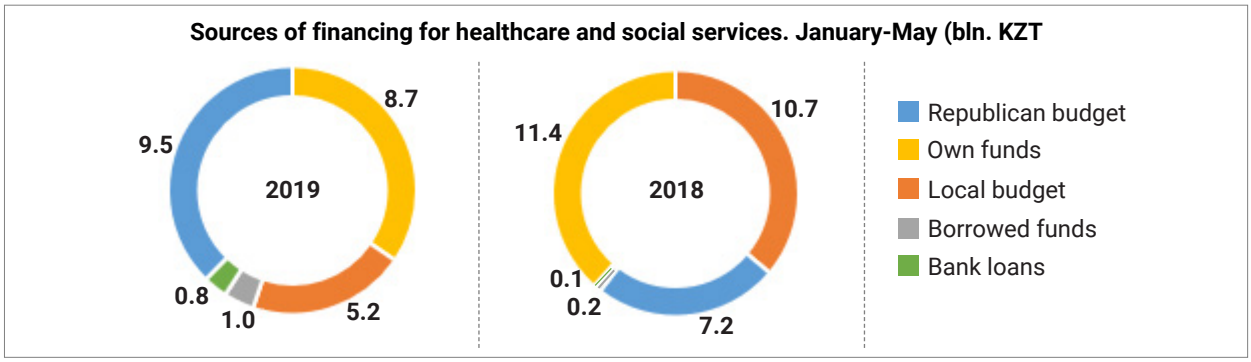

Figure 7. Sources of financing of healthcare and social services in the Republic of Kazakhstan for the first half of 2019
Source: [35]

According to the Minister of Health E.A. Birtanov, by 2021 it is planned to build more than 600 PHC facilities (primary healthcare) and hospitals within the framework of PPP in order to cover all rural settlements with medical services [35]. The development of the investment policy of the healthcare system of the Republic of Kazakhstan will eventually allow:

– improving the key performance indicators of the healthcare system;
– modernising the financing of the industry;
– reducing the industry's budget deficit;
– improving the quality, accessibility, and satisfaction of the population with medical services;
– improving the social status of healthcare workers;
– implementing the strategic objectives of the industry.

Only with a comprehensive solution to the problems

of reducing risks and increasing profitability in the healthcare system can the desired result be achieved.

Recommendations for improving PPP in the healthcare sector

Based on the study of the theory and practise of PPP in Kazakhstan's healthcare, the following recommendations were developed:

– designate the special status of the sphere of medical services as a socially significant sector of the economy, and to resolve the issue of creating under the auspices of the Government (the Ministry of National Economy of the Republic of Kazakhstan, the Ministry of Health, the Ministry of Labour, Employment and Social Protection of the Population) a state operator for the development of the investment policy of the health system of the Republic of Kazakhstan;

– redefine the healthcare industry as an effective investment vehicle. the healthcare system should become attractive for investment;

– strengthen the competitive environment in the industry, develop the private sector, develop a new economic mechanism for healthcare facilities, including: decentralise the financing of the industry, improve the quality of medical services provided, increase public satisfaction and access to medical care, improve human capital, expand the innovation and scientific environment, introduce corporate governance principles, improve the regulatory framework;

– increase profitability by providing state benefits and tax preferences in investment projects, since investments in healthcare are investments in the human potential of the country.

In the medical field, it is possible to introduce new and expand the range of PPP types used (Table 1).

Table 1. Forms of introduction of new and expansion of the range of types of PPP

Type of PPP	Scale	Positive aspects
PPP based on a contract in the field of medical equipment supply	Regional and national	Systematisation of information about the capabilities of medical equipment, centralisation of knowledge and training resources on the effective operation of equipment, guarantee of service and repair, reduction of the cost of components and consumables, exclusion of cases of unfair treatment on the part of suppliers – "shell companies"
PPP on the basis of a contract in the field of drug supply	Region or medical institution	Transfer of functions to search for information about the availability and cost of medicines, minimisation of forced contacts with numerous potential suppliers, optimisation of structures that carry out public procurement, reduction of risks in budget planning
PPP based on a contract in the field of social patronage	PHC Centre	Reallocation of secondary functions, fulfillment of the potential of the medical worker
PPP based on a concession for the construction of new healthcare facilities	Region	Risk sharing for construction, postponement of payments for the construction of the facility, implementation of payments by placing a state order, introduction of new management technologies and competitiveness of the new institution
PPP on the basis of a concession in the field of trust management of state assets	Regional and national	Reduce public sector costs and risks, expand infrastructure development opportunities

Thus, the current state of the economy of the Republic of Kazakhstan is characterised by the consolidation of the efforts of the state and the private sector in the search for new forms and methods of creating, managing, and regulating infrastructure. PPP is a real mechanism for interaction between the public sector and private capital in the creation, modernisation, maintenance, and operation of infrastructure facilities.

This provision fully applies to healthcare. The nature of self-financing of such projects makes them attractive to investors. Summarising international experience and analysing best practises allows forming specific proposals for the further development of PPP in Kazakhstan's healthcare sector, including attracting foreign companies to provide concessions in the field of medical and pharmaceutical infrastructure, including:

1) expanding the scope and mechanisms of PPP;
2) improving the regulatory framework for PPP;
3) developing the methodological base;
4) strengthening the capacity of public authorities in the field of PPP.

Conclusions

In the course of the study, PPP was analysed as a tool for attracting investment to the national economy. Based on this, a review of the literature is conducted and several positions on the definition of the concept of PPP are considered. According to this, PPP should be perceived in two contexts. The first is the common use of business resources of two entities – the state and the individual. In the second – the implementation of specific projects on the terms of PPP. Public-private partnership has different formulations: "public-private partnership", "private-public partnership" and others, which are similar in their main content and reflect the participants in this process. The main features and principles of PPP are highlighted. Among the signs of PPP, the main ones are contractual relations, limited time and space. The principles of PPP

include: focus on the final result, the dependence of cost recovery on the quality of services provided, the separation of risks and benefits.

The classification of the main forms of public-private partnership is carried out and the most common ones are identified: management and maintenance contracts, operation and maintenance contracts, design, construction, financing and operation contracts, and concessions. The international experience of PPP practise in the Republic of Kazakhstan in the field of healthcare and pharmaceuticals is analysed. The main results of the implemented projects in the above-mentioned areas are considered. However, the level of investment is not high enough, which requires the development of additional motivation for individuals to invest in the healthcare sector. Recommendations on the creation of new and modernisation of existing forms of PPP in the field of healthcare and pharmaceuticals in the Republic of Kazakhstan have been developed.

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Державно-приватне партнерство в охороні здоров'я та фармацевтичному секторі Республіки Казахстан

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Аннотация. Взаємодія держави та бізнесу є одним з основних шляхів вирішення соціальних проблем сучасних держав. Актуальність теми дослідження обумовлена тим, що розвиток форм державно-приватного партнерства забезпечує приплив інвестицій з боку приватних підприємців у сферу охорони здоров'я та фармацевтики в Республіці Казахстан. Метою статті є характеристика державно-приватного партнерства та аналіз міжнародного досвіду реалізації практик на конкретних проектах. Основною методологічною базою дослідження стали такі методи: системний, структурно-функціональний, інституціональний, монографічний, прогнозування, табличний і графічний. У процесі дослідження розглянуто теорію та практику державно-приватного партнерства у сфері охорони здоров'я та фармацевтичній сфері, ознаки та принципи такого партнерства. Проведено класифікацію, проаналізовано найбільш яскраві приклади реалізації державно-приватного партнерства. Досліджено відмінності між контрактами державно-приватного партнерства, звернуто увагу не тільки на функції і зміст таких договорів, але й на терміни, передбачувані ризики. Проаналізовано переваги для кожної із зацікавлених сторін у державно-приватному партнерстві: приватний сектор, державний сектор, споживачі. Проведено аналіз сучасного стану державно-приватного партнерства в розглянутій сфері в Республіці Казахстан. Практична цінність дослідження полягає в розробці рекомендацій щодо поліпшення форм державно-приватного партнерства для органів влади з метою збереження контролю з боку держави і дотримання умов адекватного розподілу між учасниками такого виду партнерства всіх ризиків, відповідальності та вигод

Ключевые слова: публічно-приватне партнерство, фармацевтична галузь, партнерство держави та бізнесу, соціальна сфера, ДПП в охороні здоров'я

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Regional Trade Agreements of Ukraine: Realities and Prospects

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Abstract. The conclusion of regional trade agreements has increased to hundreds. The benefits of integration, fears of protectionism on the part of uniting countries, and other factors contribute to this process. Ukraine has signed agreements with more than 40 countries, including integration groups. Therefore, the purpose of this study is to identify the specific features of its agreements, prospects for their development and signing new ones. It is worth analysing the conclusion of agreements in the historical aspect, based on the level of their economic development, foreign trade, the trade complementarity level, and identifying development opportunities. Therefore, general scientific and special methods were used in this study, in particular historical, analysis and synthesis, economic analysis, tabular, etc. The study examined research performed by other scientists; statistical data from the Centre for international trade, the Food and Agriculture Organisation of the United Nations (FAO); international treaties and regulatory documents. According to the analysis of concluding agreements, it is proposed to divide them into two periods: before and after 2000. In the first case, they were concluded mainly with developing and neighbouring countries, and in the second – with developed countries outside the former Soviet Union. At first, the partners were mainly the CIS countries, then Europe, and later other regions, but there were also disintegration processes with the Baltic states. It is established that transactions have their specific features regarding the provision of a favourable regime, e-commerce, etc. It is proposed to divide integration risks into predictable and unpredictable ones. The main importers of all and agri-food products were identified among the countries with which agreements have been concluded. Exports to such countries are mainly growing, as well as the share of agri-food products. The trade balance and low share in Ukraine's exports indicate the feasibility of developing trade. The calculation of the complementarity index allows predicting the prospects for the development of relations with countries with which agreements are planned and already concluded, as well as with the main importers of the world market. The results of the study indicate prospects for the development of trade, but this will depend on the content of transactions, product competitiveness, etc.

Keywords: international economic integration, Free Trade Agreement, foreign trade, complementarity, export

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Introduction

The EU, the North American Free Trade Area and Mercosur remain the most developed integration groups in the world, with the first two being the most powerful exporters and importers on the world market. Therewith, the benefits of foreign trade liberalisation and a number of other positive consequences of the merger have led to the conclusion of regional trade agreements between most countries of the world, and even between the aforementioned integration groupings and their individual member countries with a number of other countries. Among the latter (2019-2021), it is worth noting the regional trade agreements (RTA) between the UK and Ghana, the UK and the EU, Indonesia and Australia, ASEAN (Association of Southeast Asian Nations) and Hong Kong [1]. At the same time, reports on RTA and their consideration continued in the context of the deterioration of the trading environment caused by the COVID-19 pandemic and trade restrictions of some members of the Organisation [2].

Ukraine has also concluded regional trade agreements with a number of countries, both in the East and the West, as well as integration groups, in particular the EU and EFTA (European Free Trade Association). Ukraine remains a member of such trade and economic associations as the BSEC (Black Sea Economic Cooperation) and GUAM (Organisation for Democracy and Economic Development), but so far there is no reason to claim that they have a high development of international economic integration.

The conclusion of agreements with Serbia, Turkey, Vietnam, ECOWAS (Economic Community of West African States), etc. is also to be expected. Moreover, there is a difference in concluding agreements with countries depending on the level of economic development and the territory in certain periods of time. At first, most of the agreements were concluded with the CIS countries, later in Europe, and then in other regions. They clearly define the rules of trade in agricultural products, in particular in the agreement with the EU and Canada, which emphasises its importance. Considering the difference in the economic development of EFTA, the EU and Canada compared to Ukraine, the agreements applied the principle of asymmetry in terms of trade liberalisation. RTAs have their specific features, in particular, with EFTA, it is noted that the parties provide each other with a regime no less favourable than the EU, with Canada – e-commerce, the use of trade barriers on products transmitted in electronic form. Since it is not always possible to predict external changes, integration risks can be divided into predictable and unpredictable ones.

The creation of integration groupings is caused by a number of reasons, in particular, the development of the international division of labour, the positive consequences of the creation of integration groupings, trade liberalisation, the creation of integration groupings by neighbouring countries, the exchange of new technologies. The increase in the number of regional trade agreements, the specific features of functioning, and regulation of their creation and operation by the WTO (World Trade Organization) has led to a number of studies on this issue. Thus, D. Mc Daniels, A.S. Molina and E. Wijkstrom investigated how WTO operation affects RTAs, reflecting its importance for the development of integration, with authors analysing 260 agreements [3]. The WTO's considerable attention to the development of integration, regulation of trade policy issues, resolution of disputes between countries, etc. confirms the importance of this process, especially in the current conditions of their growing number.

Researching the issues of RTAs, integration and development, A. DiCaprio, A.U. Santos-Paulino, M.V. Sokolova note that the developing countries have become more active participants in RTAs and the issue of distribution of integration benefits has become urgent. At the same time, the analysis suggests that regional integration leads to an increase in economic growth and a reduction in inequality in member countries [4]. Such consequences contribute to an increase in the number of RTAs between developing countries, especially in the context of their increase in the world in general.

Unification between countries has a considerable impact on their economies, which is directly proportionate to the level of integration between them. Thus, while studying the EU economy, E. Khesin, citing the negative consequences of Brexit for the UK, notes that in any scenario, taking into account trade and investment ties, it would be mandatory to break the structure of its economy and foreign economic relations, as well as partial reorientation towards other countries and regions [5, p. 77]. Therefore, the creation or entry into integration groupings, the signing of free trade agreements requires a thorough analysis of the development prospects and consequences, since there are risks of both participation and withdrawal from these trade and economic associations.

These and a number of other studies confirm the key importance and expediency of analysing the conclusion of RTAs by Ukraine, and a significant part of the study focuses on issues of integration into the EU, which is not the case in the analysis of RTAs with other countries.

Purpose of the study – to identify the specific features of regional trade agreements concluded by Ukraine and provide for the development prospects of the latter and the signing of new free trade agreements.

In accordance with the purpose of the study, the following tasks were set: to consider the conclusion of RTAs by Ukraine in the historical aspect, depending on the level of economic development of partner countries, foreign trade with them, the level of complementarity of trade, as well as to outline the prospects for the development of integration processes in the future, taking into account these and other factors.

Literature Review

The study of RTAs is conditioned by an increase in their number, the impact on the trade policy of the parties, as well as on trade with third countries, and a number of other factors. Thus, P. Atkhukorola notes that over the past three decades, free trade agreements have become an integral

part of the global trading system. However, the discussions regarding the economic arguments in favour of free trade agreements as an alternative to multilateral and unilateral liberalisation are still ongoing. Therewith, the number of Free Trade Agreements reported to the WTO increased from 19 in 1990 to 292 as of January 2019 [6].

D. B. Nguyen, having studied the impact of RTAs on international trade, in particular on intraregional trade and propensity to trade with the rest of the world, and having evaluated 160 countries, notes the influence of agreements on the development of trade. Therewith, the author identifies features of RTAs depending on the continent (highlighting American and African, as well as European and Asian) [7, p. 236]. Noticeable consequences of integration are also observed in the most developed integration groups, in particular in their less-developed member countries, for example, Mexico in the North American FTA, Poland in the EU, etc.

Studies of the impact of participation of different countries in RTAs have been carried out by many scientists, which confirms the importance of this phenomenon and its growth. Thus, M. Pant and A. Paul noted that the RTAs were expected to increase intraregional trade and the well-being of countries, as well as that the agreements stimulated trade only when partner countries already accounted for a large share of trade. Scientists believe that India's interaction with individual Asian associations as such is unlikely to stimulate trade [8, p.538]. In other words, each country requires a separate study, taking into account the development of its trade and economic relations with different countries and integration groups in order to predict the consequences of concluding an RTA.

The signing of the Association Agreement with the EU is of great importance for Ukraine; therefore, a considerable part of this study is focused on this issue. For example, O. Yatsenko, N. Karasova, V. Nitsenko et al. (H.S. Jr. James, J.L. Parcell) [9] identified promising areas of agricultural export potential, taking into account the possibility of negative consequences from highly competitive markets, areas for improving bilateral relations, etc. At the same time, the authors see the main advantage in trade in agricultural products in the partial elimination of the asymmetry of trade conditions between the group and Ukraine, which increased after the latter joined the World Trade Organisation. They also note the advantages of abolishing EU export subsidies for agricultural products imported into Ukraine; increasing access of Ukrainian products to the European market due to the harmonisation of standards with the EU; introducing new rules for cooperation, etc. [9, p. 268]. Admittedly, given the territorial proximity to the EU, the development of the latter, the share of its imports on the world market, significant volumes of trade in Ukraine, as well as a number of other factors, the study of the development of economic relations with the group is extremely relevant and important.

However, Ukraine and a number of CIS countries (Commonwealth of Independent States), in particular Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, and Uzbekistan, have previously concluded bilateral free trade agreements with each other. Still, as noted by M. Roberts, P. Wehrheim, not all of them are practically performed or observed [10, p. 319]. In addition, in bilateral agreements, for example with Kazakhstan, the list of goods excluded from the free trade regime is quite extensive. As a result of the application of restrictive trade measures, the advantages for trade in agri-food products in the CIS countries are levelled. In addition, the authors note that bilateral free trade agreements with such a considerable share of it that they do not fall under the free trade regime usually do not comply with article XXIV of the WTO, which states that almost all trade should be duty-free. In addition, even when countries have agreed to greater integration, there are doubts regarding their long-term validity [10, p. 320]. This, to a certain extent, explains why Ukraine has concluded free trade agreements with other countries and integration groups.

In modern conditions, the COVID-19 pandemic has led to changes in various spheres of life, the consequences of which may affect the economic development of countries in the future. Thus, S. Baek, S. Kim, T. Rhee emphasise that the COVID-19 outbreak has dramatically changed the structure of the world, but as a result of progress and treatment, there is hope for a return to normal life, but they also note the vision of many economists that some structural changes caused by the pandemic will have long-term consequences. Scientists note that economic integration and globalisation may prevail, but there is a possibility of changing their form, and there is an impact of the pandemic on globalisation. In particular, at the initial stages of the pandemic, trade flows decreased, the FDI receipts dropped by 30-40% in 2020, and even the passenger traffic on international flights decreased by 70% [11]. Given the impact of COVID-19, it is advisable to develop general rules that can prevent the spread of the disease, as well as the creation of new products, and this requires in-depth scientific research, which can be facilitated by integration between countries, especially in the scientific field.

Considering the problem of concluding bilateral free trade agreements with Ukraine, I.Y. Huzhva predicts a positive impact of this on the national welfare of Ukraine and the development of foreign trade [12, p. 44]. Taking all of the above, the growing needs, the increase in the number of RTAs, their importance, etc. into account, Ukraine needs to use the opportunities from the conclusion of RTAs as well, but with a preliminary analysis and forecast of their consequences, respectively, for each country.

Materials and Methods

In the process of studying the creation of regional trade agreements, the theoretical basis included the scientific studies of foreign and Ukrainian scientists. Considering the fact that Ukraine has only recently engaged in the conclusion of RTAs, as well as the fact that this process has already commenced much earlier in other countries, special attention was focused on the scientific studies of foreign scientists who have investigated this problem from its various

standpoints. Thus, the study considered the issues of the impact of RTAs on the development of trade of partner countries, in particular intra-regional and with third countries, as well as factors that determine this impact; trends in their conclusion; participation of developing countries in RTAs and the impact of agreements on economic growth and inequality in partner countries; the consequences of leaving integration groupings, since this can be accompanied by substantial costs and the creation or entry into other trade and economic associations, the conclusion of new free trade agreements, etc. This purpose required research of scientific studies of Ukrainian scientists, and most of them focused on issues of integration with the EU, in particular on trade policy, advantages and risks due to the conclusion of an Association Agreement with the EU, etc. Taking into account that free trade agreements were concluded with other countries, especially in the early 1990s, the authors have considered foreign studies, which allowed identifying some features of those RTAs that were signed between Ukraine and the CIS countries, in particular regarding trade policy, compliance with WTO requirements, the reasons for the risks of successful unification, etc. As a result of the significant changes caused by the COVID-19 pandemic, the study has taken into account the research on its impact on trade flows, FDI inflows, etc., as well as integration and globalisation in general. The increase in the number of RTAs concluded by Ukraine and the availability of prospects for their growth contributed to the analysis of work on their development and opportunities for obtaining additional benefits or risks of losses. Consideration of literature sources on these issues, taking into account the existing advantages, prospects, and risks, necessitated the investigation of the evolution of the conclusion of RTAs in the world and Ukraine, which involved the study of regulations, international documents, the information base of the World Trade Organization and other internet sources. Accordingly, the analysis of the dynamics of signing the RTU by Ukraine is carried out, taking into account time periods and territorial vectors, as well as the presence and causes of disintegration processes, since in modern conditions, disintegration and reintegration are also characteristic of the development of integration. Since regional trade agreements make provision for trade liberalisation, in particular the elimination or reduction of tariff and non-tariff trade barriers, the study investigated the specific features of the trade policy of individual agreements. Apart from the existing ones, the authors of the study considered the feasibility of concluding RTAs with individual countries, in particular with those where negotiations are already underway and those that are improtant trading partners of Ukraine.

The study involved general scientific and special methods, in particular analysis and synthesis, historical, statistical, economic analysis, tabular, etc. The vital importance of foreign trade between partner countries for the development of integration and the influence of the latter on the former led to the analysis of Ukraine's trade with the countries with which the RTAs were concluded, for which economic and mathematical methods were used, and the information base included statistical data from the International Trade Center (ITC), which is a joint agency of the World Trade Organization and the United Nations, the Food and Agriculture Organization of the United Nations (FAO). Calculations were made to determine the share of Ukraine's exports to individual partner countries in its total exports, as well as agri-food products, which is conditioned by a considerable share of the latter in Ukraine's exports, a positive surplus in its trade, an increase in export volumes and an increase in demand on the world market, and the fact that many of the countries are dependent on its imports. In other words, the paper calculated and studied indicators of international trade, in particular its volumes, the share of exports to individual countries and goods, and the foreign trade balance. To determine the prospects for the development of Ukraine's foreign trade with partner countries, the complementarity index was calculated, and most product groups were taken into account.

The desire to benefit from the conclusion of RTAs resulted in Ukraine concluding them with more than 40 countries of the East, West, and even North America. However, it is

Results and Discussion

Regional trade agreements of Ukraine: Historical aspect and future plans

planned to increase their number in the future. Thus, the programme of activities of the Cabinet of Ministers of Ukraine (dated 11.12.2014) notes the signing of agreements on the creation of an FTA with Canada, Turkey, Israel, the Cooperation Council for the Arab States of the Gulf (GCC), and the Economic Cooperation of West African States (ECOWAS) (until 2018) [13]. Agreements have already been signed with Israel and Canada, and negotiations are also underway with Turkey.

According to experts' calculations, free trade agreements with these countries may lead to an increase in exports of goods and services of Ukraine by 7-10%, but increased competition in the internal market is also probable. I.V. Huzhva suggests that the export potential of Ukraine can also be realised in the markets of the Balkan region, the Middle East, the Gulf, and other regions [12, p. 38]. Notably, a considerable part of the countries with which free trade agreements have been concluded are European, while the countries with which negotiations are being conducted are Asian (Table 1).

Thus, preparations are underway to conclude free trade agreements with Turkey, Serbia, Vietnam, as well as the possibility of this with Albania, Egypt, Jordan, The Republic of Korea, Tunisia, etc., and major players in the international agricultural market are interested in developing cooperation with Ukraine [14]. Ukraine has signed free trade agreements with more than 40 countries (Table 2).

Table 1. Free trade agreements between Ukraine and other countries and groupings

Countries with which the agreements have entered into force	Negotiation stage
Macedonia (goods)	
European Free Trade Association (EFTA) (goods and services)	Turkey
Montenegro (goods and services)	Serbia
EU (goods and services)	Vietnam
Israel (products)	Singapore
Canada (products)	Lebanon
CIS countries (goods)	With BSEC (there is a prospect)
Georgia (goods)	
United Kingdom (goods and services)	

Source: compiled by the author based on sources [1; 12; 14; 15]

Table 2. Free trade agreements and other relevant regulations of Ukraine

Regional trade agreements of Ukraine with...	Signing	Effective date	Status*
Canada	11.07.2016	01.08.2017	+
Montenegro	18.11.2011	01.01.2013	+
EFTA	24.06.2010	01.06.2012	+
Moldova	13.11.2003	16.05.2008	+
Tajikistan	06.07.2001	11.08.2002	+
Republic of Macedonia	18.01.2001	10.09.2001	+
Republic of Latvia	21.11.1995	15.01.1997	– (01.05.2004)
Moldova	29.08.1995	27.05.1996	+
Republic of Azerbaijan	28.07.1995	26.08.1996 26.12.1996	+
Kyrgyz Republic	26.05.1995	31.12.1997	+
Republic of Estonia	24.05.1995	14.03.1996	– (01.05.2004)
Georgia	09.01.1995	04.06.1996	+ (as amended on 17.06.2009)
Uzbekistan	29.12.1994	01.01.1996	+ (as amended on 25.06.2004)
Turkmenistan	05.11.1994	18.12.1996	+
Republic of Armenia	07.10.1994	18.12.1996	+
Kazakhstan	17.09.1994	19.10.1998	+
Republic of Lithuania	04.08.1993	21.11.1995	– (01.05.2004)
Russian Federation	24.06.1993	21.02.1994	+ (as amended on 04.10.2001)
Republic of Belarus	17.12.1992	30.11.2006	+
CIS	18.10.2011	20.09.2012	+ (as amended on 19.10.2012, 14.11.2012)
▪ European Union	(21.03.2014) 27.06.2014	01.09.2017	+ (as amended on 30.11.2015
▪ Israel	21.01.2019	01.01.2021	+
▪ The United Kingdom of Great Britain and Northern Ireland	08.10.2020	31.12.2020	+

Notes: "+" – valid, "-" – invalid
Source: compiled according to the source data [16]

Features of RTAs of Ukraine with CIS countries

The Free Trade Agreement with Moldova of 29.08.1995 referred to the desire of the parties to become Contracting Parties to the GATT/WTO [17], and the agreement of 13.11.2003 expressed the belief that the agreement would contribute to the process of European integration. Notably, the provisions of the agreement should apply to both industrial and agricultural products (Article 2) [18]. In other words, the agreements specify not only the issues of trade liberalisation, but also the achievement of the goals pursued by partner countries.

In parallel with the integration processes, disintegration processes were also observed, in particular, according to the letter of the State Customs Service of Ukraine no. 25/4-14-35/6222- EP dated 17.05.2004 [19], the free trade agreements with the republics of Estonia, Latvia, and Lithuania have become invalid since May 1, 2004 due to their accession to the EU, but the opposite situation is observed in relation to other countries with which the RTAs have been concluded (Table 3).

Table 3. Bilateral free trade agreements with the CIS countries

Partner country	Content
Belarus	The parties do not apply duties, taxes, and fees that have an equivalent effect on the export and/or import of goods leaving the customs territory of one of the states and intended for the customs territory of another state. Exemptions from this trade regime for the agreed nomenclature of goods are drawn up in a separate protocol or agreement, which forms an integral part of this Agreement (Article 1 of the Agreement)
Kazakhstan	The parties do not apply duties, taxes, and fees that have an equivalent effect on the export and/or import of goods leaving the customs territory of one of the states and intended for the customs territory of another state. Exemptions from this trade regime for the agreed nomenclature of goods may be issued in a separate protocol, if the parties deem it necessary (Article 1)
Armenia	The parties do not apply duties, taxes, and fees that have an equivalent effect on the export and/or import of goods leaving the customs territory of one of the states and intended for the customs territory of another state. Exemptions from this trade regime for the agreed nomenclature of goods is made out by documents that form an integral part of this Agreement, if the contracting parties deem it necessary
Kyrgyz Republic	The parties do not apply duties, taxes, and fees that have an equivalent effect on the export and/or import of goods leaving the customs territory of one of the states and intended for the customs territory of another state. Exemptions to this trade regime for the agreed nomenclature of goods are drawn up in a separate protocol or agreement, which forms an integral part of this Agreement (Article 1 of the Agreement)
Moldova	The contracting parties engage in mutual trade in goods and services in a free trade regime, do not apply duties, taxes, and fees that have an equivalent effect on the export and/or import of goods originating from the customs territory of one of the contracting parties and intended for the customs territory of the other contracting party (Article 2)
Turkmenistan	The parties do not apply duties, taxes, and fees that have an equivalent effect on the export and/or import of goods leaving the customs territory of one of the states and intended for the customs territory of another state. Exemptions from this trade regime for the agreed nomenclature of goods is made out by documents that form an integral part of this Agreement, if the contracting parties deem it necessary
Tajikistan	The parties do not apply duties, as well as taxes and fees that have an equivalent effect on them, and quantitative restrictions on the import and/or export of goods originating from the customs territory of one party and intended for the customs territory of the other party. Exemptions from this trade regime for the agreed nomenclature of goods, if the parties consider it necessary, are drawn up in a separate protocol, which forms an integral part of this Agreement
Uzbekistan	The contracting parties do not apply duties, taxes, and charges having an equivalent effect, as well as quantitative restrictions on the export (or) import of goods to be shipped from the customs territory of one of the contracting parties and intended for the customs territory of the other contracting party. Exemptions from this trade regime for the agreed nomenclature of goods are made out by documents that form an integral part of this Agreement
Azerbaijan	The parties do not apply duties, taxes, and fees that have an equivalent effect on the export and/or import of goods leaving the customs territory of one of the states and intended for the customs territory of another state. Exemptions from this trade regime for the agreed nomenclature of goods is made out by documents that form an integral part of this Agreement, if the contracting parties deem it necessary

Table 3, Continued

Partner country	Content
Georgia	The contracting parties shall not apply duties and/or import duties, as well as taxes and fees that have an equivalent effect with the duty on goods originating from the customs territory of one of the contracting parties and intended for the customs territory of the other contracting arty. Exemptions from this trade regime for the agreed nomenclature of goods is made out by documents that form an integral part of this Agreement, if the contracting parties deem it necessary
Russia	The parties do not apply duties, taxes, and fees that have an equivalent effect on the export and/or import of goods leaving the customs territory of one of the states and intended for the customs territory of another state. Exemptions from the trade regime, according to the agreed list of goods, are issued in separate documents that form an integral part of this Agreement. Therewith, the contracting parties agree on a phased reduction of exemptions stipulated in these documents

Source: [16]

In each particular bilateral free trade agreement with the CIS countries, it was noted that the parties will not apply duties, taxes and fees that have an equivalent impact on the export and/or import of goods originating from one of the countries of the agreement and intended for the other. However, exemptions from the trade regime are allowed for in accordance with the agreed list of goods issued by the respective document. But among these agreements, it is worth mentioning the ineffectiveness of the FTA with Russia, although trade between the countries is ongoing.

Notably, the CIS FTA agreement stated that countries can apply special protective measures, and this should be carried out in relation to industrial and agricultural goods in accordance with Article XIX GATT 1994, WTO Agreement on Protective Measures and this Treaty (Article 8). Similarly, in relation to anti-dumping and countervailing measures, and in accordance with these articles (Article VI, XVI GATT 1994, WTO agreement on the application of Article VI GATT 1994, WTO agreement on subsidies and compensatory measures, and this Agreement) (Article 9) [20]. In other words, industrial and agricultural goods have already been allocated at the CIS level. According to the decision on the Free Trade Area Agreement (dated 18.01.2011), the governments of the CIS countries had to take measures aimed at suspending the validity of bilateral international free trade agreements between the countries of the Free Trade Agreement [21].

RTAs with European countries that are not members of the EU and developed countries

As for the Free Trade Agreement with Macedonia, its goals are to deepen economic cooperation, raise the living standards of the parties' population, gradually eliminate restrictions on trade in goods, fair competition in trade between countries, create conditions for promoting investment, promote trade and cooperation in third-country markets, etc. (Article 1). Therewith, Section I "Industrial Products" covers a number of issues: import duty (Article 4); fees of equivalent duties (Article 5); export duty and equivalent fees (Article 7); quantitative restrictions on import or export (Article 8); technical obstacles in trade (Article 9); and Section II "Agriculture, Agricultural Products and Goods of the Fishing Industry" covers the exchange of concessions (Article 11); concessions and agricultural policy (Article 12); special precautions (Article 13); sanitary and phytosanitary measures (Article 14). Thus, the parties expressed their readiness to develop trade in agricultural goods in accordance with the specified provisions of the section in accordance with the requirements of the WTO (Article 11) [22]. Section III "General Provision" covers the issues of anti-dumping and countervailing measures (Article 18), rules for establishing the origin of products, cooperation and customs administration (Article 24), intellectual property rights (Article 28), etc. It is noted that the countries are to cancel all import duties and duties of an equivalent nature on products originating from their territories, with the entry into force of the agreement, but with the specified exceptions. The parties also pledged not to impose new import duties (Article 4). The agreement also makes provision for the introduction of tariff quotas (Annex I and II, protocol B) [22].

According to the Free Trade Agreement (2010) with EFTA, Ukraine undertook to eliminate all import duties on equivalent taxes and import fees from January 1, 2012, but for the import of certain goods from EFTA, it makes provision for the elimination of duties indicating transition periods, in particular, revision within the Joint Committee no later than 3 years after the entry into force of the agreement, 5, 7 and 10 years (for example, salmon, halibut, herring, mackerel, trout, etc.) (Article 4). The issues of basic duties (Article 2.5), import and export restrictions (Article 2.6), sanitary and phytosanitary measures (Article 2.8), trade facilitation (Article 2.10), subsidies and compensation measures (Article 2.13), anti-dumping (Article 2.14), etc. have also been covered. The document notes that if a more favourable EU regime is provided for certain goods, it should also apply to EFTA. In addition, (regarding processed agricultural products), it is noted that EFTA countries should provide certain products originating from Ukraine with a regime no less favourable than that granted to the European Community (Article 2. EFTA tariff concessions), and Ukraine should provide products originating from EFTA with the same regime (Article 3) (Appendix II) [23]. In other words, the Agreement addresses trade policy issues, taking into account agricultural products, as well as prospects for integration with the EU.

Notably, during 2012-2014, as a result of trade liberalisation, the general economic impact on the Ukrainian economy was insignificant, although it was generally positive and contributed to changes in the main macroeconomic indicators, in particular, nominal GDP increased from UAH 25.71 million in 2012 to UAH 112.64 million in 2014; real GDP increased from 0.002% (2012) to 0.006% (2014); an

increase in the number of employed people (in the economy) from 0.066 thousand people in 2012 to 0.218 thousand people in 2014; growth in export volumes from UAH 22.408 million in 2012 to UAH 63.47 million in 2014, as well as imports from UAH 17.29 million in 2012 to UAH 46.69 million in 2014. Moreover, the increase in exports exceeded the corresponding increase in imports, in particular, the growth of net exports was from UAH 5.12 million in 2012 to UAH 16.78 million in 2014 [12].

The objectives of the Free Trade Agreement with Montenegro (dated 18.11.2011, ratified on 16.10.2012) are as follows: development of economic cooperation, improvement of peoples' welfare, lifting restrictions on trade in goods, liberalisation of trade in services (Article 1). Section "Trade in goods" issues related to customs duties on imports (Article 7), exports (Article 9), import and export restrictions (Article 11), sanitary and phytosanitary measures (Article 15), rules of origin (Article 16), anti-dumping and countervailing measures (Article 21), etc. were agreed upon. According to the Agreement, countries must eliminate duties on imports of goods originating from their territories, with some exceptions (Article 7). In particular, for Ukraine, sugar from sugar cane or sugar beet and chemically pure sucrose, in a solid state; parts of carcasses and edible offal of chickens, frozen, etc. (Appendix I). Moreover, new duties and equivalent taxes should not be introduced (Article 7). This also refers to the movement of individuals, that is, those who are service providers and who are hired by the service provider to render the service (Article 34) [24].

Notably, negotiations on the liberalisation of bilateral trade between Ukraine and Canada date as far back as 2009 [25]. The Free Trade Agreement between Ukraine and Canada of 11.07.2016 agreed on the following issues: national regime and market access (Chapter 2); rules and procedures for determining origin (Chapter 3), trade facilitation (Chapter 4), emergency and protective measures (Chapter 5), sanitary and phytosanitary measures (Chapter 6), technical barriers to trade (Chapter 7), e-commerce (Chapter 8; furthermore, even the duty on goods transmitted in electronic form is considered, noting on the exemption from duty and other payments on goods supplied in electronic form); competition policy, monopolies, and state-owned enterprises (Chapter 9); public procurement (Chapter 10), etc. In addition, charts of market access in Canada and Ukraine are provided. The requirements for trade liberalisation in relation to industrial and agri-food products are also indicated, and transition periods (3, 5, and 7 years) are indicated depending on the type of product [26]. Therefore, it is advisable to take into account the impact of technological advance and changes in trade forms on the content of RTAs and factor this in for future agreements, since their impact may drastically increase in the future. This creates additional opportunities for Ukrainian enterprises to adapt to the new conditions of duty-free trade with Canada, whose economy is promoted by high technologies and innovations.

Researchers predict positive and negative consequences from establishment of an FTA with Canada. In particular, they predict the expansion of the range of goods and services on the Ukrainian market. As a result of the growing flow of goods, services, and investments, the producer will have access to cheaper components, equipment and raw materials, and the consumer will have a wider choice of goods, services and prices, which provides conditions for increasing the competitiveness of products. They also predict an increase in the number of people employed in the food industry (+0.7 thousand people), metallurgy and metalworking (+3.6 thousand people). In addition, the welfare of the population is projected to grow in the short term due to lower domestic prices, as well as an increase in nominal GDP by UAH 50 million annually. However, there are also possible negative consequences, including a decrease in the revenue side of the state budget of Ukraine [12, p. 40], but this did not prevent the conclusion of the Agreement. The development of trade and economic relations of partner countries with third countries, participation or prospects of joining integration groups, in particular Canada in the North American Free Trade Agreement, changes in the world market, and external factors, such as the coronavirus, are also important for the FTA. The impact of some factors can be predicted, but others cannot, so it is suggested to single out, respectively, predictable and non-predictable integration risks. That is, the projected risks of integration are those that can be predicted, for example, due to a decrease in trade with third countries when creating an integration group (reduction of exports or better imports due to higher duties than in the association); disintegration processes during the functioning of powerful integration groups, primarily neighboring ones, for example, the Baltic states joined the EU, and the UK was a member of the EFTA, and became the EU; import of cheap low – quality imports, etc. As for the unpredictable ones, these are pandemics, wars, changes in the political system, etc. However, it is necessary to develop measures that can prevent such events or reduce their impact, and accordingly disintegration processes. This should be supported by the creation of support funds in the group, in particular on food security, natural disasters, a noticeable decline in economic growth, etc.

In addition to RTAs and Canada, A Free Trade Agreement was signed between Ukraine and Israel in 2019, after more than five years of negotiations [27], which was also conditioned by a reduction in risks to countries and an increase in their well-being.

The Order of the Cabinet of Ministers of Ukraine "On the delegation of the Government of Ukraine to participate in negotiations on the conclusion of a free trade agreement between the Cabinet of Ministers of Ukraine and the Government of the state of Israel" (11.07.2013) referred to the creation of a delegation, in particular its composition, approved directives on participation in negotiations, etc. [28]. The first round of negotiations was held in Jerusalem on July 22-23, 2013 [29], although the governments of Ukraine and Israel signed an agreement on trade and economic cooperation back in 1995, which states that the countries will take measures to guarantee development, promote trade and economic relations between them (Article 1) [30].

Thus, countries should apply the most-favoured-nations regime in relation to all aspects of goods produced in the territory of the other party or exported to it, for example, in relation to: duties and fees on imports and exports, in particular methods of collecting such duties and fees; rules and regulations on exports and imports, in particular those related to customs clearance, transit, storage, transshipment; taxes and other internal fees that apply to imported goods; purchase, sale, transportation, distribution, storage and use of imported goods on the domestic market (Article 2). Cooperation with Israel is quite promising, based on the level of economic development of the country, the production and introduction of new technologies, the demand for agri-food products, etc.

It is advisable to develop foreign economic relations with Israel, which is one of the most developed countries, and not only in Asia. According to the World Economic Forum, out of 144 countries, Israel ranked 27th in the Global Competitiveness Index in 2014, and the first three were Switzerland, Singapore and the United States, and Ukraine – 76th (Russia – 53rd) [31, p. 13]. In addition, in 2017 (2017-2018), Israel rose to the 16th position in this index, the first three remained for Switzerland, the United States and Singapore, and Ukraine moved to the 81st position (Russia – 38) [31]. It was assumed that mutual tariff liberalisation contributes to strengthening the competitive position of Ukrainian producers, in particular, given the fact that Israel used larger trade barriers. The arithmetic average rate of the (current) customs tariff of Israel was compared – 6.8%, which is 2% more than in Ukraine, and the average tariff rates of the first country for agricultural and non-agricultural products – 17.9% and 5.1%, respectively, and the second – 8.8% and 3.6%, respectively [12, p. 42]. This is also the basis for optimistic forecasts regarding the development of Ukraine's exports.

Thus, within the framework of the FTA, it is actually planned to eliminate import duties on industrial goods, with the exception of jewelry. Moreover, it was agreed, immediately after the entry into force of the agreement, to eliminate approximately 80% of duties from Israel and 70% from Ukraine on these goods. At the same time, the system of concessions in trade in agricultural goods and food products is quite complex [27].

In the commodity structure of Ukraine's exports, according to calculations according to ITC [32], to Israel, the largest share is occupied by the following commodity groups: cereals, ferrous metals, food industry residues and waste, fats and oils, seeds and fruits of oilseeds, wood and wood products, milk and dairy products, poultry eggs, natural honey, which accounted for 89.9% of all exports in 2018, and 87.5% in 2019, respectively. That is, agri-food products are mainly exported to Israel, in particular, only cereals accounted for 40.9% in 2018, and more than half (51%) in 2019. In addition, in 2018, the export of flour and cereal products was higher than that of the commodity group "milk and dairy products, poultry eggs, natural honey". This confirms the prospect of exporting finished products, the availability of demand for them, and this should be facilitated, since the main part of exports belongs to cereals.

However, Israel mainly exports to Ukraine a variety of chemical products; mineral fuels, oil and its distillation products; plastics, polymer materials; nuclear reactors, boilers and machines; essential oils; pharmaceutical products; optical and photographic devices, which accounted for 79% (2018) of total exports to Ukraine, that is, mainly industrial products are exported. Moreover, more than 40% (40.7%) (2018) of exports accounted for a variety of chemical products, and among agricultural ones, edible products and nuts were exported the most (2.4% in 2018). In 2019, the 8 most sold goods in Ukraine included electric cars, shifting pharmaceutical products, and their share was 78.0% in total exports to the country. That is, foreign trade between the two countries is quite diverse, but Ukraine needs to diversify the commodity structure of exports and focus on the export of finished products, in particular, due to state support for enterprises, preferential taxation, informing entrepreneurs, creating joint ventures, etc.

Promising areas for RTAs of Ukraine in the future

Ukraine is also negotiating a free trade agreement with Turkey. Most of the provisions of the draft agreement have already been agreed upon, including trade in goods and services, provisions on recognising the country of origin of goods, competition rules, protection of intellectual property rights, dispute resolution, etc. As for the anti-dumping investigations, Turkey agreed to fix the market status of Ukraine in the agreement. However, the issues of access to the markets of goods under the agreement and the application of export duties and subsidies in mutual trade by countries, in particular, Turkey emphasises the elimination of export duties by Ukraine, and Ukraine does not accept the use of export subsidies for agricultural products by Turkey. Notably, agreement on the terms of access to the markets (goods) of countries is one of the most difficult issues. Ukraine emphasises the liberalisation of access for all commodity items (agricultural and industrial) with a maximum reduction in import duty rates, and Turkey – on the elimination of duties only on industrial goods with the introduction of transition periods for the most sensitive commodity items, while agricultural goods are supposed to exchange concessions for individual commodity items [12, p. 41]. Issues related to tariffs for agricultural products and some services remain uncoordinated [33]. It is also necessary to take into account the state support of agriculture by Turkey, and for farming and processing enterprises, and this increases the competitiveness of goods [12, p. 41] and, accordingly, affects trade. Moreover, according to the Global Competitiveness Index, Turkey ranked 53rd in 2017, and Ukraine – 81st, by the rating of the World Economic Forum [31, p. 13]. In addition, Turkey offers weightless concessions when considering issues of liberalisation of trade in services, and this does not bring advantages for operators of the Ukrainian service market [12, p. 41]. Therefore, it is not surprising that due to Turkey's demands on trade policy, in particular on agricultural products, its state support for agriculture, its position in the global competitiveness rating

and other factors, there are discussions about the feasibility of concluding an agreement under such conditions.

Through the conclusion of a free trade agreement with Serbia, it is planned to develop trade and economic cooperation and increase its presence in the markets of the Balkan region. It is predicted that if Ukraine maintains the current customs rates for certain sensitive groups of goods, the FTA will have a positive small impact on the main macroeconomic indicators and revenues to the state budget. Thus, this would contribute to an increase in exports, and most noticeably products of the woodworking industry and metallurgy, as well as imports – products of agriculture and food industry, textile industry, mechanical engineering, and chemical industry, and will have a positive impact on the foreign trade balance [12, p. 42]. The countries of the peninsula are also Albania, Bulgaria, Greece, Italy, Romania, Croatia, etc., they are members of the EU and within which the FTA operates, which can facilitate the creation of joint ventures and increase exports.

In 2011, a free trade agreement with Vietnam was initiated. Ukraine provides for a comprehensive agreement that will include issues of trade in goods, services, competition, investment cooperation, cooperation in the fields of labour, environmental protection, as well as rules for determining the country of origin of goods, institutional provisions. Notably, the economy of Vietnam is one of those that are rapidly developing, and in 10 years the country has moved from a poor, collectivised agricultural economy to an economy that is growing dynamically [12, p. 42]. Therefore, in bilateral trade, the average rate of import duty within the MFN (most-favoured-nation regime) of Vietnam is 9.8%, and the average rate of the MFN of Ukraine is 4.6%, (that is, 5.2 percentage points higher), the average rate of the MFN on agricultural products of countries is 17% and 9.8%, respectively (7.2% percentage points more), and on industrial products – 8.7% and 3.8%, respectively (4.9% percentage points higher). I.Y. Guzhva notes that the best option for concluding the agreement will be to reduce the average level of import duties by Vietnam from 10.9% to 0.8% and maintain Ukraine's current customs rates for certain groups of goods, mainly light industry and sensitive agricultural goods originating from Vietnam. At the same time, Ukraine should retain the right to use export duties under the agreement, in accordance with its obligations under the WTO. According to Ukrainian experts, the introduction of a free trade regime in the implementation of this scenario for Ukraine contributes to a significant increase in exports, in particular, most of all agricultural products, food industry, mechanical engineering, moderate imports, and most of all products of the fish, textile and leather industries, while positively affecting the foreign trade balance. The forecast of gross value added growth in the following industries is quite positive: agriculture, food processing, production of machinery and equipment, metallurgy and metal processing. It is also predicted that there would be an increase in employment in the economy, mainly in the metallurgical industry and agriculture [12, p. 43]. Special attention should be paid to the growth of gross value added and the number of employees, which should have a positive impact on economic development.

There is a steady increase in trade turnover between Ukraine and Vietnam, and the latter is one of the largest trading partners among the countries of Asia and the Pacific. Notably, on October 10, 2017, a plenary session of the Ukrainian-Vietnamese intergovernmental commission on trade, economic, scientific and technical cooperation was held. Given the importance of deepening cooperation with Vietnam, it is worth noting the special importance of allowing the export of plant products (to Vietnam). It is important to deepen cooperation in the energy sector, that is, projects for the modernisation, reconstruction and construction of new electric power plants in Vietnam, as well as for the production of mechanical engineering products. Moreover, Vietnam, according to research conducted for the export strategy of Ukraine, is one of the countries with which Ukraine does not trade, and this applies to agricultural products [34].

Thus, from 2001 to 2018, exports to Vietnam increased only 1.2 times from USD 77.5 million up to USD 132.0 million, and in 2019 by 1.2 times and, accordingly, amounted to USD 95.5 million moreover, more than half of exports (56.0%) are accounted for by ores, slag and ash (28.1%), meat and edible offal (16.2%), food industry residues and waste (11.8%), that is, it is rather non-diversified. By the way, the EU and Vietnam have signed an agreement on an FTA, which notes the reduction of 99% of duties on goods, as well as the partial opening of access to the first companies to the market of services and purchases in Vietnam [35]. Therefore, given the development of Vietnam, trade with Ukraine, in particular agri-food products, as well as prospects for cooperation in the energy sector and mechanical engineering, there is reason to predict positive consequences from the conclusion of RTA.

In addition, negotiations on the creation of an FTA with Singapore began in 2007, although an agreement has not been concluded yet [36]. Ukraine considers Singapore's proposals on the terms of applying the agreement very critically, taking into account the interests of Ukrainian producers. It was assumed that Singapore would completely eliminate customs tariffs on all goods of Ukrainian origin, and similarly Ukraine, but except for all types of sugar. However, later, after negotiations and assessment by national associations of commodity producers of the consequences of trade liberalisation, the possibility of maintaining tariff protection for individual product groups was noted. Moreover, the parties have already agreed on the provisions of the following sections: “technical barriers to trade”, “competition policy”, “sanitary and phytosanitary measures”, “intellectual property rights”, but the sections on trade in goods, rules of origin, trade in services, investment, public procurement, dispute resolution, etc., remained open. According to Ukrainian experts, the agreement with Singapore would have positive consequences only in increasing Ukrainian exports (by UAH 8 million). For its part, the elimination of customs rates to zero will negatively affect nominal GDP, which is projected to decrease by UAH 129.0 million,

and state budget revenues – by UAH 4.5 million [12, p. 43-44]. In other words, the conclusion of an agreement cannot be considered unambiguously as advantages for the country, these are only opportunities that they can get depending on its starting state and the partner country, as well as the terms of the agreement.

Ukraine also provides for the conclusion of a free trade agreement with Lebanon. Notably, an agreement has already been concluded between the Central Bank of Lebanon and the National Bank of Ukraine (dated 25.11.2011, in effect), a Memorandum of understanding between the State Agency of Fisheries of Ukraine and the Ministry of Agriculture of the Lebanese Republic (dated 25.11.2011), as well as agreements between the Government of Ukraine and the Government of the Lebanese Republic on the promotion and mutual protection of investments (dated 25.03.1996), on trade and economic cooperation (dated 25.03.1996), agreements between the Cabinet of Ministers of Ukraine and the Government of the Lebanese Republic on air traffic (dated 22.04.2002), on cooperation in the field of culture (dated 08.07.2003), in the field of Tourism (dated 08.07.2003), in customs affairs (dated 08.07.2003), in the field of science and technology (dated 08.07.2003), in the field of education and research (dated 08.07.2003), agreement between the Ministry of Health of Ukraine and the Ministry of Health of the Lebanese Republic on cooperation in the field of medicine and health (dated 08.07.2003), as well as the convention between Ukraine and the Lebanese Republic for the avoidance of double taxation and the prevention of tax evasion with respect to taxes on income and capital (dated 22.04.2002) [16].

According to WTO data for 2010-2011, in bilateral trade, the average duty rate of the MFN of Lebanon is 7.1%, and Ukraine – 4.5% (that is, 2.6% higher), respectively, for agricultural products – 9.7% and 9.5% (0.2 percentage points more), for industrial products – 6.6% and 3.7%, respectively (2.9% higher). It is assumed that as a result of liberalisation, Ukraine will have a more noticeable effect from resetting duties, than Lebanon from eliminating its import duties. As for the impact of changes caused by the conclusion of the agreement on the state budget of Ukraine, it is assumed that it will be positive for the indicators of the consolidated budget of Ukraine and almost zero for local budgets. According to financial and economic calculations, the budget revenue side is projected to grow by UAH 87.6 million next year after the agreement comes into force, but no significant impact on the budget expenditure side is expected. At the same time, a negative impact on revenues from import duties is predicted. It is assumed that after the entry into force of the agreement, with a reduction in customs rates, next year the reduction in revenues from import duties will be by UAH 1.0 million, and next (year) – by UAH 1.1 million [12, p. 44]. It is worth mentioning the Euro-Mediterranean Agreement, which establishes the association agreement between the Lebanese Republic and the European community (dated 17.06.2002), among the goals of which: creating conditions for the gradual liberalisation of trade in goods, services and capital; promoting economic, social, cultural, financial and monetary cooperation, etc. (Article 1) [37]. Thus, Lebanon has concluded an RTA with the EU, EFTA, Great Britain, the pan-Arab Free Trade Zone [1], and Ukraine, except for the last association. In other words, the EU has agreements with countries with which Ukraine also seeks to conclude free trade agreements, such as Vietnam, and this indicates its desire to diversify and increase trade, which should be an example for Ukraine.

Thus, Ukraine enters into an RTA and conducts negotiations with some countries, but slows them down in relation to others, for example, negotiations on the creation of an FTA with Syria have been suspended [36]. The adoption of this decision will depend on a number of factors, namely: the aspirations, negotiations, goals of the parties, the development of trade between them, although the conclusion of the RTU does not guarantee positive consequences, and in the case of the latter, there is always the possibility of losing its force, as was observed, for example, with the Baltic countries.

For a deeper analysis, it is advisable to consider how trade is carried out between Ukraine and its partner countries. Although free trade agreements have been signed with more than 40 countries, however, the volume of exports with them is not significant enough.

Analysis of foreign trade of Ukraine and RTA partner countries

Armenia. Thus, Ukraine's exports to Armenia increased 6.2 times from 2001 to 2018, that is, from a minimum of USD 22.0 million up to USD 136.7 million, although the highest was observed in 2006-2014, when the values did not fall below 136.7 units, and in other years, except for 2018, it did not exceed USD 105.1 million (2017), and the highest was in 2008 – USD 263.6 million (Table 4).

Table 1. Ukraine's exports of all and agri-food products to Armenia (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018/2001	Min. value	Max. value
Export of all goods	22.0	97.3	201.3	173.4	101.6	88.9	105.1	136.7	6.2	22.0	263.6
Share of exports	0.1	0.3	0.4	0.3	0.3	0.2	0.2	0.3	2.1	0.1	0.4
Export of agri-food products	12.8	41.8	79.1	92.7	62.0	56.3	67.8	72.2	5.7	12.8	115.6
Share of agricultural products in exports to Armenia	58.1	42.9	39.3	53.5	61.1	63.3	64.5	52.8	0.9	33.1	64.5

Source: calculated by the author based on ITC data [32]

The share of exports to Armenia in Ukraine's total exports did not exceed 0.4% (2006-2010), although in general it increased from a minimum of 0.1% in 2001, to 0.3% in 2018. The volume of exports of agri-food products in 2001 was the smallest – USD 12.8 million and increased to 72.2 million in 2018, that is, by 5.7 times, and most of it was exported in 2011 – USD 115.6 million. Its share (agri-food exports) in total exports to Armenia was quite significant, and did not fall below 33.1% (2007), and in addition to 2006-2010, it was not less than 42.9% (2005), while the maximum value was 64.5% (2017).

Azerbaijan. The volume of exports of all Ukrainian goods to Azerbaijan increased from a minimum of USD 45.6 million in 2001, up to USD 360.0 million in 2018, that is, by 7.9 times, although in addition to 2001 it did not fall below USD 102.6 million (2002) and did not exceed USD 910.5 million. (2008). At the same time, the share of exports to Azerbaijan increased by 2.7 times, including from the minimum 0.3% (1995) to 0.8% (2018), and the maximum was 1.4% (2008-2009, 2013) (Table 5).

The volume of exports of agri-food products increased quite noticeably by 24.4 times from 2001 to 2018, namely from a minimum of USD 7.7 million (2001) to USD 188.3 million (2018), although it did not exceed USD 221.9 million (2013). The share of agri-food products in total exports to Azerbaijan has more than tripled (3.1 times) – from 16.9% (2001) to 52.3% (2018), and in general, it has changed from 16.1% (2007) to 56.7% (2017), and since 2015 it did not fall below 45.5%.

Table 5. Ukraine's exports of all and agri-food products to Azerbaijan (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018/2001	Min. value	Max. value
Export of all goods	45.6	290.5	610.8	591.6	318.8	248.0	355.0	360.0	7.9	45.6	910.5
Share of exports	0.3	0.8	1.2	1.1	0.8	0.7	0.8	0.8	2.7	0.3	1.4
Export of agri-food products	7.7	55.0	139.0	206.9	144.9	123.9	200.0	188.3	24.4	7.7	221.9
Share of agri-food products in exports to Azerbaijan	16.9	18.9	22.7	35.0	45.5	49.9	56.4	52.3	3.1	16.1	56.4

Source: calculated by the author based on ITC data [32]

Belarus. During 2001-2018, exports of all goods to Belarus were the lowest in 2001 and amounted to USD 243.9 million, but increased to USD 1,304.2 million in 2018, that is, by 5.3 times, and the maximum value was observed in 2012 – USD 2,251.1 million (Table 6).

The share of exports to Belarus in the total exports of Ukraine varied from 1.5% (2001-2003) to 3.7% (2010), and in 2018 it was equal to 2.8%, that is, in general, it increased. Exports of agri-food products in 2018 were the highest during the specified period and amounted to USD 568.5 million, and increased 8.9 times compared to 2001 (USD 63.7 million), and the least amount of it was exported in 2003 – USD 62.8 million. The share of exports of agri-food products in total exports to Belarus ranged from 16.6% (2005) – 45.0% (2015), and increased from 26.1% in 2001-2002 to 43.6% in 2018.

Table 6. Ukraine's exports of all and agri-food products to Belarus (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	243.9	891.1	1899.2	1617.1	870.7	902.6	1148.4	1304.2	5.3	243.9	2251.1
Share of exports	1.5	2.6	3.7	3.0	2.3	2.5	2.6	2.8	1.8	1.5	3.7
Export of agri-food products	63.7	148.2	407.5	518.3	391.5	399.2	490.0	568.5	8.9	62.8	568.5
Share of agri-food products in exports to Belarus	26.1	16.6	21.5	32.1	45.0	44.2	42.7	43.6	1.7	16.6	45.0

Source: calculated by the author based on ITC data [32]

Georgia. Exports of all goods (from Ukraine) to Georgia from 2001 to 2018 increased 13.3 times, namely from the minimum during this period – USD 36.2 million up to USD 480.0 million, and the largest was in 2011 and amounted to USD 657.5 million. Although its share in total exports of Ukraine did not exceed 1.1% (2007, 2015-2016), it did not fall below 0.2% (2001) and in 2017-2018 it was equal to 1.0% (Table 7).

Table 7. Ukraine's exports of all and agri-food products to Georgia (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	36.2	199.5	527.5	490.9	402.7	390.8	427.9	480.0	13.3	36.2	657.5
Share of exports	0.2	0.6	1.0	0.9	1.1	1.1	1.0	1.0	4.6	0.2	1.1
Export of agri-food products	12.5	61.0	240.3	245.1	213.7	227.5	238.5	272.9	21.8	12.5	322.4
Share of agri-food products in exports to Georgia	34.6	30.5	45.6	49.9	53.1	58.2	55.7	56.8	1.6	30.2	58.2

Source: calculated by the author based on ITC data [32]

Exports of agri-food products increased quite significantly, including from a minimum of USD 12.5 million in 1995, up to USD 272.9 million in 2018, that is, by 21.8 times, and in 2011 it reached USD 322.4 million. Moreover, its share in total exports was quite significant and increased, and ranged from 30.2% (2006) to 58.2% (2016). In 2003-2004, 2009, and 2015-2018, the values were the highest and did not fall below 52.5% (2009), while in others they did not exceed 49.9% (2014).

Kyrgyzstan. Exports of all Ukrainian goods to Kyrgyzstan increased from a minimum of USD 5.1 million in 1995, up to USD 28.6 million. In 2018, that is, by 5.6 times, although in 2011-2014 it was the highest and did not fall below USD 102.5 million, and the maximum value was USD 134.7 million (2013), but in other years it did not exceed USD 83.8 million (2009) (Table 8).

At the same time, the share of exports to Kyrgyzstan in total exports of Ukraine was low and did not exceed 0.2% (2009, 2011-2015), but increased from 2001-2002 to 2016-2018 – from 0.03% to 0.1%.

Exports of agri-food products increased from 2001 to 2018 more than for all goods, namely by 12.9 times – from a minimum of USD 1.2 million up to USD 16.0 million, although most of them were exported in 2011-2014, when the values did not fall below USD 59.6 million (2014) and the maximum amount was USD 79.1 million (2013), and in other years exports did not exceed USD 49.9 million (2009). That is, there were separate periods of increase and decrease in exports. The share of agri-food products in total exports (Ukraine) ranged from 24.0% (2001) to 65.9% (2009), and in addition to 2001, it did not fall below 39.1% (2005), that is, it was quite significant and generally increased.

Table 8. Ukraine's exports of all and agri-food products to Kyrgyztan (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	5.1	31.6	75.0	102.5	75.5	40.4	34.3	28.6	5.6	5.1	134.7
Share of exports	0.0	0.1	0.1	0.2	0.2	0.1	0.1	0.1	1.9	0.0	0.2
Export of agri-food products	1.2	12.4	49.4	59.6	47.3	19.7	14.6	16.0	12.9	1.2	79.1
Share of agri-food products in exports to Kyrgyzstan	24.0	39.1	65.9	58.1	62.6	48.8	42.6	55.9	2.3	24.0	65.9

Source: calculated by the author based on ITC data [32]

Moldova. Exports of all goods to Moldova in 2001 were the lowest during 2001-2018 and amounted to USD 273.8 million, but increased to USD 789.2 million in 2018, that is, by 2.9 times, although the largest was observed in 2008, when it reached USD 1,171.8 million (Table 9).

The share of exports to Moldova in the total exports of Ukraine in 2001-2002 and 2018 was 1.7%, and in general it varied from 1.2% (2012) to 2.1% (2003). Exports of agri-food products increased more than for all goods, namely by 6.7 times – from a minimum of USD 33.5 million up to USD 226.0 million, and in 2008 it reached USD 359.3 million, that is, it was the maximum. Its (agri-food exports) share gradually increased from 12.3% in 2001 to 28.6% in 2018, and during the entire period fluctuated between 11.7% (2002) – 40.6% (2016).

Table 9. Ukraine's exports of all and agri-food products to Moldova (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	273.8	678.6	713.5	743.8	524.3	481.1	711.9	789.2	2.9	273.8	1171.8
Share of exports	1.7	2.0	1.4	1.4	1.4	1.3	1.6	1.7	1.0	1.2	2.1
Export of agri-food products	33.5	87.5	232.4	265.2	195.3	195.2	218.6	226.0	6.7	33.5	359.3
Share of agri-food products in exports to Moldava	12.3	12.9	32.6	35.7	37.2	40.6	30.7	28.6	2.3	11.7	40.6

Source: calculated by the author based on ITC data [32]

Kazakhstan. Exports of all goods to Kazakhstan in 2001 amounted to USD 117.3 million, and in 2018 – USD 376.5 million. That is, it has more than tripled (3.2 times) from the minimum value during the specified period, and the maximum value was USD 2,459.3 million (2012). Moreover, in 2004-2016, exports were higher than in other years, that is, there was a certain fluctuation (Table 10).

Table 10. Ukraine's exports of all and agri-food products to Kazakhstan (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	117.3	667.1	1300.5	1073.2	712.7	400.1	372.8	376.5	3.2	117.3	2459.3
Share of exports	0.7	1.9	2.5	2.0	1.9	1.1	0.9	0.8	1.1	0.7	3.6
Export of agri-food products	20.7	92.5	318.3	250.5	233.2	187.1	168.9	156.1	7.5	20.7	361.9
Share of agri-food products in exports to Kazakhstan	17.7	13.9	24.5	23.3	32.7	46.8	45.3	41.5	2.3	13.1	46.8

Source: calculated by the author based on ITC data [32]

Its share in total exports of Ukraine varied from 0.7% (2001) to 3.6% (2009, 2012), but except for 2001, 2017-2018 did not fall below 1.1% (2002, 2016). Exports of agri-food products increased even more than all goods, namely by 7.5 times, from a minimum of USD 20.7 million (2001) to USD 156.1 million (2018), and the latter value was the highest, except for 2007-2017, when exports did not fall below USD 168.9 million (2017) and peaked in 2008 at USD 361.9 million. Its share in total exports increased significantly, in particular, in 2001 and 2018 it was 17.7% and 41.5%, respectively, and ranged from 13.1% (2013) to 46.8% (2016), and since 2016 it did not fall below 41.5% (2018).

Tajikistan. In contrast to other countries, Ukraine's exports to Tajikistan in 2018 compared to 2001 decreased, in particular from USD 34.7 million up to USD 34.4 million, although in 2007-2013 it was significantly higher and did not fall below USD 51.2 million (2007), and in other years did not exceed USD 46.9 million (2005) (Table 11).

Table 11. Ukraine's exports of all and agri-food products to Kazakhstan (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	34.7	46.9	74.7	46.7	30.0	25.4	34.1	34.4	1.0	25.4	100.8
Share of exports	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.2
Export of agri-food products	0.3	1.8	15.4	27.1	17.9	13.9	16.5	17.7	67.5	0.3	27.1
Share of agri-food products in exports to Tajikistan	0.8	3.7	20.6	58.1	59.6	54.5	48.3	51.5	68.0	0.8	59.6

Source: calculated by the author based on ITC data [32]

At the same time, the minimum and maximum export values were USD 25.4 million (2016) and USD 100.8 million (2012). The share of exports to Tajikistan reached 0.2% only in 2001-2002 and 2009, while in others it did not exceed 0.1%. Exports of agri-food products in 2001 were the smallest and amounted to USD 0.3 million, and in 2018 – USD 17.7 million that is, it increased 67.5 times, although it did not exceed USD 27.1 million. Its share in total exports varied from 0.8% (2001, 2003) to 59.6% (2015), and until 2007 it did not exceed 6.4% (2006), and later it did not fall below 18.2% (2007).

Turkmenistan. Ukraine's exports to Turkmenistan were the highest in 2002-2017, when they did not fall below USD 109.0 million, and in other years did not exceed USD 106.1 million (2001), while the minimum and maximum values were observed in 2018 and 2012 and were equal to USD 56.8 million and USD 528.2 million, respectively. That is, after 2014, exports steadily declined (Table 12).

Table 12. Ukraine's export of all and agri-food products to Turkmenistan (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	106.1	187.2	208.9	431.3	170.3	109.0	62.2	56.8	0.5	56.8	528.2
Share of exports	0.7	0.5	0.4	0.8	0.4	0.3	0.1	0.1	0.2	0.1	0.8
Export of agri-food products	5.8	20.7	64.1	75.6	47.9	37.6	40.9	20.0	3.4	5.8	87.2
Share of agri-food products in exports to Turkmenistan	5.5	11.1	30.7	17.5	28.2	34.5	65.7	35.1	6.4	5.5	65.7

Source: calculated by the author based on ITC data [32]

Its share in total exports of Ukraine did not exceed 0.8% (2003, 2009, 2014), and in 2017-2018 it was the smallest and was equal to 0.1%. Exports of agri-food products, on the contrary, increased from a minimum of USD 5.8 million in 2001, up to USD 20.0 million in 2018, namely by 3.4 times, and the maximum was in 2013 when it was equal to USD 87.2 million. At the same time, in 2007-2017 it did not fall below USD 24.8 million (2007), and in other years did not exceed USD 20.7 million (2005). That is, there are separate periods of growth and decline. The share of agri-food products in total exports increased from a minimum of 5.5% in 2001 to 35.1% in 2018, and the maximum value was 65.7% (2017).

Uzbekistan. Exports of all goods to Uzbekistan increased from USD 108.7 million in 2001, up to USD 286.0 million in 2018, that is, by 2.6 times, and it changed from 6 65.5 million (2002) to USD 595.3 million (2008) (Table 13).

Table 13. Ukraine's export of all and agri-food products to Uzbekistan (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	108.7	150.6	228.5	308.6	174.5	142.4	167.7	286.0	2.6	65.5	595.3
Share of exports	0.7	0.4	0.4	0.6	0.5	0.4	0.4	0.6	0.9	0.4	1.0
Export of agri-food products	1.5	3.4	50.9	52.5	39.2	20.9	24.0	129.0	85.2	1.5	129.0
Share of agri-food products in exports to Uzbekistan	1.4	2.3	22.3	17.0	22.5	14.7	14.3	45.1	32.4	1.4	45.1

Source: calculated by the author based on ITC data [32]

Its share in total exports of Ukraine did not exceed 1% (2009), although it did not fall below 0.4% (2002-2005, 2010, 2016-2017) and in 2018 was equal to 0.6%. Exports of agri-food products were minimal and maximum in 2001 and 2018, and amounted to USD 1.5 million, respectively, and USD 129.0 million, that is, it increased by 85.2 times. At the same time, its share in total exports increased significantly from a min. value of 1.4% (2001) to a max. of 45.1% (2018).

Russia. Exports of all goods to Russia increased from USD 3,640.8 million in 2001, up to USD 3,652.4 million in 2018, that is, by USD 11.6 million, and the smallest and largest was in 2002 and 2011, when it amounted to USD 3,148.7 million and USD 19819.7 million, respectively. (Table 14).

Table 14. Ukraine's exports of all and agri-food products to Kazakhstan (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	3640.8	7489.8	13431.9	9799,1	4827.7	3592.9	3943.2	3652.4	1.0	3148.7	19819.7
Share of exports	22.4	21.9	26.1	18.2	12.7	9.9	9.1	7.7	0.3	7.7	29.0
Export of agri-food products	673.8	1383.2	1869.2	911.8	276.5	93.0	102.4	92.0	0.1	92.0	2025.0
Share of agri-food products in exports to Russia	18.5	18.5	13.9	9.3	5.7	2.6	2.6	2.5	0.1	2.5	22.2

Source: calculated by the author based on ITC data [32]

Its share in total exports of Ukraine decreased to a minimum of 7.7% in 2018, although the maximum value was 29.0% in 2011, while until 2015 the share did not fall below 17.6% (2002), and later did not exceed 12.7% (2015). Exports of agri-food products decreased by 7.3 times, namely from USD 673.8 million in 2001, up to a minimum of USD 92.0 million in 2018, and the largest was in 2011, when it amounted to USD 2025 million. Its share in total exports to Russia has significantly decreased, in particular from 18.5% in 2001 to 2.5% in 2018, when it was minimal, but did not exceed 22.2% (2003).

Canada. Ukraine's exports to Canada almost tripled (2.7 times) from 2001 to 2018, namely from USD 28.4 million up to USD 78.1 million, and the smallest and largest was in 2001 and 2008, when it reached USD 144.1 million (Table 15).

Table 15. Ukraine's exports of all and agri-food products to Canada (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	28.4	90.1	73.3	72.4	30.2	28.9	50.5	78.1	2.7	28.4	144.1
Share of exports	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.9	0.1	0.3
Export of agri-food products	5.4	1.2	2.3	4.7	3.4	4.9	8.1	9.9	1.8	1.2	15.9
Share of agri-food products in exports to Canada	19.1	1.3	3.2	6.5	11.1	16.8	16.0	12.7	0.7	1.3	38.7

Source: calculated by the author based on ITC data [32]

The share of exports to Canada was low and varied from 0.1% to 0.3%, and in 2001-2003 and 2018 it was equal to 0.2%, although, as noted above, the total export of Ukraine to Canada increased. Exports of agri-food products increased from USD 5.4 million in 1995, up to USD 9.9 million in 2018, that is, 1.8 times less than all products, and it varied from USD 1.2 million (2005) to USD 15.9 million (2002), but except for 2002, 2009, and 2017-2018, it did not exceed USD 6.9 million (2012). The share of its exports in total exports (to Canada) ranged from 1.3% (2005) to 38.7% (2002), and if in 2001-2002, 2009, 2015-2018 it did not fall below 11.1%, then in others it did not exceed 6.5% (2014).

Israel. Exports of all goods to Israel increased from a minimum of USD 113.6 million in 2001, up to USD 580.0 million in 2018, that is, by 5.1 times, and the highest was in 2012, when it reached USD 796.4 million (Table 16).

Table 16. Ukraine's exports of all and agri-food products to Israel (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	113.6	290.7	467.6	593.1	597.1	488.6	605.1	580.0	5.1	113.6	796.4
Share of exports	0.7	0.8	0.9	1.1	1.6	1.3	1.4	1.2	1.8	0.7	1.6
Export of agri-food products	43.4	103.0	280.1	377.6	395.2	292.8	411.2	337.0	7.8	43.4	510.2
Share of agri-food products in exports to Israel	38.2	35.4	59.9	63.7	66.2	59.9	68.0	58.1	1.5	25.5	68.0

Source: calculated by the author based on ITC data [32]

Its share in Ukraine's total exports ranged from 0.7% (2001, 2006-2008, 2011) to 1.6% (2015), and in 2018 it increased by 1.2%, i.e., it increased. Moreover, the minimum and maximum values of the indicator were higher than for Azerbaijan, Armenia, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Georgia, Canada, Macedonia, Montenegro, Norway and Iceland, but less than for Belarus, Moldova and Russia. Compared to Kazakhstan, the minimum values were equal (0.7%), and with Switzerland, they were higher for Israel, but the maximum values were higher than for the latter. That is, in comparison with the countries with which free trade agreements were concluded, the maximum share of exports in Israel was less only than in Belarus, Moldova, Russia, Kazakhstan, and Switzerland, but in this case, the EU is not considered.

The growth of exports of agri-food products by 7.8 times, that is, even more than the total, is quite noticeable. Thus, in 2001, it was the smallest and amounted to USD 43.4 million, and in 2018 – USD 337.0 million, although it did not exceed USD 510.2 million in 2012 Its share in total exports to Israel increased from 38.2% in 2001 to 58.1% in 2018, and varied between 25.5% (2003) – 68.0% (2017), and if before 2008 it did not exceed 45.8% (2002), then later it did not fall below 53.0% (2011).

Macedonia. Exports of all goods to Macedonia decreased from USD 25.9 million in 2001, up to USD 15.8 million in 2018, that is, by 1.6 times. However, in 2006-2011 it was significantly higher than in 2009, when it was equal to USD 42.3 million, did not fall below USD 69.5 million (2006), and in other years did not exceed USD 50.2 million (2004), and generally varied from USD 8.1 million (2013) to USD 184.1 million (2008) (Table 17).

Table 17. Ukraine's exports of all and agri-food products to Israel (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	25.9	35.9	96.0	40.5	12.9	25.9	30.7	15.8	0.6	8.1	184.1
Share of exports	0.2	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.2	0.0	0.3
Export of agri-food products	0.3	0.6	0.5	3.3	0.7	3.5	4.5	3.6	13.2	0.1	4.5
Share of agri-food products in exports to Macedonia	1.1	1.6	0.5	8.1	5.4	13.4	14.6	23.1	21.6	0.2	23.2

Source: calculated by the author based on ITC data [32]

Its share in total exports of Ukraine was the maximum in 2008 – 0.3%, and in other years did not exceed 0.2% (2001, 2003-2004, 2006-2007, 2010), although it did not fall below 0.01% (2013), and has decreased since 2012, its maximum value was 0.1% (2014, 2016-2017). Exports of agri-food products in 2001 and 2018 amounted to USD 0.3 million and USD 3.6 million, respectively. That is, it increased by 13.2 times, and changed from USD 0.1 million (2006) to USD 4.5 million (2017). Its share in exports of all goods increased 21.6 times from 2001 to 2018, namely from 1.1% to 23.1%, and during the entire period fluctuated between 0.2% (2006) and 23.2% (2013). Moreover, its growth was observed, in particular, until 2012 the share did not exceed 1.6% (2005), and later it did not fall below 5.4% (2015).

Montenegro. Exports of all goods to Montenegro from 2008 to 2018 increased 2.6 times, namely from USD 2.7 million up to USD 7.0 million, and changed from USD 0.5 million (2009) to USD 8.8 million (2017), and was previously absent (Table 18).

Table 18. Ukraine's exports of all and agri-food products to Montenegro (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	0.00	0.00	3.87	1.80	1.14	4.67	8.76	7.00	2.59	0.00	8.76
Share of exports	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.01	3.66	0.00	0.02
Export of agri-food products	0.00	0.00	0.06	0.20	0.09	3.34	7.33	4.69	293.06	0.00	7.33
Share of agri-food products in exports to Montenegro			1.47	11.19	8.16	71.58	83.74	67.00	113.20	0.00	83.74

Source: calculated by the author based on ITC data [32]

Its share in Ukraine's total exports was insignificant and did not exceed 0.02% (2017), and in other years – 0.01% (2010, 2012, 2016, 2018). Exports of agri-food products increased from USD 0.02 million in 2008, up to USD 4.7 million (2018), and except for 2009 (when it was absent), it fluctuated within USD 0.001 million (2011) – USD 7.3 million (2017). And its share in total exports increased from 0.6% to 67.0% (2018) from 2008 to 2018, with the minimum value being 0.04% (2011) and the maximum value being 83.7% (2017), and until 2013 the share did not exceed 1.5% (2010), and later did not fall below 8.2% (2015).

Export analysis from EFTA (European Free Trade Association)

It is known that Ukraine has also signed an RTA with EFTA, therefore, the study considers trade separately with member countries of the group.

Iceland. Thus, Ukraine's exports to Iceland increased from USD 0.6 million in 2001, up to USD 1.4 million in 2018, that is, in 2.4, and did not fall below USD 0.002 million (2002) and, except for 2012, when it was equal to USD 17.2 million, did not exceed USD 3.5 million (2007) (Table 19).

Table 19. Ukraine's exports of all and agri-food products to Iceland (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	0.6	1.2	0.1	0.2	0.3	0.6	0.7	1.4	2.4	0.0	17.2
Share of exports	0.004	0.004	0.000	0.000	0.001	0.002	0.001	0.003	0.8	0.0	0.0
Export of agri-food products	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.003	–	0.0	0.2
Share of agri-food products in exports to Iceland	0.0	0.0	0.9	0.0	0.0	34.7	0.8	0.2	–	0.0	34.7

Source: calculated by the author based on ITC data [32]

Notably, the share of exports to Iceland was quite low and did not exceed 0.03% (2012). Exports of agri-food products have been observed since 2010, although they did not exceed USD 0.2 million (2016), and in 2018 it amounted to USD 0.003 million. Moreover, its share in total exports to Iceland was the highest in 2016, when it was 34.7%, and in other years it did not exceed 0.9% (2010). That is, exports to Iceland are small, and the share of agricultural products in it is also small, since, in addition to 2016 (34.7%), its maximum value was 0.9% (2010).

Norway. Exports of all goods to Norway in 2001 and 2018 amounted to USD 19.9 million and USD 28.0 million, respectively. That is, it increased 1.4 times, although it was the highest in 2005-2013, when it did not fall below USD 46.9 million (2005), and in other years did not exceed USD 28.0 million (2018), and in general fluctuated in the range of USD 9.4 million (2003) – USD 153.8 million (2009) (Table 20).

Moreover, its share in total exports, with the exception of 2009, when it was 0.4%, did not exceed 0.2% in 2006-2008, 2010. Exports of agri-food products increased from USD 1.7 million in 2001, up to a maximum of USD 9.9 million in 2018, that is, by 5.9 times. Although in 2002-2007 it was quite low and did not exceed USD 0.03 million (2005). Its share in total exports to Norway increased from 8.4% in 2001 to a maximum of 35.4% in 2018, although in 2002-2008 it did not exceed 0.2% (2008), and in other years it did not fall below 1.5% (2009).

Table 20. Ukraine's exports of all and agri-food products to Norway (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	19.9	46.9	84.1	20.2	12.8	15.3	19.4	28.0	1.4	9.4	153.8
Share of exports	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.5	0.0	0.4
Export of agri-food products	1.7	0.03	1.3	5.4	1.8	0.5	3.7	9.9	5.9	0.0	9.9
Share of agri-food products in exports to Norway	8.4	0.1	1.6	26.9	14.2	3.1	18.9	35.4	4.2	0.0	35.4

Source: calculated by the author based on ITC data [32]

Switzerland. Exports of all goods to Switzerland increased from USD 93.6 million in 2001, up to USD 108.8 million in 2018, that is, by USD 15.2 million or 1.2 times, and changed from USD 69.4 million (2011) to USD 831.6 million (2008). Although in addition to 2001, 2007, and 2011 did not fall below USD 106.0 million (2016) and other than 2008 did not exceed USD 472.4 million (2010) (Table 21).

Its share in total exports of Ukraine ranged from 0.1% (2011) – 1.9% (2003), and except for 2003-2005, 2008-2009 did not rise above 0.9% (2002, 2010). In contrast to total exports to Switzerland, exports of agri-food products decreased from USD 62.3 million in 2001, up to USD 23.3 million in 2018, that is, by 2.7 times, and it changed from USD 1.4 million (2011) to USD 201.6 million (2003). The highest values were observed in 2001-2005 and 2013, when they did not fall below USD 60.8 million (2005), and in other years did not exceed USD 55.9 million (2017). The share of agri-food exports in total exports to Switzerland decreased from a maximum of 66.5% in 2001 to 21.4% in 2018, and the minimum value was 0.4% in 2010. At the same time, in 2001-2004, 2013, and 2016-2018, the indicator was the highest and did not fall below 21.4% (2018), and in other years it did not exceed 15.4% (2005-2006).

Table 21. Ukraine's exports of all and agri-food products to Iceland (million USD) and their share in total exports to the country, 2001-2018

	2001	2005	2010	2014	2015	2016	2017	2018	2018 to 2001	Min. value	Max. value
Export of all goods	93.6	395.9	472.4	188.6	125.5	106.0	228.3	108.8	1.2	69.4	831.6
Share of exports	0.6	1.2	0.9	0.3	0.3	0.3	0.5	0.2	0.4	0.1	1.9
Export of agri-food products	62.3	60.8	1.7	6.1	8.0	23.1	55.9	23.3	0.4	1.4	201.6
Share of agri-food products in exports to Switzerland	66.5	15.4	0.4	3.2	6.4	21.8	24.5	21,4	0.3	0.4	66.5

Source: calculated by the author based on ITC data [32]

Dynamics of Ukraine's trade with countries with which free trade agreements have been concluded and certain trade indicators

In 2018. In trade with the countries with which free trade agreements were concluded, except for the EU, the largest exports for all goods were carried out to Russia (USD 3,652.4 million), Belarus (USD 1,304.2 million), Moldova (USD 789.2 million), Israel (USD 580.0 million), Georgia (USD 480.0 million), Kazakhstan (USD 376.5 million), Azerbaijan (USD 360.0 million), and for agri-food products – to Belarus (USD 568.5 million), Israel (USD 337.0 million), Georgia (USD 272.9 million), Moldova (USD 226.0 million), Azerbaijan (USD 188.3 million), Kazakhstan (USD 156.1 million), Uzbekistan (USD 129.0 million), Russia (USD 92.0 million), and least of all (for all and agri-food products) – to Iceland.

At the same time, in 2018, compared to 2001, exports of all goods did not increase significantly to Russia, but decreased to Tajikistan, Macedonia, Turkmenistan, and for agri-food products – to Switzerland and Russia, respectively, but in all other cases there was an increase.

Ukraine's total exports to all countries with which free trade agreements are in force, except for the EU (excluding the latter due to its significant share compared to other countries with which RTA is signed), from 2001 to 2018 increased from a minimum of USD 1,275. 4 million up to USD 4,671.6 million. That is, by 3.7 times, and the largest was in 2008, when it amounted to USD 9838.1 million. Moreover, its share in total exports varied from 7.8% (2001) to 16.3% (2009) and in 2018 amounted to 9.9%, although the largest increase was observed in 2003-2015, when the values did not fall below 10.6% (2003), and in other years did not exceed 10.0% (2017) (Table 22).

Table 22. Dynamics of Ukraine's export of all goods (million USD) to countries with which free trade agreements are concluded, except for the EU, and its share in total exports (%), 2001-2018

	2001	2005	2010	2011	2014	2015	2016	2017	2018	2018 to 2001
World	16264.7	34228.0	51430.3	68393.0	53913.3	38127.0	36361.0	43428.4	47334.7	2.9
Russian Federation	3640.8	7489.8	13431.9	19819.7	9799,1	4827.7	3592.9	3943.2	3652.4	1.0
Belarus	243.9	891.1	1899.2	1922.3	1617.1	870.7	902.6	1148.4	1304.2	5.3
Republic of Moldova	273.8	678.6	713.5	874.4	743.8	524.3	481.1	711.9	789.2	2.9
Israel	113.6	290.7	467.6	510.2	593.1	597.1	488.6	605.1	580.0	5.1
Georgia	36.2	199.5	527.5	657.5	490.9	402.7	390.8	427.9	480.0	13.3
Kazakhstan	117.3	667.1	1300.5	1857.5	1073.2	712.7	400.1	372.8	376.5	3.2
Azerbaijan	45.6	290.5	610.8	708.3	591.6	318.8	248.0	355.0	360.0	7.9

Table 22, Continued

	2001	2005	2010	2011	2014	2015	2016	2017	2018	2018 to 2001
Uzbekistan	108.7	150.6	228.5	353.8	308.6	174.5	142.4	167.7	286.0	2.6
Armenia	22.0	97.3	201.3	227.6	173.4	101.6	88.9	105.1	136.7	6.2
Switzerland	93.6	395.9	472.4	69.4	188.6	125.5	106.0	228.3	108.8	1.2
Canada	28.4	90.1	73.3	122.6	72.4	30.2	28.9	50.5	78.1	2.7
Turkmenistan	106.1	187.2	208.9	241.9	431.3	170.3	109.0	62.2	56.8	0.5
Tajikistan	34.7	46.9	74.7	60.2	46.7	30.0	25.4	34.1	34.4	1.0
Kyrgyzstan	5.1	31.6	75.0	111.3	102.5	75.5	40.4	34.3	28.6	5.6
Norway	19.9	46.9	84.1	61.4	20.2	12.8	15.3	19.4	28.0	1.4
Macedonia	25.9	35.9	96.0	81.8	40.5	12.9	25.9	30.7	15.8	0.6
Montenegro			3.9	2.6	1.8	1.1	4.7	8.8	7.0	2.6
Iceland	0.6	1.2	0.1	0.2	0.2	0.3	0.6	0.7	1.4	2.4
All countries except the EU-28	1275,4	4101.3	7037.4	7863.0	6495.8	4161.0	3498.9	4362.8	4671.6	3.7
Share of all countries except the EU-28	7.8	12.0	13.7	11.5	12.0	10.9	9.6	10.0	9.9	1.3
All countries including Russia except the EU-28	4916.2	11591.0	20469.3	27682.8	16294.9	8988.7	7091.7	8306.0	8324.0	1.7
Share of all countries including Russia except the EU-28	30.2	33.9	39.8	40.5	30.2	23.6	19.5	19.1	17.6	0.6

Source: calculated by the author based on ITC data [32]

Exports of all goods to countries with which free trade agreements were concluded without the EU and with Russia increased from USD 4,916.2 million in 2001, up to USD 8,324.0 million in 2018, that is, by 1.7 times, and changed from USD 4,699.3 million (1996) to USD 27,682.8 million (2011). In 2003-2015 it was the highest and did not fall below USD 9379.4 million, and in other years did not exceed USD 8988.7 million (2015). Its share in total exports of Ukraine decreased from 30.2% in 2001 to a minimum of 17.6% in 2018, and the maximum value was 40.5% (2011), and in 2005-2013 the indicator did not fall below 33.9% (2005), although it did not rise above the level of 2001, 2014 (30.2%) in other years.

Given the significant share of agri-food products in Ukraine's exports, it is worth considering how their imports have changed by the countries with which free trade agreements have been concluded. Thus, from 1992 to 2017, the import of agri-food products by them (from the EU-28, but without Russia) increased 2.8 times, namely from USD 210,390.4 million up to USD 593,883.0 million. Its share in world imports, respectively, decreased from 54.5% (1992) to 41.3% (2017), but is almost half. The same trend continues taking into account Russia, in particular, imports increased from USD 224,511.4 million up to USD 620,888.0 million, that is, by 2.8 times, and its share in world imports decreased from 58.1% (1992) to 43.2% (2017) (Table 23).

Table 23. Dynamics of imports of agri-food products of countries with which Ukraine has concluded Free Trade Agreements (million USD) and share in world imports

	1992	1995	2000	2005	2010	2015	2016	2017	2017 simiied to 1992
Armenia	172.3	236.8	207.8	297.8	667.5	648.0	610.4	703.1	4.1
Azerbaijan	278.4	279.2	213.2	453.9	1223.0	1819.8	1529.5	1675.6	6.0
Belarus	962.7	710.0	968.0	1472.7	2704.0	4059.6	3749.2	4178.3	4.3
Canada	7585.1	9079.8	11442.2	16895.5	27179.7	32860.5	32434.2	33567.6	4.4
Georgia	232.4	365.7	256.9	491.3	898.7	1056.5	1003.1	1108.1	4.8
Iceland	155.4	173.5	188.4	323.6	322.6	470.0	501.9	591.7	3.8
Israel	1326.6	1825.9	1813.2	2385.2	4142.0	4866.2	5101.4	5466.5	4.1
Kazakhstan	610.7	498.5	445.1	1278.5	2733.0	3311.5	2968.3	3325.1	5.4

Table 23, Continued

	1992	1995	2000	2005	2010	2015	2016	2017	2017 similed to 1992
Kyrgyzstan	307.2	107.9	81.7	191.9	548.8	564.2	455.6	631.2	2.1
Montenegro*					524.3	504.3	519.3	577.7	2.0
North Macedonia	194.9	319.1	240.5	413.1	680.2	742.5	762.4	816.8	4.2
Norway	1560.7	1897.1	1791.6	3341.8	5358.2	6433.8	6395.9	6955.6	4.5
Republic of Moldova	116.0	71.7	106.4	321.1	550.8	518.7	541.3	633.6	5.5
Russia	14121.0	12866.7	7233.8	15613.9	32373.1	24948.6	23355.1	27005.0	1.9
Switzerland	4758.2	5462.7	4742.1	6990.2	10336.5	11139.3	11143.3	11572.3	2.4
Tajikistan	263.1	181.6	125.8	257.4	476.0	720.0	655.3	597.0	2.3
Turkmenistan	238.9	176.8	105.3	111.3	304.4	652.0	605.6	623.7	2.6
Uzbekistan	973.8	748.0	387.3	369.4	868.9	1512.7	1322.3	1256.3	1.3
EU-28	190654.0	209428.8	182693.2	308440.0	441605.1	463792.1	471494.2	519602.8	2.7
World	386177.7	461025.1	433157.4	679892.7	1107372.2	1326147.1	1321275.6	1436624.7	3.7
Countries with which FTA agreements are in force in 2020	210390.4	231562.9	205808.8	344034.5	501123.8	535671.7	541793.1	593883.0	2.8
Share of countries' imports in world imports, %	54.5	50.2	47.5	50.6	45.3	40.4	41.0	41.3	0.8
Countries with which agreements were concluded (with Russia)	224511.4	244429.6	213042.6	359648.4	533496.9	560620.3	565148.3	620888.0	2.8
Share of countries with which trade agreements have been concluded (with Russia) in world imports, %	58.1	53.0	49.2	52.9	48.2	42.3	42.8	43.2	0.7

Note: * – for Montenegro, imports in 2017 are compared to 2006
Source: calculated by the author based on FAO data [38]

Notably, the import from EU-28 during the specified period increased 2.7 times (from USD 190654.0 million) up to USD 519,602.8 million), then import from Russia increased by 1.9 times (from USD 14,121.0 million) up to USD 27,005.0 million), and the share of the EU-28 in world imports of agri-food products was 36.2%, and Russia – 1.9%. Although it is necessary to take into account a significant part of intraregional trade of the grouping. In addition, among the countries with which Ukraine signed free trade agreements, in 2017, compared to 1992, imports of agri-food products increased the most by Azerbaijan (6.0 times), Moldova (5.5), Kazakhstan (5.4), Georgia (4.8 times), Norway (4.5), Canada (4.4), Belarus (4.3), North Macedonia (4.2), Israel (4.1), Armenia (4.1), Iceland (3.8), but not more than 3.8 times (Iceland), although this figure was higher than for the world, the EU-28 and Russia, which was 3.7 times, 2.7 and 1.9 times, respectively.

Although the largest importers among them were the EU-28, Canada, Russia, Switzerland, Norway, Israel, Belarus, Kazakhstan, Azerbaijan, Uzbekistan and Georgia, for the former imports are noticeably higher. That is, given the volume and trend of imports of agri-food products, Ukraine needs to deepen foreign trade relations with these countries. At the same time, it is necessary to increase exports in various directions, using the concluded RTAs. For example, Moldova is a relatively small country, but it has significantly increased imports, and Ukraine has significantly increased exports of agri-food products to it, and although it was small, its share increased to 28.6% (2018) in the export of all goods (to Moldova, 1.7% in total exports of Ukraine).

By the way, from 1992 to 2017, imports of countries with which free trade agreements were concluded by Ukraine, but in addition to the EU and Russia, increased from USD 19736.4 million up to USD 74,280.2 million, that is, by 3.8 times, and their share in world imports almost did not change and amounted to 5.1% and 5.2%, respectively. It was typical for the entire specified period – the values ranged from 4.8% (1995) to 5.4% (2002, 2006-2007, 2009-2010, 2014-2015). And the imports of these countries and Russia in 1992-2017 increased from USD 33,857.4 million up to USD 101,285.2 million, that is, by 3.0 times, and it

was higher than without it in 1992 and 2017, respectively, by 1.7 and 1.4 times. Although its share in world imports decreased from a maximum of 8.8% in 1992 to 7.1% in 2017, the minimum value was 6.9% (1999) and was higher than the maximum share of imports of these countries without Russia (5.4% during the specified period).

In trade in all goods, the balance of Ukraine changed during 2001-2018 from USD -18496.1 million up to USD 3,669.4 million, and it was positive only until 2005 (in 2001-2004) and in 2015 (Table 24).

Table 24. Dynamics of the trade balance of Ukraine's foreign trade with the countries with which free trade agreements were concluded, 2001-20018 million USD

	2001	2005	2010	2014	2015	2016	2017	2018	Min. value	Max. value
World	489.6	-1894.0	-9306.8	-468.1	610.9	-2888.6	-6010.8	-9852.4	-18496.1	3669.3
Russia	-2138.2	-5352.7	-8766.1	-2879.5	-2665.0	-1556.4	-3253.3	-4438.0	-9786.5	-1556.4
Belarus	-163.2	-48.7	-668.4	-2354.0	-1578.5	-1875.2	-2055.9	-2482.7	-2817.4	116.1
Republic of Moldova	209.4	594.5	639.9	682.0	483.1	433.5	605.3	671.1	209.4	1002.2
Israel	73.5	227.7	376.1	267.4	427.1	303.8	437.3	367.4	73.5	529.6
Georgia	25.0	158.5	391.5	337.2	341.0	325.0	347.2	346.4	25.0	513.1
Kazakhstan	-548.7	480.7	534.3	697.4	335.2	-34.2	54.8	-83.4	-1286.4	1436.5
Azerbaijan	37.5	262.7	-340.4	547.8	288.5	208.2	-62.1	-104.6	-340.4	834.8
Uzbekistan	-84.3	-54.7	146.7	235.7	112.2	71.3	45.0	164.6	-1523.0	327.0
Armenia	13.6	84.1	183.4	160.1	94.2	80.7	94.3	115.6	13.6	238.1
Switzerland	-51.8	154.6	-35.7	-335.0	-332.6	-878.3	-1421.1	-1536.7	-1536.7	317.3
Canada	5.3	3.1	-86.9	-118.8	-176.1	-188.4	-243.8	-254.9	-254.9	38.6
Turkmenistan	-1548.0	-2490.9	177.5	406.8	154.0	74.6	-26.8	-87.6	-5254.7	406.8
Tajikistan	33.1	41.6	71.3	43.5	27.2	24.2	33.4	33.8	20.1	93.6
Kyrgyzstan	2.6	25.9	68.9	98.2	69.7	38.7	31.3	27.1	1.8	122.9
Norway	-36.0	-81.4	-177.2	-567.6	-728.9	-147.7	-197.3	-199.2	-728.9	-36.0
North Macedonia	24.6	33.4	69.7	19.2	0.8	14.2	18.8	-0.1	-65.7	176.8
Montenegro	0.0	0.0	1.6	0.7	-3.7	2.0	5.2	6.4	-3.7	6.4
Iceland	-2.4	-11.9	-51.8	-41.1	-30.9	-63.6	-71.9	-97.1	-113.9	-2.4

Source: calculated by the author based on ITC data [32]

As for the countries with which free trade agreements were concluded, except for the EU, the balance was constantly positive in trade with Moldova (USD 209.4-1002.2 million), Israel (USD 73.5-529.6 million), Georgia (USD 25.0-513.1 million), Armenia (USD 13.6-238.1 million), Tajikistan (USD 20.1 - 93.6 million), and Kyrgyzstan (USD 1.8-122.9 million), and negative – with Russia (USD -9786.5 – -1556.4 million), Norway (USD -728.9 – -36.0 million), Iceland (USD -113.9 – -2.4 million).

Moreover, in 2018, a positive balance was observed in trade with Moldova (USD 671.1 million), Israel (USD 367.4 million), Georgia (USD 346.4 million), Uzbekistan (USD 164.6 million), Armenia (USD 115.6 million), Tajikistan (USD 33.8 million), Kyrgyzstan (USD 27.1 million), Montenegro (USD 6.4 million), and the opposite situation for North Macedonia (USD -0.1 million), Kazakhstan (USD -83.4 million), Turkmenistan (USD -87.6 million), Iceland (USD -97.1 million), Azerbaijan (USD -104.6 million), Norway (USD -199.2 million), Canada (USD -254.9 million), Switzerland (USD -1536.7 million), Belarus (USD -2482.7 million), Russia (USD -4438.0 million). The negative balance also prevailed in trade with Belarus (except for 2004 and 2007), Switzerland (except for 2002-2005, 2009), Canada (except for 2001-2002, 2004-2006), Turkmenistan (except for 2010, 2012-2016), and the positive balance prevailed with Azerbaijan (except for 2010, 2017-2018), Uzbekistan (except 2001, 2003, 2005-2009, 2011), North Macedonia (2011-2013, 2018), and Montenegro (except 2009, 2015). In trade with Kazakhstan, the balance was negative, except for 2004-2005, 2010-2015, and 2017.

Determination of the level of complementarity of trade relations between Ukraine and the countries with which free trade agreements have been signed

To predict the prospects for the development of cooperation between Ukraine and individual countries with which it has been already or possible to sign a free trade agreement, it is advisable to analyse the level of mutual complementarity of their trade relations. For this purpose the level of complementarity of the commodity structure of trade in Ukraine and these countries was calculated using the formula (1):

$$TCI_j = 100 - \sum \frac{m_{ik} - x_{ij}}{2} \quad (1)$$

where TCI_j - trade complementarity index;
m_{ik} – share of goods and total imports of the country k;
x_{ij} – share of exports i-th product of the country j.

This index demonstrates that the import structure of one country corresponds to the export structure of a trading partner [39, p. 251]. More than 30 product groups were taken for calculation, which accounted for more than 92% of all Ukrainian exports.

The results obtained indicate great prospects for the development of cooperation between Ukraine and countries with which free trade agreements have been concluded, and a similar situation is observed for a number of other countries, in particular, calculations were made for trade with the largest exporters/importers of the world and individual regions and countries with which regional trade agreements are supposed to be concluded. Thus, Ukraine's trade relations with the EU-28 are complementary at the level of 52.43%, Canada – 53.09%; Great Britain – 52.09%, Germany – 51.21%, Poland – 53.04%, Armenia – 55.0%, Azerbaijan – 57.38%, Belarus – 48.30%; Montenegro – 54.06%; Georgia – 57.58%; Iceland – 48.91% Kazakhstan – 53.67%; Kyrgyzstan – 50.70%; Macedonia – 60.39%; Moldova – 52.94%; Norway – 55.02%; Russia – 51.45%; Serbia – 49.71%; Switzerland – 54.41%; Tajikistan – 61.51%; Turkmenistan – 52.58%; Uzbekistan – 54.69%; Israel – 52.77%, as well as with Lebanon – 53.49%; Brazil – 45.40%; Singapore – 35.24%; Saudi Arabia – 56.22%; Mexico – 45.12%; Nigeria – 41.04%; Vietnam – 48.28%; Japan – 47.33%; Republic of Korea – 45.3%; India – 43.42%; Indonesia – 51.91%; Iran – 58.85%; Egypt – 58.88%; Turkey – 52.56%; China – 46.21%; USA – 46.76%; Argentina – 51.36%; Australia – 49.51% (Table 25).

Table 25. Level of complementarity of the commodity structure of foreign trade in Ukraine and individual countries by main product groups, 2018

Countries with which Ukraine has concluded FTAs	TCI*	Countries with which Ukraine plans to conclude FTAs	TCI	Countries – the world's largest importers	TCI	Some countries are the largest importers of Ukraine	TCI
EU-28	52.43			EU-28	52.43	EU-28	52.43
Canada	53.09			Canada	53.09		
				China	46.21	China	46.21
United Kingdom	52.09	United Kingdom	52.09	United Kingdom	52.09	United Kingdom	52.09
Germany	51.21			Germany	51.21	Germany	51.21
Poland	53.04					Poland	53.04
		Turkey	52.56			Turkey	52.56
				USA	46.76	USA	46.76
				Argentina	51.35		
Armenia	55.00						
				Australia	49.51		
Azerbaijan	57.38					Azerbaijan	57.38
Belarus	48.30					Belarus	48.30
				Brazil	45.40	Brazil	45.40
Montenegro	54.06						
				Egypt	58.88	Egypt	58.88
Georgia	57.58						
				India	43.42	India	43.42
				Indonesia	51.91	Indonesia	51.91
				Iran	58.85	Iran	58.85
Iceland	48.91						
				Japan	47.33	Japan	47.33
Kazakhstan	53.67					Kazakhstan	53.67
				Republic of Korea (North Korea)	45.30	Republic of Korea (North Korea)	45.30
Kyrgyzstan	50.70						
		Lebanon	53.49				
Northern Macedonia	60.39						
				Mexico	45.12	Mexico	45.12

Table 25, Continued

Countries with which Ukraine has concluded FTAs	TCI*	Countries with which Ukraine plans to conclude FTAs	TCI	Countries – the world's largest importers	TCI	Some countries are the largest importers of Ukraine	TCI
Moldova	52.94						
				Nigeria	41.04		
Norway	55.02						
Russia	51.45			Russia	51.45	Russia	51.45
				Saudi Arabia	56.22	Saudi Arabia	56.22
		Serbia	49.71				49.71
Switzerland	54.41					Switzerland	54.41
		Singapore	35.24				
Tajikistan	61.51						
Turkmenistan	52.58						
Uzbekistan	54.69						
		Vietnam	48.28			Vietnam	48.28
Israel	52.77					Israel	52.77

Notes: TCI_j – trading complementarity index
Source: calculated by the author based on ITC data [32]

Moreover, the values of the indicator are noticeably higher for Egypt, Iran and Saudi Arabia, which confirms the prospects for the development of bilateral relations with them and the conclusion of RTAs. At the same time, it is worth considering that these countries are regular and significant importers of agri-food products, which account for approximately 40% of Ukraine's exports.

Thus, in trade with these countries, there is mainly an increase in exports, their imports of agricultural products are increasing, the value of the complementarity index and other indicators indicate prospects for the development of cooperation. However, quite often these issues are debatable and ambiguous, which is really not unfounded. After all, the effectiveness of the development of trade and economic relations between them as a result of the signing of the RTA depends on its content, the settlement of issues of trade liberalisation with the peculiarities inherent in modern forms of trade; negotiations of the parties on trade policy, etc. Therefore, they must be clearly taken into account when laying down agreements with each specific country. In addition, the production of competitive products, preferential taxation for the production of new products, the introduction of the latest technologies, etc., are of great importance.

Conclusions

Ukraine has signed RTAs with more than 40 countries, including integration groups (the EU and EFTA), and negotiations are also underway with other countries. However, disintegration processes were also observed. This study proposes to divide the conclusion of RTA into two periods – before and after 2000 – taking into account the territorial aspect and the economic level of development of partner countries. The difference in the economic development of EFTA, the EU and Canada in comparison with Ukraine led to the application of the principle of asymmetry in trade liberalisation in agreements, and each RTA has its own characteristics. Taking into account the causes and consequences of integration, it is advisable to divide the risks into predictable and unpredictable.

In addition to the EU, Ukraine exported the most of all goods to Russia, Belarus, Moldova, Israel, Georgia, Kazakhstan, Azerbaijan, and agri-food products – to Belarus, Israel, Georgia, Moldova, Azerbaijan, Kazakhstan, Uzbekistan, and Russia, although Iceland was the smallest importer among them. Total exports to the countries with which the agreements are in force increased 3.7 times and its share in Ukraine's exports varied between 7.8% (2001) and 16.3% (2009), and there are separate periods of its growth (in 2003-2015). Taking into account Russia, total exports increased by 1.7 times, and its share did not fall below 17.6% (2018) and did not exceed 40.5% (2011). Exports of all goods from 2001 to 2018 increased to all countries except Tajikistan, Turkmenistan, Macedonia, and for agri-food – except Russia and Switzerland.

The most noticeable (more than 5 times) increase was in total exports to Armenia, Azerbaijan, Belarus, Georgia, Kyrgyzstan, Israel, and for agri-food – to all countries except Turkmenistan, Canada, Iceland, Switzerland (decrease) and Russia (decrease). Agricultural exports increased more than the total for all countries except Armenia, Russia, Canada, and Switzerland, although the share of exports to them is low – less than 1% accounted for Armenia, Kyrgyzstan, Tajikistan, Turkmenistan, Canada, Macedonia, Montenegro, Iceland, Norway, and the highest maximum values – for Belarus, Moldova, Kazakhstan, but did not exceed 3.7%, and only for Russia reached 29%. The share of agricultural exports in total exports to Armenia and Georgia did not fall below 30%, to Israel and Kyrgyzstan – 24%, and its maximum values exceeded half of exports for Armenia, Azerbaijan, Georgia, Kyrgyzstan, Tajikistan, Turkmenistan, Israel, Montenegro, Switzerland, 65% for Kyrgyzstan, Turkmenistan, Israel and Montenegro, which confirms the growth of the importance of the agricultural sector.

In addition, the import of agri-food products by countries with which free trade agreements are in force (for 2020 with the EU-28, but without Russia) increased 2.8 times, and its share in world imports decreased from 54.5% (1992) to 41.3% (2017). The same trend continues taking into account Russia, in particular, the increase was 2.8 times, and the share decreased from 58.1% (1992) to 43.2% (2017). Most of all, imports were increased by Azerbaijan, Moldova, Kazakhstan, Georgia, Norway, Canada, Belarus, North Macedonia, Israel, Armenia, Iceland, but no more than 3.8 times (Iceland), although this figure was less than for the world, the EU-28 and Russia (3.7 times, 2.7 and 1.9 times, respectively). However, the main importers among them are the EU, Canada, Russia, Switzerland, Norway, Israel, Belarus, Kazakhstan, Azerbaijan, Uzbekistan and Georgia, so taking into account these features, trends and the existence of free trade agreements, it is necessary to increase exports. In addition, the imports of these countries without the EU and Russia increased 3.8 times, and their share in world imports varied from 4.8 to 5.4% (and with Russia by 3.0 times, and the share in fluctuated between 6.9% (1999) – 8.8% (1992).

The trade balance of Ukraine during 2001-2018 was positive only until 2005 and 2015, and generally varied in the range of USD -18496.1 million up to USD 3,669.4 million, and it was constantly positive with Moldova, Israel, Georgia, Armenia, Tajikistan and Kyrgyzstan, and negative with Russia, Norway, Iceland. In trade with Belarus, Switzerland, Canada, and Turkmenistan, the indicator was mostly negative, while with Azerbaijan, Uzbekistan, North Macedonia, and Montenegro – it was positive. In trade with Kazakhstan, the balance was negative, except for 2004-2005, 2010-2015, and 2017.

The complementarity index indicates that there are prospects for the development of cooperation between Ukraine and countries with which free trade agreements are planned and already concluded, and other major exporters, as well as Egypt, Saudi Arabia and Iran, and these countries have a significant demand for agri-food products, which occupy almost half (40-50%) of Ukraine's exports. Therefore, there are prospects for developing cooperation and trade with these countries, which can be facilitated by the conclusion of an RTA with a precise settlement of trade policy issues on mutually beneficial terms for all parties.

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Регіональні торговельні угоди України: реалії та перспективи

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Анотація. Укладання регіональних торговельних угод збільшило до сотень. Переваги інтеграції, побоювання протекціонізму з боку країн, які об'єднуються та інші фактори сприяють даному процесу. Україною укладено угоди більш ніж з 40 країнами, причому і з інтеграційними угрупованнями. Тому метою роботи є виявлення особливостей її угод, перспектив їх розвитку та підписання нових. Варто проаналізувати укладання угод в історичному аспекті, виходячи з рівня їх економічного розвитку, зовнішньої торгівлі, рівня комплементарності торгівлі, окреслити можливості розвитку. Тому застосовувались загальнонаукові та спеціальні методи, зокрема історичний, аналізу та синтезу, економічного аналізу, табличний та ін. Використовувались дослідження вчених; статистичні дані Центру міжнародної торгівлі, Продовольчої та сільськогосподарської організації ООН (ФАО); міжнародні договори та нормативно-правові документи. Відповідно до аналізу укладання угод пропонується розділити їх на два періоди: до та після 2000 р. У першому їх підписували в основному з країнам, що розвиваються і ближнього зарубіжжя, а у другому – з розвиненими країнами дального зарубіжжя. Спочатку партнерами були переважно країни СНД, потім – Європи, а пізніше – інших регіонів, проте спостерігались і дезінтеграційні процеси з країнами Прибалтики. Встановлено, що угоди мають свої особливості щодо надання сприятливого режиму, електронної комерції та ін. Запропоновано ризики інтеграції поділяти на передбачувані та непередбачувані. Виявлено основних імпортерів усієї та агропродовольчої продукції серед країн з якими укладено угоди. Експорт до них переважно зростає, а також – частка агропродовольчої продукції. Торговельне сальдо, невисока частка у експорті України вказують на доцільність розвитку торгівлі. Розрахунок індексу комплементарності дозволяє прогнозувати перспективи розвитку відносин з країнами, з якими планується та вже укладено угоди і основними імпортерами світового ринку. Результати вказують на перспективи розвитку торгівлі, але це залежатиме від змісту угод, конкурентоспроможності продукції та ін.

Ключові слова: міжнародна економічна інтеграція, угода про вільну торгівлю, зовнішня торгівля, комплементарність, експорт

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Open Land Market in Ukraine: Pragmatics of the Phenomenon Through the Lens of European Experience

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Abstract. The relevance of the study is conditioned by the fact that the violation of land ownership rights and the moratorium on the purchase and sale of land plots limit the development of the national economy in general and the land market in particular, contributing to the operation of shadow agribusiness. However, starting from 01.07.2021, all restrictions on the sale of agricultural land are lifted, and new opportunities and threats arise. The purpose of the study is to analyse the new legislation regulating the launch of an open land market in Ukraine. To obtain scientific results, the following methods are used: dialectical, comparison, analogies and comparisons, monographic, benchmarking, expert evaluation method, SWOT analysis, forecasting method, analysis and synthesis. In accordance with this, the current state of land in Ukraine and European countries is considered. The existing land market in Ukraine and the world is analysed. A historical retrospective inquiry of events related to the lifting of the land moratorium is carried out. The law that ensures the launch of an open land market is characterised. Significant additions are identified in the law between the first and second readings. The mechanism of regulating the launch of the Ukrainian open land market is clarified. This study considers the international experience of operation of the open-type land market and reflects competitive prices for 1 hectare of land in comparison with Ukraine. According to this, the positive impact of land reform in European countries is determined. The main factors of effectiveness of the open land market model in foreign countries are presented. The main opportunities and threats for an open land market in Ukraine are analysed. The findings of the study reflect both the positive and negative consequences of launching an open market in Ukraine, citing expert opinions of supporters and opponents of such a market transformation

Keywords: moratorium, liberal land market, investment, national economy, agricultural land plots

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Introduction

One of the most important sectors of the national economy is the development of agriculture. The totality of limited resources or factors of production (land and natural and material resources, labour, capital, entrepreneurship, technology) determine the general characteristics of the national economy of Ukraine. The economic efficiency of the state is determined by the level of satisfaction of citizens' needs, accumulation of national wealth, preservation of the environment and depends on the economic system. An important component of which is the establishment of ownership of production resources and the introduction of a transparent mechanism for regulating this activity. According to this, land, as the national wealth of Ukraine under state protection, should become a commodity.

According to the Constitution of Ukraine (Articles 13, 14) [1] and the Land Code (Article 1) [2], the right of ownership of land to the Ukrainian people is guaranteed. However, for 25 years now, Ukraine has had a moratorium on the purchase and sale of land, which is a world record. In the history of Mexico, the issue of introducing a land reform that would lift the moratorium on land lasted 23 years [3]. In accordance with this, first of all, two problems arise. The first is a violation of human rights, since a citizen has the right to property, but cannot fully use it due to certain restrictions by law. The second is the development of "shadow" land market and corruption schemes. With this in mind, it is necessary to develop mechanisms for regulating the open land market in Ukraine. In all European countries, except Venezuela, Cuba, North Korea, and Zimbabwe, there is an open land market model that determines the development of the agro-industrial complex and economy [4].

On March 31, 2020, the Verkhovna Rada of Ukraine adopted draft law No. 552-IX "On amendments to certain legislative acts of Ukraine concerning the conditions of turnover of agricultural land" [5], which provides for the lifting of the moratorium on land and the introduction of a limited land turnover market, which would last from 01.07.2021–01.01.2024. Accordingly, the right of purchase and sale belongs only to individual citizens of Ukraine, subjects of legal ownership are limited in the exercise of such a right.

The analysis of previous papers by Ukrainian and foreign researchers indicates the topicality of the issue of land relations in the system of the national economy. O.B. Anisenko and A.I. Kozak in their study [6] explored the basic meaning of the concept of moratorium, identify the object and subject of land relations. Two positions on the further development of the land market were analysed: the first is the extension of the moratorium, and the second is the introduction of an open land market, but under certain conditions, which are also determined by scientists. Authors N.V. Dombrovan and K.S. Izbash [7] studied the general mechanisms of the moratorium on the purchase and sale of agricultural land in Ukraine. The initial assessment of the draft law mentioned above [5] was carried out, its advantages and disadvantages were identified. The consequences of the moratorium were considered from an economic standpoint. S. Zakirova [3] analysed the history of the moratorium on land in Ukraine and the reasons for its extension. The state of the land market was analysed using the example of European countries, a comparison of expert opinions of supporters and opponents of lifting the moratorium on Ukrainian lands was carried out. O.P. Radchenko and O.I. Konoplia [8] investigated the historical stages of the moratorium on agricultural land. The legal framework for regulating relations between the purchase and sale of these lands was reviewed. The positive consequences of lifting the moratorium on land, in particular the development of land relations and the national economy as a whole, were determined.

The purpose of the study consists in economic substantiation of the feasibility of introducing an open land market. The furtherance of this goal involves the implementation of the following *tasks*: 1) analyse the draft law No. 552-IX of March 31, 2020, and conduct a comparative analysis of the first and second readings; 2) characterise the pricing policy for land in European countries; 3) determine the economic prospects for the introduction of an open land market in Ukraine.

Materials and Methods

The methodology of the study provides an exhaustive disclosure of the subject matter through the use of theoretical methods. In the course of study, the main method of cognition was *dialectical*. Through the use of this method, the current state of agricultural land in Ukraine is determined. The main provisions of draft law No. 552-IX "On amendments to certain legislative acts of Ukraine concerning the conditions of turnover of agricultural land" were reviewed [5]. In accordance with this, four stages of introducing market turnover of land were analysed. The essence of this method is to increase economic efficiency, so the expediency of lifting the moratorium and its impact on the national economy of Ukraine was considered.

Using *comparison method* draft law No. 552-IX was analysed [5] between the first and second readings and significant amendments and additions after the second reading were identified. The use of the *monographic method* allowed the study to analyse the price of land in 23 European countries. Four countries with the highest price per 1 hectare of land have been identified – Switzerland, the Netherlands, Austria, and the Czech Republic. The impact of land reform on the economies of Austria, the Czech Republic, and the Netherlands was also determined. *Method of analogies and comparisons* allowed comparing the pricing policy for agricultural land in Europe and Ukraine. According to this and the use of *benchmarking method,* it was concluded that the lifting of the moratorium on land would lead to an increase in its prices and economic efficiency in general. Other than that, *method of expert assessments* allowed the study to represent the position of specialists in the field of land relations, the *SWOT analysis method* identified the

strengths and weaknesses of the open land market of the agro-industrial complex. Using the *forecasting method* the expected economic results and possible risks were considered.

Using *analysis and synthesis* the main regulatory documents were analysed: the Constitution of Ukraine [1], The Land Code [2], draft law No. 552-IX [5]. The main source database were papers in professional publications, information portals. To visually display and improve the readability of the research material, the *tabular and graphical methods* were used.

Results and Discussion

According to the State cadastre of Ukraine, the current state of the land has the following indicators: 60.3 mln ha is the total area of Ukraine, in global terms – 6% of the entire territory of Europe. Of these, 41.4 million ha are occupied by agricultural land, which for its part is 19% of the territory of Europe. The structure of agricultural land includes: arable land (32.7 mln ha), pastures (5.3 mln ha), hayfields (2.3 mln ha), perennial plantings (0.9 mln ha), neglected fields (0.2 mln ha) [4]. Ukraine has large reserves of chernozems, soils and arable land. For example, the study compares the following countries: Poland, Romania, Germany, and Ukraine. The total area of chernozems in Ukraine – 28 mln ha, Romania – 2 mln ha, Poland and Germany – 1 mln ha. Soils in Ukraine cover 60 mln ha, Germany – 35 mln ha, Poland – 31 mln ha, Romania – 23 mln ha. Arable land in Ukraine covers more than 32 mln ha, in Poland – 14 mln ha, Germany – 12 mln ha, Romania – 9 mln ha. Admittedly, the land potential of Ukraine is much greater than in European countries, but the ecological state of the land and the price level are lower [4].

The main reason for curbing the development of the national economy is the moratorium on the purchase and sale of land. All lands are under a moratorium (96 %) and only 4% are not subject to a ban on the free use of a land plot, provided that this land is used for the introduction of its own agriculture (excluding shares), subsidiary agriculture, gardening [4]. The lack of the right to freely buy or sell agricultural land hinders investment in the agro-industrial complex, violates the rights of citizens, and reduces the rental price. Lifting the moratorium would lead to the creation of a new "transparent" land market. At the initial stages of development, the level of "shadowiness" and corruption would decrease. Ex-presidents of Ukraine have repeatedly tried to lift the moratorium on land (Table 1).

Table 1. Chronological sequence of attempts to lift the moratorium on land

Year	Event
2001	L. Kuchma signed the Land Code of Ukraine, which forbade the sale of land for five years According to this code, it was assumed that during 2005-2010 it would be possible to sell 100 ha to one citizen
2004	L. Kuchma tried to lift the moratorium, but the Verkhovna Rada, with the support of the following parties: Our Ukraine, the Yulia Tymoshenko Bloc, and the Socialist Party, extended the moratorium until 2007
2007	V. Yushchenko tried to veto the extension of the moratorium, however the Parliament approved the decision to extend the moratorium until 2009
2009-2010	V. Yushchenko twice vetoed the extension of the moratorium, but the Verkhovna Rada overcame the President's veto on the second attempt and extended the moratorium until 2012
2012	The moratorium has been extended by default until 2015
2015	The parliament postponed the issue of opening the land market until 2017, by introducing amend-ments to the transitional provisions of the Land Code
2016	The Verkhovna Rada extended the moratorium on land until 2018
2018	Extension of the moratorium on land sales until 2020
2020	V. Zelensky signed the Law of Ukraine № 552-IX on lifting the moratorium on land purchase and sale

Source: compiled by the author based on [9]

On March 30, 2020, V. Zelensky signed the Law of Ukraine № 552-IX "On Amendments to Certain Legislative Acts of Ukraine Concerning the Conditions of Circulation of Agricultural Lands" [5], which enters into force on July 1, 2021. According to this law, it is planned to open the land market, which will be carried out sequentially in four stages (Table 2).

Table 2. Stages of implementing the open land market model

Term	Name	Purpose
31.03.2020-01.07.2021	Preparatory	Settlement of all regulatory documents in accordance with the new law. Development of a programme to support local farmers and a mechanism for providing loans at lower interest rates
01.07.2021-01.01.2024	Limited market	Individuals have the right to purchase a land plot of 100 ha per citizen
From 1.01.2024	Launch of the market	The right to purchase land is granted to legal entities, but only to those who are citizens of Ukraine. The total amount of land owner-ship can be 10,000 ha

Source: compiled by the author based on [10]

For a modern understanding of the situation with the land market, now, before the law comes into force, it is allowed to carry out the following operations: rent shares, exchange land plots, transfer shares by inheritance. It is forbidden to sell land, change its intended purpose, add rights to the land share to the authorized capital of the company, transfer land as collateral [11]. Next, the study takes a closer look at the main provisions of the law and compares its first and second readings to determine the possibilities and limitations of this law. Land is a valuable material resource, which, first of all, should be freely disposed of by a citizen of Ukraine. Registration of land as a commodity would involve a rapid influx of foreign investment, which in turn caused discontent among the Ukrainian people [11]. Figure 1 shows a comparative description of the main provisions of the draft law between the first and second readings.

Figure 1. Mechanism for regulating the launch of an open land market
Source: compiled by the author based on [12]

According to Figure 1, the lift of the moratorium on the purchase and sale of land was supposed to take place on October 1, 2020, but the draft law did not resolve all issues, thus, according to the second reading, it was decided to launch the market on July 1, 2021. According to the law of Ukraine [5], only individuals who are citizens of Ukraine have the right to buy and sell agricultural allotments with a limit of 100 hectares from 01.07.2021-01.01.2024. Starting from 01.01.2024, Ukrainian agricultural holdings and partially foreigners can enter the land market with a limit of 10 thousand ha. According to the first reading, foreign citizens were allowed to buy agricultural land (subject to land lease for more than three years from 1.10.2020), in the absence of such a period, land could be purchased from 1.01.2024. In the second reading, the issue of selling land to foreign citizens is decided in a referendum, but even in case of a positive result, there are still restrictions (Fig. 1). Banks receive the implementation of the owner's rights to land only for two reasons: the first provides for the pledge of a land plot as collateral, and the second – the withdrawal of land through an outstanding loan. In any case, banks are required to sell these lands within two years from the date of acquisition of ownership rights at land auctions. It is prohibited to sell state and municipal land until 1.01.2024.

Thus, in Ukraine, the establishment of an open land market begins, but with certain restrictions. For a comprehensive understanding of the specifics of the land market operation, the study will analyze world practices. There are four types of land markets: closed market, closed market for foreigners, open with restrictions, open market [4]. The closed land market includes the following countries: Venezuela, Congo, Cuba, North Korea, Tajikistan, Belarus, China, and Ukraine. The land market, which is closed to foreigners, operates in Azerbaijan, Albania, Armenia, the Republic of Kazakhstan, Kyrgyzstan, Iran, Macedonia, Moldova, Serbia, and Russia. Open market with restrictions – in Argentina, Bulgaria, Brazil, Greece, Georgia, Denmark, Canada, Latvia, Lithuania, Mexico, Poland, Romania, Slovakia, Turkey, Hungary, Finland, France, Switzerland, Sweden, Japan. The restriction mainly consists in different concentrations of land in the same hands. For example, in Romania, it is allowed to buy up to 200 hectares for individuals and legal entities. In Hungary, this figure is 300 hectares, while in Denmark it is only 30 hectares and only for people with special education

and farming experience. The open land market with no restrictions operates in the following countries: Australia, Austria, Belgium, Great Britain, Estonia, Ireland, Spain, Italy, the Netherlands, Germany, Portugal, the USA, the Czech Republic [4].

Lifting the moratorium on land sales in Ukraine would lead to an increase in the price per 1 ha of land (approximately USD 1.5-2 ths) and an increase in rents, at least this was the case in countries where land became a commodity [13]. Next, the study makes a comparative description of the price of a land plot in Europe and Ukraine. Figure 2 shows European prices for 1 hectare of land. Not everyone can purchase an agricultural land plot, as there are requirements for compulsory education of a farmer, the place of residence and guarantees of compliance with environmental standards. In European countries, the open land market differs from the Ukrainian one (which is closed until the moratorium is lifted) in its high productivity, introduction of new technologies, and thrifty attitude to allotments.

Next, the study considers the price of land on the territory of Ukraine under the moratorium (Fig. 3). The low cost of land is conditioned by the imperfection of the legislative and economic sphere.

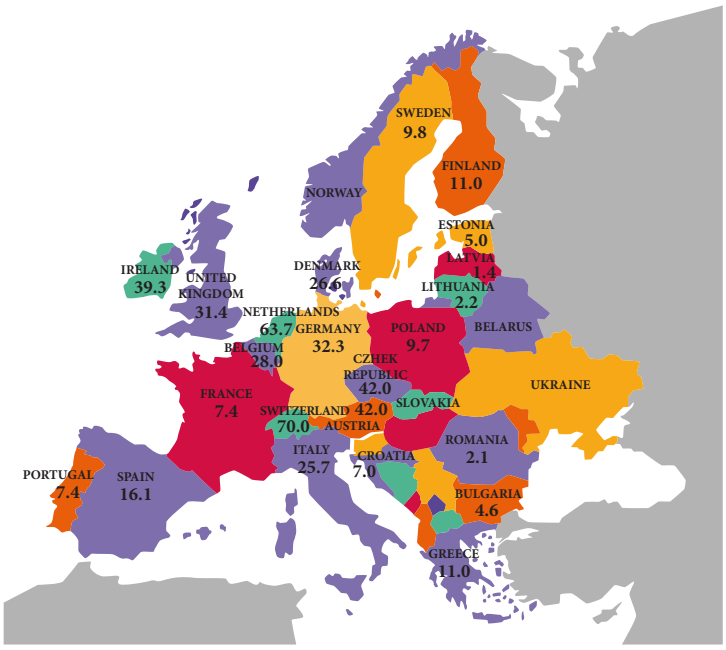

Figure 2. Average price for an agricultural land plot in European countries (thousand USD/1 ha)
Source: compiled by the author based on [14]

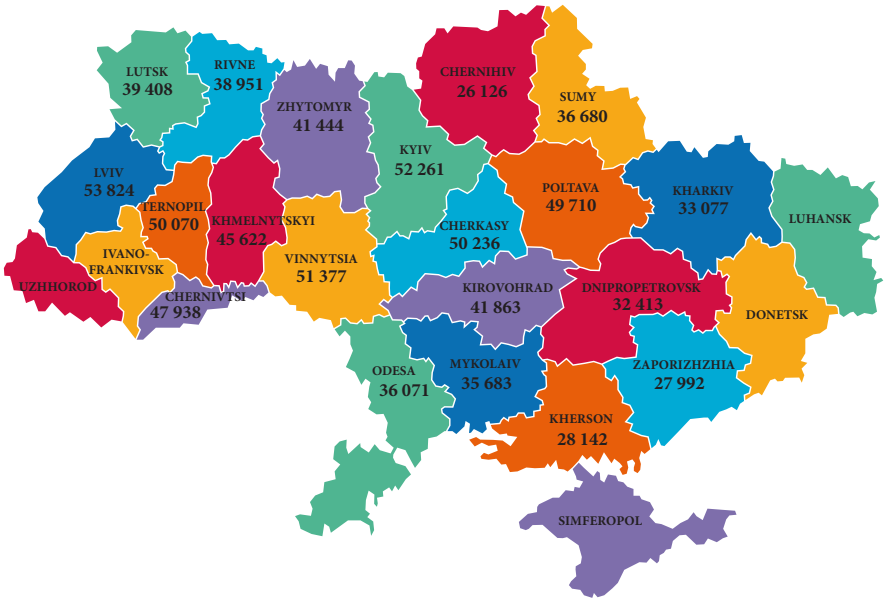

Figure 3. Average price for agricultural land on the territory of Ukraine (thousand UAH/1 ha)
Source: compiled by the author based on [3]

Next is the analysis of the open market regulation mechanism in Austria, the Czech Republic, and the Netherlands. Austria is a highly developed industrial country with an open land market with restrictions. Foreigners are allowed to buy land, but with the permission of the authorities. The minimum rental period is three years. The buyer pays a stamp duty of 3.5% of the transaction price. The buyer also pays for registration in the land register – 1.1% of the transaction price. The tax on income from the sale of land is 20% of the transaction price [14]. The land market in the Czech Republic is open. Foreigners can freely buy land, because the state does not regulate the price. Tax on the sale of agricultural land – 3% of the transaction price. No land tax is charged. In the Netherlands, there is an open market without restrictions. Foreigners can buy land in any size. Prices are set by the market. The size of the land owned is not regulated. The purchase tax is paid by the buyer in the amount of 6% of the transaction price. But the buyer can be exempt from tax if guarantees are provided that the land would be used for agricultural purposes for at least 10 years. An additional notary fee is paid. The minimum lease term for a land plot – 6 years, and for a farm – 12 years. The lessee has the primary right to buy out the land plot if it is put up for sale [14]. In Ukraine, with the lifting of the moratorium, there will be an open market with restrictions, where only individuals of Ukraine are the first to have the right to purchase land, from 2024 legal entities of Ukraine. However, a controversial issue arises, as most Ukrainian agricultural holdings sell their shares on international exchanges, so the participation of foreigners in this process is not regulated. The tax on the land plot after the lifting of the moratorium is not determined.

Figure 4 shows the reasons for the effectiveness of land reform and the opening of the land market in European countries.

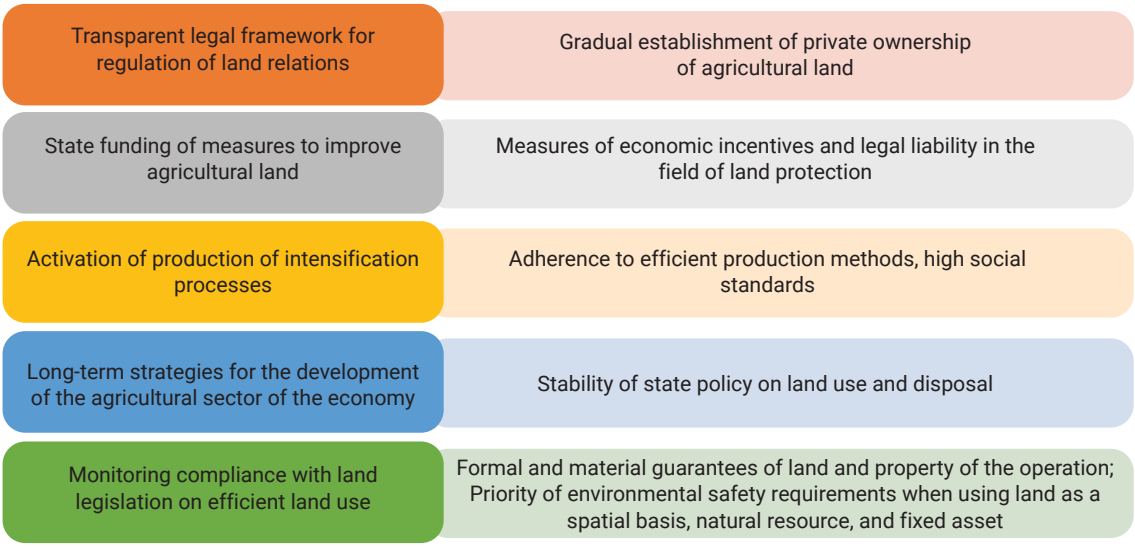

Figure 4. Main factors of the effectiveness of open land market model in foreign countries
Source: compiled by the author based on [15]

The lifting of the moratorium and the opening of a new land market caused a lot of discussion among experts. First of all, the introduction of this process would lead to the development of agricultural production, reduce the level of "shadow" practices due to an increase in land prices [16]. The lack of incentives for foreign capital investment in the agro-industrial complex reduces the level of the economy as a whole. The developed legislation only postpones the right to purchase a land plot by foreigners for three years, but does not include a decision on the amount of direct investment, economic efficiency, and tax rate. Therefore, the authors E. Dankevych, V. Dankevych, O. Chaikin [17] suggest that at the first stage of development of the land market should not sell land to foreigners. An interesting fact is that banks can own land, but in case of recovery due to an outstanding loan for up to two years from the date of acquisition of ownership, after which this land must be disposed at land auctions. Notably, most banking institutions in Ukraine are foreign-owned. A foreign bank is an institution where the share of the capital of one investor is not less than 10% [18]. Therefore, foreigners can purchase agricultural land plots in Ukraine in the authorized (pooled) capital of banks. However, the draft law does not establish mechanisms for controlling the sale of land collected by the bank.

The primary right to buy agricultural land by individuals would lead to the emergence of a large number of intermediaries, including fictitious ones, who would buy land plots for Ukrainian agricultural holdings and foreigners. But it also makes no sense to extend the moratorium, because, firstly, it violates the rights of citizens, and secondly, it creates conditions for the development of corrupt land privatization schemes. Proponents of lifting the moratorium are O.V. Anisenko, A.I. Kozak [6], O.P. Radchenko and O.I. Konoplia [8], who suggest that the extension of the moratorium could lead to serious socio-economic decline. In contrast to this position, there are opponents of the opening of the land market, in particular

I.M. Gonak [19] argues that in the war between Russia and Ukraine, the imperfect mechanism of legal regulation of land relations, low incomes, it is not advisable to open a new land market. S. Zakirova [3] adheres to a neutral position, putting forward "pros" and "cons" for opening of the land market. Next, the study considers the possibilities and threats of lifting the moratorium (Table 3).

Table 3. Prospects and threats of launching an open land market in Ukraine

Prospects	Threats
Launch of a competitive land market, similar to the European one	An increase in social tension due to the illegal distribution of the right to purchase a land plot by various subjects of this process
Establishment of a high market price for a agricultural land plot	Unreasonably high price
Land can become a powerful economic asset	Division of one land plot into parts, self-seizure, reduction of the efficiency of agro-industrial business
Implementation of rights guaranteed by the Constitution of Ukraine regarding land ownership rights	Purchase of land plots by major market players would lead to the decline of small businesses in Ukraine
Improvement of the efficiency of municipal and state-owned land use	Different conditions for the purchase and sale of public and private land
Gaining experience in conducting electronic land auctions	Determination of the winner by officials based on the submitted documents, not price offers. The winner should be determined by the system based on the analysis of the best offers

Source: compiled by the authors

The authors of this study suggests that it is necessary to open the land market. Land can be a powerful asset of the national economy of Ukraine, provided that transparent and understandable activities are introduced that bring profit to those who own and use it.

Conclusions

The land market in Ukraine differs in its type from European countries. Until June 1, 2021, a moratorium on the purchase and sale of agricultural land plots is automatically in effect. The Verkhovna Rada has adopted a corresponding law that lifts the land moratorium and creates a mechanism for launching and regulating an open, liberal land market, as happened in European countries following the land reforms. The process of forming a transparent system of land purchase and sale will create competition in the market, which would positively affect the development of the national economy and the structure of agribusiness in general. In accordance with this, such phenomena as illegal sale of land, corruption of officials would disappear.

The law defines all market participants who have the right to own land, the amount of land concentration per individual, the minimum price, and the form of calculation. However, there is no clear mechanism for controlling the entry of foreign players and their investments into the land market. The advantages of opening the land market are the gradual establishment of a market price, replenishment of the state budget, increasing the efficiency of using land plots and capital in the agro-industrial complex. At the initial stage of launching the land market in Ukraine, it is necessary to focus on the experience of land reforms, the open type of markets (with or without restrictions) of Central European countries, which have implemented reforms through land redistribution, rational use and the development of effective legislation on land regulation and control.

There are both supporters and opponents of opening the land market, since the process of transformation from a closed to an open type of market has its own opportunities and threats mentioned above. However, the author of this study suggests that the introduction of an open land market model is necessary, since this will determine the correct distribution of land use resources and form the concept of "value land", due to the high quality of chernozems and an increase in the level of environmental friendliness.

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Відкритий ринок землі в Україні: прагматика явища через призму європейського досвіду

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Анотація. Актуальність теми дослідження зумовлена тим, що порушення прав власності на землю, дія мораторію на купівлю-продаж земельної ділянки обмежують розвиток національної економіки загалом і ринку землі зокрема, сприяючи функціонуванню тіньового агробізнесу. Однак із 01.07.2021 року знімаються усі обмеження на продаж сільськогосподарських земель, згідно з цим виникають нові можливості та загрози. Метою статті є аналіз нового законодавства, що регулює питання запуску відкритого ринку землі в Україні. Для отримання наукових результатів були використані такі методи: діалектичний, порівняння, метод аналогій та зіставлень, монографічний, бенчмаркінг, метод експертних оцінок, SWOT-аналіз, метод прогнозування, аналіз та синтез. Відповідно до цього, було розглянуто сучасний стан землі в Україні та країнах Європи. Проаналізовано наявний ринок землі в Україні та світі. Проведена історична ретроспектива подій, пов'язаних із скасуванням мораторію на землю. Здійснена характеристика Закону, що забезпечує запуск відкритого ринку землі. Порівняно Закон між першим та другим читанням, визначені суттєві доповнення. З'ясовано механізм регулювання запуску українського відкритого ринку землі. Розглянуто міжнародний досвід функціонування ринку землі відкритого типу та відображено конкурентні ціни за 1 га землі у порівнянні з Україною. Згідно з цим визначено позитивний вплив земельної реформи у країнах Європи. Наведено основні чинники ефективності відкритої моделі ринку землі у зарубіжних країнах. Проаналізовано головні можливості та загрози запуску відкритого ринку землі в Україні. Результати дослідження відображають як позитивні, так і негативні наслідки запуску відкритого ринку в Україні, наводячи експертні думки прибічників і противників такого трансформування ринку

Ключові слова: мораторій, ліберальний ринок землі, інвестиції, національна економіка, земельні наділи сільськогосподарського призначення

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Analysis of Organisational and Economic Support of Urban Parks in Ukraine

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Abstract. The requirements of modern society for urban parks represent them as multifunctional territories. Global trends suggest that parks have a social essence and are focused on creating a healthy and aesthetic environment. But in Ukraine, parks are considered only as landscape and architectural complexes. Therefore, they are financed under urban planning programmes and at the expense of budget funds. Attracting funds from organisations in the field of landscaping requires greater integration of parks into the socio-economic system. At the same time, it is necessary to develop mechanisms for economic incentives for organisations to participate in the improvement of park areas. The purpose of this study is an economic analysis of modern financing of the green economy in Ukraine and the development of proposals for additional sources of financial support for parks. In this paper, using the analytical method, the accounting of the financial state of the green economy in the regions of Ukraine is carried out. Typical problems of modern financing, the main shortcomings of budget financing, and problems of commercial organisations in the field of urban greening are highlighted. Using the economic and mathematical modeling (index method), the analysis of changes in indicators of providing green spaces and, accordingly, indicators of their financial condition is carried out. The practical significance of the study lies in the development of recommendations on additional ways to finance park management based on the introduction of the practice of public-private partnerships, trust agreements, and easement. Requirements have been formed for legal entities that have the right to conclude such transactions. An economic mechanism for stimulating the establishment of public-private partnerships and concluding agreements in the field of landscaping is proposed

Keywords: park management, urban greening, natural capital, infrastructure support, landscaping, public space

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Introduction

The key characteristic of the park among the variety of urban landscaping objects is its infrastructure support in accordance with public demand. The park, as a part of a public space, must be maintained. Providing parks with landscaping requires sufficient funding. Balanced landscaping requires the maintenance and improvement of green spaces and timely updating of infrastructure. In addition, as evidenced by foreign experience, the improvement of the park should meet the needs of society, which change over time, and therefore, there should be room for innovation. Thus, today the development of park management in Ukraine should be based on the best foreign practices.

The study of the development of parks and their promising opportunities is studied at an interdisciplinary level, in particular, as a socio-cultural phenomenon. The park is considered primarily as a leisure environment [1], and the scientific approach in the park management includes working with various categories of the population [2-3]. In world practice, parks are considered as natural capital, the concept of which is close to the natural resource potential. The following researchers studied the capitalisation of natural resource potential (capital): I.M. Bobukh [4], B.V. Burkinsky and V.F. Goryachuk [5], G.M. Shevchenko and M.M. Petrushenko [6].

Given that parks are an element of the public space of cities, their design and organisational and economic support should take into account the social component [7]. One of the most important organisations in the field of park research is the International Theme Park Service. The results of its research are systematically published in their specialised publications – "Amusement Business" and "Parks and recreation" [8]. Recent publications of which already analysed the impact of the COVID-19 pandemic on promising areas in the field of park construction [9], tips for safe use of parks during the pandemic [10].

Given the recent publications, it can be argued that the priority areas that are considered by scientists and service workers are: justice in the accessibility and use of park space [11, 12]; the park as an indicator of social and economic well-being [13, 14]; the use of abandoned and spent natural or urban areas to create parks, stimulating public-private partnership in the field of public space [15]; organisational and economic support of parks in accordance with the individual characteristics of territories and the needs of communities. The latter direction, for Ukraine, can be developed in accordance with the needs of territorial communities [16]. The National Parks and Recreation Association (USA) also develops scientific approaches to creating parks and conducts statistical research [17]. In other words, urban parks in the world experience have significant advantages over Ukrainian parks, primarily as socio-economic objects. Their integration into the life of the urban population, functionality as an element of public space, provides many opportunities for finding alternative ways of development, expanding sources of financing, and implementing the best park space projects.

Taking into account international practice, *the purpose of the study* is to develop proposals for additional ways to provide financial support for urban parks with the involvement of funds from legal entities. It is also necessary to provide economic mechanisms for stimulating extra-budgetary revenues. In accordance with this, *the aim of the study* is to investigate the current state of organisational and economic support for green economy in the regions of Ukraine, to analyse the leisure opportunities of parks in the world.

Materials and Methods

At the beginning of the study, the relationship between the natural and infrastructural components of the park space was illustrated using a graphical method. The graphic method allows briefly reflecting the interdependence of components and changes in quality characteristics depending on their ratio. The next method is economic analysis. Its special feature is the use of reporting materials in numerical form, the study of economic activity in a particular area, the interdependent impact and changes in indicators, and consistency in the study of an object. The main statistical base of the study were the reports of the Ministry of community and territory development of Ukraine on the state of the green economy during 2014-2019 [18-23], containing information mainly of an economic nature. The conclusions were drawn about the financial and infrastructure security of parks based on data on public green spaces. Therefore, the change in the indicator of maintenance of public plantings during 2014-2019 and their financial support were analysed.

At the first stage, using the method of economic analysis, the level of provision of general-purpose green spaces with landscaping is considered, which provides for the support of both the natural and infrastructure components. The dialectical approach of this method allows the study to assess the change in the indicator of landscaping provision in dynamics (during 2014-2019). At the second stage, also using the method of economic analysis, the relationship between the level of improvement of green spaces and the implementation of financial programmes is shown, comparing its decline with the uncollected expenses in 2017. At the third stage, the analysis of the financial support of public green spaces continued. Next, the study considers the accounting of expenses in the field of green economy by regions of Ukraine and determine which points of expenditure have the highest percentage value of expenses. As part of this stage, the index method is also used, which can be used to consider the overall dynamics of indicators of general-purpose green spaces and their financing. As a result, using the method of economic and mathematical modelling (index method), the general trend in the green economy of Ukraine (2015-2019) is analysed for the following indicators: damage by phytodiseases, changes in the area of public plantings, culture and recreation parks, water parks, expenses for the maintenance of plantings, accounts payable and receivables.

Results and Discussion

Organisational and economic support of parks should take place from the standpoint of their role in the city system, namely: as a component of the public space of cities, and the value of their natural capital. The concept of "natural capital" is closely related to the concept of "natural resource potential". According to I.M. Bobukh, parks belong to the natural resource potential of renewable recreational resources. The natural capital implies "a set of natural resources that are owned by the economic units of a given country and are used for the purpose of creating added value and/or generating profit or other economic benefits" [4].

From the standpoint of added value, the park, as natural capital, should have a sufficient level of care and infrastructure support. Unlike forests, forest belts, sanitary protection zones and plantings grown by self-seeding, parks have an integral element – infrastructure support. The park is an important part of the public space of the city and according to SCR B. 2.2-12:2019 (clause 8.2.1), belongs to public areas: "the green spaces of public use of settlements include multifunctional and specialised parks, gardens, squares, boulevards, urban forest parks, green areas of embankments and beaches, botanical gardens and zoological parks, parks-monuments of landscape art and other natural and artificially created landscape objects" [24]. And according to Article 13 of the Law of Ukraine "On improvement of settlements" [25], the park, as a part of public space, is subject to mandatory improvement and maintenance of infrastructure. Thus, the sphere of improvement of urban green spaces is a separate branch of the national economy, and the park is one of the elements of public space and commercial interests. The lack of maintenance of infrastructure is bound to have negative consequences – environmental, social, and economic. Therefore, the presence of parks with developed infrastructure in the city increases the cost of adjacent housing by up to 40%. The lack of landscaping and the presence of marginal elements in parks creates the opposite effect. Therefore, capitalisation at the expense of parks depends on the infrastructure component [26].

The key factor in the best manifestation of the qualities of ecosystem services of parks is a balanced combination of infrastructure support and maintenance of green spaces. The combination of the infrastructure component and the mass of green spaces that make up the park can be illustrated in the form of a balance curve (Fig. 1), which clearly shows the importance of the balance of green spaces and infrastructure support and changes in the species diversity of parks depending on their ratio. The park is a natural capital, but it must have infrastructure support and care.

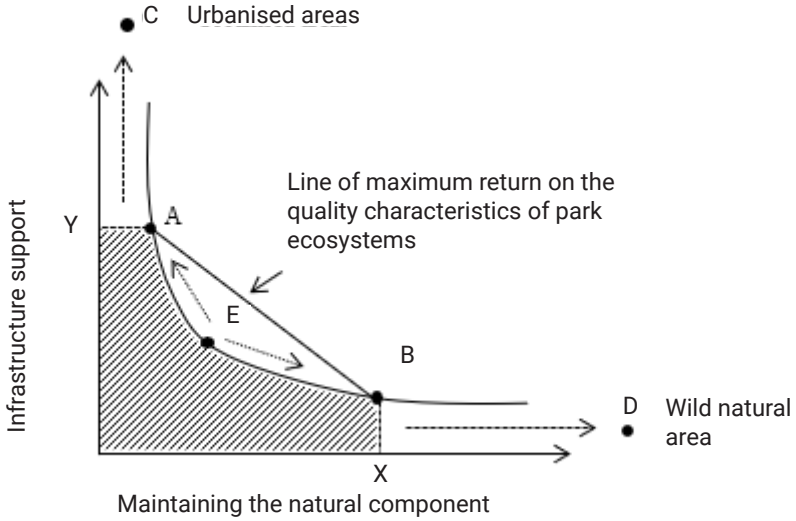

Figure 1. Schematic representation of the balance of natural and infrastructure component of parks
Source: developed by the author

As can be seen from Figure 1, getting the greatest return on the park environment is possible with a balanced combination of green spaces and infrastructure. Excessive growth of plantings and lack of infrastructure (point D) reduces the possibility of using the park area by citizens. Excessively developed infrastructure (many food establishments, attractions, children's and sports grounds and entertainment complexes) on the territory of the park can disrupt the comfortable stay and recreational impact of the natural component. Such a park becomes more similar to the usual public places (point C). The need for the ratio of the natural component and infrastructure support of a particular park follows from its type. Multifunctional parks that include culture and recreation parks are marked by point E. They are designed to meet the needs of the widest segments of the population and necessarily perform a recreational function. The segment on Curve A–B, marked with an arrow from E to A, can be timed to coincide with specialised parks for which infrastructure plays a crucial role in their specialisation (sports, children's, health-improving, exhibition, ethnographic, water parks). The segment marked with an arrow from E to B indicates specialised

parks of nature protection significance and tend to favour the natural component (forest parks, recreational forests, botanical gardens, national parks).

In the reporting on the state of the green economy sector, the Ministry of community and territory development of Ukraine [27], there are no data on the provision of park care. But there is information about public green spaces [18-23]. Therefore, one of the prerequisites for the quality of ecosystem services of parks is to provide public green spaces with tendance (Table 1).

Table 1. Change in the indicator of provision of care for public green spaces by oblasts, 2014-2019 (%)

Oblasts	2014	2015	2016	2017	2018	2019
1	2	3	4	5	6	7
Vinnytska Oblast	59	59	59	60	70	70.2
Volynska Oblast	*100*	*100*	*100*	*100*	*100*	*100*
Dnipropetrovska Oblast	71	*100*	*100*	79	*81*	*80.7*
Donetska Oblast	50	49	49	48	48	48
Zhytomyrska Oblast	62	62	62	62	62	62.2
Zakarpatska Oblast	86	81	*96*	90	*90*	*90*
Zaporizka Oblast	***36***	***40***	***41.5***	***42***	***37***	***40.6***
Ivano-Frankivska Oblast	56	56	74	74	71	77.1
Kyivska Oblast	64	64	64	64	–	63.6
Kirovohradska Oblast	***40***	***40***	***40.9***	***41***	***41***	***41.3***
Luhanska Oblast	–	79	–	77	74	77.7
Lvivska Oblast	*100*	*100*	*100*	*100*	*100*	*100*
Mykolaivska Oblast	*100*	*100*	*100*	*100*	*100*	*100*
Odeska Oblast	*100*	*100*	*100*	71	75	***50.1***
Poltavska Oblast	*100*	*100*	*100*	*100*	*100*	*100*
Rivnenska Oblast	*86*	*86*	*89.8*	*90*	*91*	*90*
Sumska Oblast	50	50	84	51	51	***50.6***
Ternopilska Oblast	*96*	*96*	*100*	*100*	*100*	*100*
Kharkivska Oblast	81	81	81	*81*	*81*	*100*
Khersonska Oblast	72	72	86	90	*100*	77.7
Khmelnytska Oblast	*100*	*100*	*100*	85	*100*	*100*
Cherkaska Oblast	51	51	51	53	54	***54.7***
Chernivetska Oblast	*100*	*100*	*100*	*100*	*100*	*100*
Chernihivska Oblast	*100*	*100*	*100*	***11***	***11***	***11.3***
Kyiv city	*100*	*100*	*100*	*100*	*100*	*100*
Total in Ukraine	***69***	***77.3***	***78.8***	***65***	***65***	***65.5***

Note: numbers in bold italics indicate the lowest annual values for the maintenance of general-purpose green spaces, and underlined Italics indicate the highest

Source: compiled by the author based on [18-23]

Thus, the highest rates of providing care for general-purpose green spaces during 2014-2019 were observed in the following oblasts: Volynska, Lvivska, Mykolaivska, Poltavska, Ternopilska, Chernivetska, and Kyivska – 100% provision. Relatively high rates in were observed in the Rivnenska and Kharkivska Oblasts. Zaporizka and Kirovohradska Oblasts had the lowest annual indicators of maintenance of green spaces – within 40%. A steady trend towards a decrease in the maintenance of green spaces is observed in two oblasts – Odeska and Chernihivska. The Odeska Oblast during 2014-2016 had 100% provision of green spaces with care, since 2017 there has been a decrease to 50.1% (as of 2019). In Chernihivska Oblast, it was the same – 100% during 2014-2016, and since 2017 – a sharp drop to 11%.

Next, the study considers the problem of providing care for general-purpose green spaces in the Chernihivska Oblast in more detail. According to the report on the "programme for the development and preservation of green spaces in settlements of the Chernihivska Oblast for 2013-2017" [28] based on data from 2017, financing of measures to create and support green spaces was carried out at the expense of three main sources. Thus, according to the report, in 2017 it was planned to allocate 26,400.14 thousand UAH,

in particular at the expense of:

– state budget – 2,000.0 thousand UAH (not allocated);

– budgets of local government bodies – 14,901.1 thousand UAH;

– other sources of financing – 9,499.04 thousand UAH.

In the end, the amount of expenses incurred amounted to 14,964.3 thousand UAH, instead of the planned 26,400.14 thousand UAH. The deviation from the funding provided for the programme was 11,435.8 thousand UAH. In other words, the planned expenses from the state budget were not fulfilled at all. As can be seen from Table 1, starting in 2017, the level of provision of green spaces with care in the Chernihivska Oblast fell to 11%. It can be assumed that the main share of funding was from the local budget and partially from other sources. This practice is the most common. Therefore, when drawing up programmes for creating and supporting public green spaces, it is necessary to provide reliable sources of funding and look for interested partners.

Urban planning and green economy development programmes should include opportunities for cooperation with commercial organisations to create green spaces. The presence of a large number of subjects of green landscaping creates healthy competition, which means it contributes to the best park projects. But such cooperation should include the interests of organisations. The principle of residual financing of green spaces is inappropriate in this case. Therefore, the results of reviews from representatives of commercial urban landscaping organisations, in particular, TOPIAR (Kyiv, 2019) were analysed [26]. It can be stated that the main problems of landscaping companies in modern cities of Ukraine are:

– the lack of long-term programmes and plans for the development of green areas for 10-20 years;

– the lack of a legal framework for extending and protecting contracts of landscaping companies with the city government when it changes. That is, all contracts from the previous cadence of the mayor are being terminated. At the same time, the establishment of parks goes through certain stages that exceed the period of 5-6 years;

– inefficient management of the park economy: inefficient use of funds, violation of agrotechnical standards during works;

– the lack of possibility of subscription and long-term contracts within the limits of budget financing;

– the city authorities choose companies that provide the cheapest services;

– the absence of an independent expert committee that would assess the company's work on landscaping, as well as the officials responsible for the project;

– lack of dialogue between the authorities and society regarding the work performed and its quality.

Notably, the above comments of the representative of a commercial greening organisation coincide with the positions of the World Health Organisation (WHO) on the development of green areas. Thus, the WHO report notes the approach of long-term prospects in the planning of Parks and other landscaping facilities, including [29]:

– green urban space requires long-term development and maintenance;

– the advantages of green areas manifest themselves over time – with the growth of plantings and development of ecosystems;

– planning of green areas should be flexible, that is, provide for the possibility of changes in accordance with the demand of society.

In addition, WHO considers the creation of green zones in cities as investments in the community needs (green zones as an important element of public space), and in health (creating conditions for physical and mental well-being). Nowadays, the state of financial support does not allow to provide sufficient care for general-purpose green spaces (Table 2).

Table 2. Cost record of maintaining general-purpose green spaces in 2019 by oblasts

Administrative division	Expenses for the maintenance of public green spaces, ths. UAH					
	Total	In particular:				
		Material costs, (%)	Labour costs, (%)	Deductions for social events, (%)	Depreciation, (%)	Other operating expenses, (%)
1	2	3	4	5	6	7
Vinnytska Oblast	32431.378	35%	42%	8%	3%	11%
Volynska Oblast	5744.6	28%	47%	10%	1%	14%
Dnipropetrovska Oblast	129771.37	14%	27%	8%	3%	48%
Donetska Oblast	157782.524	16%	52%	11%	1%	19%
Zhytomyrska Oblast	21974.8	27%	51%	13%	3%	6%
Zakarpatska Oblast	28888.4	55%	26%	17%	1%	1%
Zaporizka Oblast	92410.55	22%	53%	11%	4%	9%
Ivano-Frankivska Oblast	26559	25%	53%	11%	2%	9%
Kyivska Oblast	14530.32	18%	46%	21%	8%	8%

Table 2, Continued

Administrative division	Expenses for the maintenance of public green spaces, ths. UAH					
	Total	In particular:				
		Material costs, (%)	Labour costs, (%)	Deductions for social events, (%)	Depreciation, (%)	Other operating expenses, (%)
Kirovohradska Oblast	34939.4	37%	45%	9%	2%	7%
Luhanska Oblast	8445.1	39%	38%	8%	2%	13%
Lvivska Oblast	52141.5	16%	42%	12%	4%	26%
Mykolaivska Oblast	32321.95	23%	51%	17%	1%	7%
Odeska Oblast	74965.8	9%	74%	15%	0%	2%
Poltavska Oblast	25564	20%	50%	11%	3%	15%
Rivnenska Oblast	30077.68	17%	58%	12%	7%	7%
Sumska Oblast	28843.2	49%	14%	12%	17%	8%
Ternopilska Oblast	7521.922	33%	52%	5%	3%	6%
Kharkivska Oblast	223701.63	26%	36%	8%	8%	22%
Khersonska Oblast	26100	41%	46%	7%	0%	5%
Khmelnytska Oblast	37101.74	19%	57%	13%	7%	4%
Cherkaska Oblast	23866.5	54%	32%	7%	0%	7%
Chernivetska Oblast	9948.4	30%	55%	14%	0%	0%
Chernihivska Oblast	22786.1	26%	39%	7%	3%	25%
Kyiv city	0	0	0	0	0	0
Total in Ukraine	1148417.864	24%	44%	10%	4%	18%

Source: compiled by the author based on [18-23]

As can be seen from Table 2, as of 2019, most of the costs of maintaining green spaces, except for the Dnipropetrovska, Zakarpatska, Luhanska, Sumska, and Cherkaska Oblasts, go to labour remuneration. In second place – material costs, that is, directly infrastructure support and measures to support green spaces. Only in Kyivska and Odeskaa Oblasts, spending on material support is in third place – after social events. Moreover, in the Odeska Oblast, the situation with the distribution of financial security is the worst. Labour costs account for 74% of the total funding for the maintenance of green spaces, followed by deductions for social events – 15%, and material support – only 9%.

For the development of any economic entity, the availability of loan capital is important. It includes depreciation charges, monetary savings of the population, and temporarily available state funds. As for depreciation costs, they are so low in the Odeska, Khersonska, Cherkaska, and Chernivetska Oblasts, that they do not have a percentage value (0%). This means that when the time comes for the renewal of fixed assets, the funds will be absent. A high percentage of depreciation costs in relation to other items of expenditure is observed in the Sumska Oblast (17%).

Next, the study looks at the general trend in Ukraine in the green economy during 2015-2019. To analyse changes and compare various indicators of green space provision, the method of economic and mathematical modelling was used, namely, the index method. The results are presented in Table 3.

Table 3. Analysis of changes in indicators of green space provision using the index method (2015-2019)

Years	Total area of plantings (ths. ha.)	I 1	Plantings affected by phytodiseases (ths. m²)	I 2	Public plantings (ths. ha.)	I 3	Culture and recreation parks (ths. ha.)	I 4	Water parks, forest parks, meadow parks (thsd. ha.)	I 5
2015	457	0,872	219	0,512	117	0.96	15	0,937	19	0.95
2016	443	0.97	215	0,982	117	1	14.3	0,953	19.1	1,005
2017	494	1,115	197.5	0,919	138.7	1,185	17	1,189	29.8	1,497
2018	479.3	0.97	3,833	0.02	134	0,966	18.1	1,065	29.9	1.003

Table 3, Continued

Years	Total area of plantings (ths. ha.)	I 1	Plantings affected by phytodiseases (ths. m²)	I 2	Public plantings (ths. ha.)	I 3	Culture and recreation parks (ths. ha.)	I 4	Water parks, forest parks, meadow parks (thsd. ha.)	I 5
2019	403.4	0,842	501.2	130,759	135.7	1.017	18.2	1,006	29.9	1
Average change in the index (average I)		0.95		1.04		1.12		1.03		1.07

Notes:
I 1 – annual indices of changes in total green space areas for 2015-2019;
I 2 – annual indices of changes in plantings affected by phytodiseases for 2015-2019;
I 3 – annual indices of changes in the area of public green spaces for 2015-2019;
I 4 – annual indices of changes in the area of culture and recreation parks for 2015-2019;
I 5 – annual indices of changes in the area of water parks, forest parks, and meadow parks for 2015-2019
Source: compiled by the author based on [18-23]

As can be seen from Table 3, over the past five years, there has been a slight tendency to increase the area of public green spaces, in particular, culture and recreation parks, water parks, forest parks, and meadow parks. At the same time, there is a slight decrease in the total area of green spaces. Of particular note is the increase in the index of phytodiseases, which increased significantly in 2019.

In the field of landscaping, the main areas of financing should be the maintenance of green spaces and infrastructure equipment of public landscaping areas. As can be seen from Table 2, in the oblasts of Ukraine, the structure of expenses in the field of landscaping is very different. Not always the main share of funding goes to the maintenance of green spaces. Nevertheless, changes in financial support primarily affect the quality of landscaping and infrastructure support. Therefore, the obtained indices of green space provision with the indices of changes in their financial provision will be compared (Table 4).

Table 4. Analysis of changes in indicators of financial support for public green spaces using the index method (2015-2019)

Years	Expenses for the maintenance of public green spaces (mln. UAH)	I 6	Accounts payable of landscaping companies (mln. UAH)	I 7	Accounts receivable of enterprises (mln. UAH)	I 8
2015	395	1,088	22.4	0.54	12.8	0.3
2016	536	1,357	33.2	1.48	14.2	1,109
2017	995	1,856	29.2	0.88	22.9	1.61
2018	934	0.94	63.7	2.18	29.7	1,297
2019	1148.4	1.23	74.3	1,166	36.9	1,242
Average change in the index (av-erage I)		1.26		1.12		0.97

Notes:
I 6 – annual indices of changes in the cost of maintaining public green spaces for 2015-2019;
I 7 – annual indices of changes in accounts payable of enterprises for the maintenance of green spaces for 2015-2019;
I 8 – annual indices of changes in accounts receivable of enterprises for the maintenance of green spaces for 2015-2019;
Source: compiled by the author based on [18-23]

Table 4 shows that for the period 2015-2019, the following trends were observed in the maintenance of public green spaces: an increase in the cost of maintaining green spaces, an increase in accounts payable and receivables. The lack of funding in this area hinders the disclosure of the environmental and economic potential of ecosystem services in parks. Therefore, it is relevant to introduce alternative ways of financial support for parks and its incentives. Notably, improvement of financial security is closely related to the overall investment policy of the state [30]. Modern parks in the world function and develop as multifunctional institutions. Their cost-effectiveness is determined by the number of visits. Therefore, the development of parks is aimed at creating comfortable conditions and meeting the needs of the majority of the population [31]. Given this fact, the study offers to raise funds from legal entities, for example, by entering into agreements of an environmental trust and a land or nature reserve easement with interested parties.

The use of a conservation trust is attractive for both park development and land owners. Funds under the environmental trust are directed to measures to protect the ecosystem, and owners are required to abandon construction and other unfavourable activities. Such an agreement allows the land owner to receive tax benefits. Financing

through protected easements – allows attracting investors to preserve valuable nature parks, and investors, for their part, get a preferential discount. It is estimated that conservation partnerships under the reserve easement during 2005-2015 increased land conservation by 175% [32].

At the same time, it is important to maintain state control of park territories. Therefore, the organisation of extra-budgetary financing of parks with the possibility of commercial activities can be organised within the framework of a public-private partnership. Today, such partnerships in the field of environmental protection are common in the United States and Canada, in the housing and communal services sector – in Italy. In Ukraine, a common form of public-private partnership is a concession, but cases of concluding such an agreement in the field of landscaping are unknown [33]. However, there are already studies on the introduction of public-private partnership in the field of land management and land use in Ukraine [34].

In this context, it is important to choose interested parties for making an agreement. The global trends show that at the end of the 20th century, parks turned into social and educational complexes. Therefore, it would be logical to support this direction for parks in Ukraine, because trends in the organisation of public space are determined by the demand of society. Therefore, when concluding land easements and trusts, concluding public-private partnerships, it is advisable to identify the range of possible applicants for these transactions. From the standpoint of meeting social and educational needs, these can be: cultural and educational institutions, upbringing, sports and creative clubs, medical institutions. The idea is to use a share of the park area for educational, cultural, and rehabilitation activities. In this case, social programmes are carried out not only within the premises of the relevant organisations, but can also be conducted in a natural environment in the fresh air. For example, the opportunity to play sports professionally in a specially equipped summer pavilion will be an attractive opportunity to spend time in the fresh air. This is a good opportunity both to attract visitors to the relevant institutions, and to encourage the creation of parks in different parts of the city by increasing their economic efficiency. The expansion of the city's park network through the creation of regional parks is particularly relevant in the context of forecasts of foreign scientists. In the future, mixed-type multifunctional parks will become popular, which will have [31]:

– walking area;
– thematic zoning;
– commercial recreational opportunities;
– implementation of creative leisure activities.

The best foreign practices show how different categories of parks can be adapted to different social and educational programmes (Table 5):

Table 5. Possibilities for organising leisure parks of various categories in the world

Category and its features	Social and educational programmes
State parks. National, ethnographic, landscape, state reserves, sea coasts, national recreation areas, nature conservation areas, reservoirs, forests, cultural monuments, memorials	They have areas for camps, museums, exhibition halls on their territory; They have programmes of hiking trips, excursions, expeditions. Separate educational programmes for children: "Junior-ranger" in the USA, "Ocean News", "Wildlife", "Ecology of Alaska", "Economy and Environment", "Friends of the Little Prince of Earth". Environmental education programmes for teenagers and young people
Parks in states, counties, and municipalities. Parks that serve the population of a particular state or county	They have cultural and tourist programmes financed from city budgets
Urban parks. The purpose of creating parks is to improve a person's leisure time, ecological culture, and develop aesthetic qualities. The combination of landscape design and nature protection is important	Educational programmes in children's parks, their zoning and equipment in accordance with the age categories of children. Cooperation with rehabilitation centres and nursing homes. The following programmes are known: "Recreation in the park for the elderly", "Golden Age", "New Horizons"

Source: compiled based on [31]

In short, the foreign park construction industry pays attention to the social essence of parks and the organisation of a healthy and aesthetic environment. But in Ukraine, parks are considered as architectural complexes in the urban space planning. When identifying legal entities that have an advantage in entering into an easement or trust agreement, the following requirements can be formed:

– territorial affiliation to the perimeter of the park area;
– availability of a prescribed activity plan that does not contradict the standards of activity on the territory of parks;
– financial statements confirming the organisation's ability to maintain a section of the park in proper condition;
– their activities do not contradict the conditions of a relaxing holiday in the park, do not lead to crowds, do not cause damage to green spaces and lawns, and do not lead to building-up of the territory.

Admittedly, the organisation should benefit from measures to care for and maintain the park's territory. Therefore, appropriate incentives can be offered to create public-private partnerships in parks, and conclude easement and trust agreements (Fig. 2):

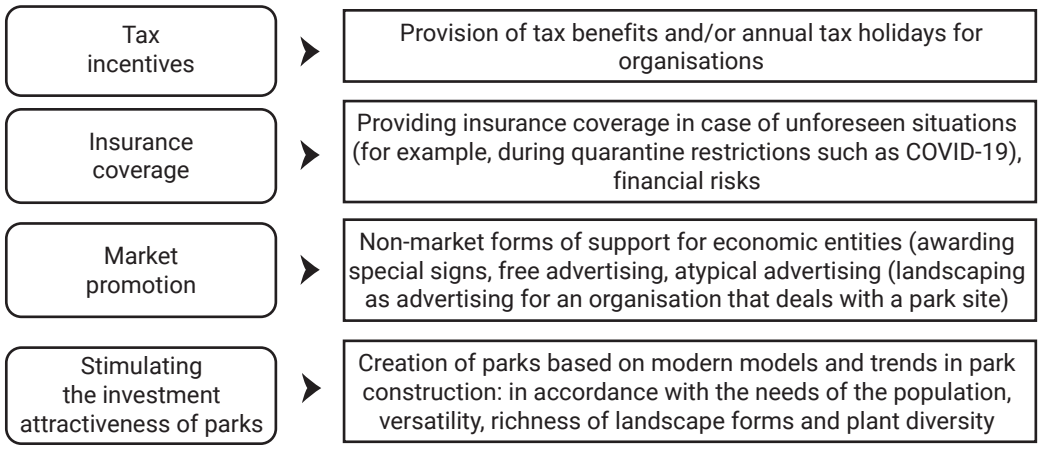

Figure 2. Economic mechanisms for stimulating the establishment of public-private partnerships and the conclusion of land easement and trust agreements in the field of landscaping

Source: compiled by the author

Taking into account the above, it can be stated that the organisation of a modern urban park requires the work of specialists in urban space planning, educational and recreational spheres. Unlike wild natural areas, the park has social and economic significance in the urban environment, while maintaining its environmental significance. Therefore, the creation of the State Parks Agency of Ukraine is proposed, which could organise and control extra-budgetary financing of parks of all categories, establish relations with relevant international organisations, and conduct socially oriented research in the field of park management. Within the framework of the agency's activities, it is possible to organise independent expert commissions to assess the quality of landscaping works under the city authorities. Similar structures already operate in many countries: the National Parks and Recreation Association (USA), The National Recreation and Tourism Foundation (USA), the Institute of Leisure and Entertainment Management (Great Britain), the Association of Municipal Parks and Gardens Managers (Netherlands), the Parks and Recreation Foundation (Japan), and others [31].

International organisations specialising in park development include: EUROPARC Federation (although specialising in parks of protected status) [35], the International Theme Park Service, and the International Association of Amusement Parks and Attractions. These organisations are open to cooperation and have best practices in the field of park leisure [36].

Conclusions

It can be stated that public plantings include: culture and recreation parks, city and district parks, gardens of residential areas attached to residential buildings, squares, embankments and boulevards, water parks, meadow parks, forest parks, and other landscaping objects. Therefore, the study considers a high level of provision of public green spaces with care as one of the prerequisites for the quality of ecosystem services. Analysis of the financial condition of the green economy in Ukraine and the state of its improvement has indicated that today in Ukraine there are no services that report on organisational and economic support specifically for parks. The current level of funding and organisational support often does not meet the needs of society. The problem lies in the following:

– impractical redistribution of funds, even with one hundred percent financing of the green space sector, a large share of funds goes to labour remuneration or social events. On the other hand, this situation shows insufficient funds even with one hundred percent financing. Which implies the following:

– non-compliance of organisational and economic support with the real needs of landscaping facilities;

– extremely low level of involvement of the private sector in the field of green space improvement, preferential financing from the state and local budgets.

Solutions to problems can be found in the following measures:

– organisation of independent expert supervisors for the quality of landscaping works under the city government;

– creation of the State Parks Agency of Ukraine, based on which expert commissions and groups will be created, and financial projects will be coordinated;

– attracting funds from sponsors and investors, stimulating public-private partnerships in the field of park improvement, trust agreements and easement;

– introduction of economic mechanisms to encourage organisations to improve parks, including: tax incentives, insurance protection, market assistance, and stimulating the investment attractiveness of parks;

– exclusion of the corruption component, keeping records of expenses and their publication based on the model of European countries and the United States.

Economic analysis of indicators of green space care provision has shown that there are “stable” areas – with constant high, medium or constant low provision, and there are areas that have moved from the status of high green space care provision to the status of low provision over the past five years.

Based on the identified problems, additional sources of extra-budgetary financing of parks and economic

mechanisms for their stimulation are proposed. World experience shows that a socially oriented approach is becoming more and more relevant in the field of park management every year. Therefore, it is important for Ukraine not to miss this trend. In addition to the rich foreign experience in the field of park construction, the development of the principles of inclusive nature management, which can be widely implemented in the parks of Ukrainian cities, is relevant. Prospects for further study are the detailed development of mechanisms for implementing public-private enterprises in the field of park management, the creation of the state parks agency in Ukraine, and the development of features of its functioning.

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Аналіз організаційно-економічного забезпечення міських парків в Україні

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Анотація. Вимоги сучасного суспільства до міських парків репрезентують їх як поліфункціональні території. Світові тенденції показують, що парки мають соціальну сутність та зорієнтовані на створення здорового та естетичного середовища. Натомість в Україні, парки розглядаються лише як ландшафтно-архітектурні комплекси. Тому їх фінансування відбувається за програмами містобудування і за рахунок бюджетних коштів. Залучення коштів організацій в сферу паркового благоустрою потребує більшої інтеграції парків в соціально-економічну систему. Водночас необхідна розробка механізмів економічного стимулювання організацій брати участь у благоустрої паркових територій. Метою статті є економічний аналіз сучасного фінансування сфери зеленого господарства в Україні та розробка пропозицій додаткових джерел фінансового забезпечення парків. У даній науковій статті за допомогою аналітичного методу проведено облік фінансового стану зеленого господарства за регіонами України. Виділено типові проблеми сучасного фінансування, основні недоліки бюджетного фінансування і проблеми комерційних організацій в сфері озеленення міст. З використанням методу економіко-математичного моделювання (індексний метод), проведено аналіз змін показників забезпечення зеленими насадженнями та відповідно показників їх фінансового стану. Практичне значення статті полягає у розробці рекомендацій щодо додаткових шляхів фінансування паркового господарства на основі впровадження практики публічних приватних партнерств, трастових угод та сервітуту. Сформовано вимоги до юридичних осіб, що мають право на укладання подібних угод. Запропоновано економічний механізм стимулювання утворення публічних приватних партнерств та укладання угод в сфері благоустрою парків

Ключові слова: паркове господарство, озеленення міст, природний капітал, інфраструктурне забезпечення, благоустрій територій, громадський простір

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Level of Ecological and Economic Diversification: A Methodology for Assessing the Sustainability of Agricultural Enterprises

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Abstract. As a global initiative within the framework of the United Nations Environment Programme framework, the Economics of Ecosystems and Biodiversity emphasises the importance of applying a systematic approach to the assessment of Natural Resources and the need to introduce new forms of economic growth to the sustainable development of enterprises. Existing management practices of agricultural enterprises, such as monoculture, create a constant monotonous load on the soil and lead to a decrease in humus content, contribute to erosion, but remain highly profitable. Changing the forms of economic growth in favour of introducing sustainable practices such as organic production, sustainable intensification, and eco-production requires appropriate sources of financing, a high level of environmental awareness, and comprehensive methods for assessing environmental and economic factors. The purpose of the study is to substantiate a methodological approach to a comprehensive assessment of the ecological and economic diversification of an enterprise based on the principles of sustainable development, which allows taking into account the level of diversity of cultivated crops in relation to the structure of marketable products. To achieve this goal, statistical information on the activities of agricultural enterprises in the Kharkivska Oblast was used, as well as monographic, graphical and statistical methods of research. Data analysis and processing were performed using specialised software: Microsoft Excel and Statistica 10. The study presents the developed and tested coefficient of ecological and economic diversification, which allows assessing the level of agrobiodiversity of sown areas and marketable products of agricultural enterprises based on the management results for 2019. The coefficient is based on information theory in the context of applying the Shannon-Weaver index. As a result of the search for the relationship between the coefficient of ecological and economic diversification and profit per 1 hectare, the statement about the gradual loss of profitability during the growth of the number of types of crops is confirmed. However, there are enterprises that maintain profitability during the expansion of the acreage structure. The practical significance of the findings obtained is allows assessing the possibility of adapting the structure of acreage to market conditions, taking into account environmental and economic factors

Keywords: sustainable development, biodiversity, monoculture, agricultural enterprise, coefficient of ecological and economic diversification, economic efficiency

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Introduction

As the world's population grows, so does the need for more sustainable food and agricultural systems designed to meet human needs while minimising environmental damage and reducing further loss of biodiversity. The Economics of Ecosystems and Biodiversity (TEEB) as a global initiative within the United Nations Environment Programme focuses on how to support the transition to sustainable agricultural systems, which, in addition to economic, should provide social and environmental impact [1].

The available natural resources and favourable climatic conditions that have ensured the growth of arable land in Ukraine (43.4 million hectares or 2.3% of the world's area) [2] are an incentive to increase the export potential of profitable agricultural products. Further intensification and expansion of agricultural land, subject to the application of traditional management practices, can have a detrimental impact on the environment and biodiversity, if the consequences of such an impact are not prevented at the level of effective solutions. One of the directions of implementing aspects of the Sustainable Development Policy in agriculture is to increase the level of diversification of acreage that forms biodiversity-friendly landscapes. In this aspect, the issue of finding a compromise between preserving the environment and using the economic potential of the industry is relevant, the solution of which lies in the plane of innovative circular business models, promising management practices in agriculture, biomimicry, etc. However, barriers to sustainable development are the traditional views of most producers on farming practices and the lack of financial resources to invest in sustainability.

The introduction of ideas for sustainable agricultural development is possible during the gradual transition from traditional practices to more sustainable ones, such as organic production, sustainable intensification, etc. This requires diversification of production, which allows obtaining products with different consumer characteristics, which determines its different purpose. In the process of finding an answer to the question of assessing the level of diversification, which can take into account environmental and economic factors in a complex, the author of this study developed a coefficient that allows combining the structures of acreage and marketable products. A comprehensive assessment of the state of an agricultural enterprise takes into account the diversity and complexity of combining factors based on the coefficient of ecological and economic diversification. Unlike existing approaches, such an assessment takes into account the principles of sustainable development, provides for a combination of environmental and economic components, and allows taking into account the dependence of the enterprise on the agrobiodiversity of the cultivated area and market fluctuations in demand affecting the structure of market products.

In the agricultural sector, the idea of more sustainable agriculture has gained popularity since the publication of the report by G.H. Brundtland [3] and due to the emergence of the triple bottom line (TBL) [4]. However, the characteristics of sustainable development in agriculture reflect a wide variety of aspects [3]. Many studies have attempted to link sustainable agricultural development to various agricultural practices (or systems), such as organic production [5]; conservation agriculture [6]; biological production [7]; ecological production, eco-production [8]; sustainable intensification [9], etc.

The expansion of monoculture and the excessive use of herbicides has led to a sharp decline in plant diversity in agricultural landscapes, with negative consequences for the versatility of ecosystems and sustainable production [10; 11]. In order to reduce the negative impact and increase the heterogeneity of landscapes, some authors propose a number of measures that include crop diversification, plant conservation and agricultural environment schemes [12; 13]. Effective assessment of plant diversity in agricultural landscapes and determination of the level of crop diversification are fundamental to the successful implementation of measures.

In addition, to develop a systematic vision of the problems of sustainable development in agriculture, the studies of the authors were examined [14; 15], the results of which indirectly influenced the establishment of ideas about certain aspects of sustainability inherent in the industry. In particular, the study [14] indicates the dialectical nature of sustainable development, which can be implemented in an innovation-oriented cluster model of regional development, the revival of traditional production and consumption of local food, the advantages of the latter are technological uniqueness, high quality and savings on logistics costs. In [15], sustainable development is considered as a balanced dynamic equilibrium that has specific features of reproduction in agriculture. The author suggests an innovative scenario of development in the short term, in which innovative solutions that ensure the growth of production volumes against the background of efficient use of natural resources are an additional source of sustainability.

The purpose of the study is a substantiation of a methodological approach to a comprehensive assessment of the ecological and economic diversification of an enterprise based on the principles of sustainable development, which allows taking into account the level of diversity of cultivated crops in relation to the structure of marketable products. For the furtherance of this goal, a task was set and solved on the development of a comprehensive assessment of the level of enterprise diversification, taking into account environmental and economic components, as an attempt to expand the understanding of assessing aspects of sustainable agricultural development.

Materials and Methods

To achieve the above goal, the study used statistical information on the activities of 529 agricultural producers of the Kharkivska Oblast in 2019, which make up the general population for the region and can act as a sample

population for Ukraine. The information was processed based on the statistical reports of existing business entities of the Kharkivska Oblast [16]. The anonymity of data was ensured by presenting information in a grouped and systematised form.

The stages of the study provide for determining the structure of acreage and marketable products for each agricultural enterprise in the sample, calculating the proposed coefficient that reflects the combined effect of environmental and economic factors, and further correlating its values with the indicator of economic efficiency of management. The establishment of the coefficient assessment scale allowed identifying the reasons for assigning certain enterprises to the selected intervals when taking into account the level of profit per 1 ha of land area. The theoretical and methodological basis of the study is a set of methods, approaches to scientific knowledge, scientific developments on the economic development of agricultural enterprises based on the principles of sustainability.

To implement the purpose and objectives of the study, the following methods were used: *monographic approach* – when studying the reports of international organisations on sustainable agricultural development; *statistical and economic approach* – to collect and process statistical data on the existing structure of acreage and the structure of marketable products of agricultural enterprises in the region, as well as to determine the relationships and interdependencies of the coefficient and performance indicators; *graphical approach* – used for visual display of the obtained results; *comparative approach* – used to compare the causal relationships of economic phenomena identified in the course of the study when analysing trends in the development of crop production.

As a result of using the coefficient of ecological and economic diversification, the sample was optimised and reduced to 495 business entities due to the exclusion of enterprises from the general population that were engaged either only in cultivation and did not sell products, or only in their sale. To analyse the influence of the coefficient of environmental and economic diversification on performance indicators, *methods of computer processing and analysis of information* using an Excel spreadsheet processor were used, followed by data processing in the Statistica software package. The initial information during the study was statistical data of the State Statistics Service of Ukraine, international organisations, annual financial statements of agricultural enterprises, papers by Ukrainian and foreign scientists and practitioners, the findings of their own studies on the use of sustainable development practices by agricultural enterprises.

Results and Discussion

Assessment of the level of acreage diversification, adjusted for the indicator of the structure of marketable products, allows determining for each business entity how much the farm applies certain aspects of sustainability in its activities. Environmental indicators of sustainable development measure biodiversity using a number of indicators, which include: population of a country, region or local area; species richness (number of rare species); habitat area; greenhouse gas emissions (CO^2 eq.); quantitative (m^3) and qualitative (mg of pollutant per ml) parameters of water resources and their availability; type or change of land cover (% of conversion) [17].

Considering agriculture as a type of economic activity, the author proposes a coefficient for evaluating the artificially created species structure of sown areas, which forms an enterprise based on ecological and economic factors. This refers to the coefficient of ecological and economic diversification (CEED) (1).

$$\text{CEED} = -\sum_{i=1}^{n} p_{is} LN p_{is} \cdot \sqrt{\sum_{i=1}^{n} p_{iqp} \cdot LN p_{iqp}} \quad (1)$$

where p_{is} – specific weight of crops in the structure of areas, coef.; p_{iqp} – specific weight of the corresponding marketable products in their total volume, coef.; LN – natural logarithm with the basis of an irrational constant.

This indicator is based on the Shannon-Weaver index, which uses information theory to assess the species constancy and community diversity. It is calculated as the sum of the products of the fractions of individual populations in the total sample and their natural logarithms [18]. The amount of meaningful information can reduce uncertainty. The index is often used in environmental research because it is not significantly affected by the sample size, and its application allows covering significant amounts of information using a single mathematical expression. In addition, the author suggests taking into account the structure of acreage and marketable products of the enterprise in the coefficient of ecological and economic diversification, which allows assessing the possibility of adapting the structure of areas to market conditions with optimal use of natural resources.

Having calculated the coefficient of ecological and economic diversification for each enterprise in the aggregate, its rating scale was determined with gradation to low (from 0 to 1), medium (from 1 to 1.5) and high (more than 1.5). The economic content of the indicator is that with its growth, the possibility of ensuring sustainable production at the enterprise level increases, which, in turn, may be associated with a decrease in profitability compared to traditional agriculture and the monoculture characteristic of it in recent years (Fig. 1).

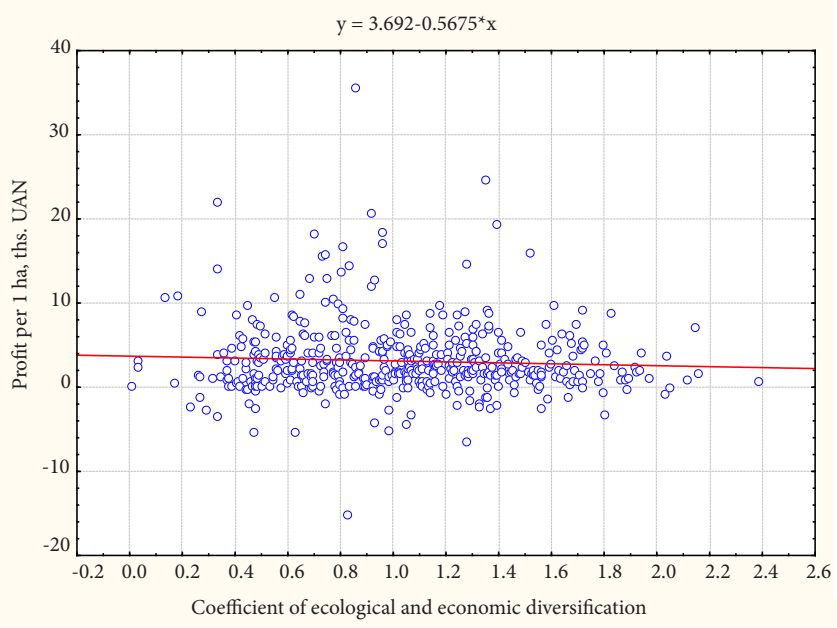

Figure 1. The graph of the function of dependence of profit per 1 ha on the coefficient of ecological and economic diversification of agricultural enterprises in the Kharkivska Oblast

Source: compiled by the author based on the data of financial reports of business entities of the industry [16]

This relationship was revealed as a result of regression analysis and an equation of dependence of profit per 1 ha on the coefficient of ecological and economic diversification of agricultural enterprises was obtained, which characterises the downward dynamics of profit per 1 ha with an increase in this coefficient.

Agricultural enterprises of the Kharkivska Oblast in 2019 specialised in growing various crops, but the vast majority used the practice of monoculture, in particular, 3% of them grew exclusively wheat, 1.5% – only sunflower, and more than 35% of enterprises in the structure of sown areas had only two crops – sunflower and wheat [16]. Monoculture creates a constant monotonous load on the soil and leads to a decrease in the humus content, contributes to erosion, and so on. Among the factors identified as the main threats to the further provision of soil ecosystem services, the loss of soil biodiversity, as indicated in [19], is the fourth most important after soil erosion, reduction of organic carbohydrates and nutrient imbalance.

The study of data obtained from statistical reports of enterprises allowed grouping the results obtained at intervals of the developed coefficient of ecological and economic diversification and establish the relationship between it and quantitative indicators of the area of management, yield, profit per 1 ha of harvested area, cost of products sold and the cost of mineral fertilisers used for the 2019 harvest (Table 1).

Table 1. Dependence of the coefficient of ecological and economic diversification on individual performance indicators of agricultural enterprises of the Kharkivska Oblast for 2019

Groups of enterprises by CEED	Number of enterprises	Area, ha	Production cost per 1 ha, ths. UAH/ha	Cost of goods sold per 1 ha, ths. UAH/ha	Commercial products, ths. UAH	Commercial products per 1 ha, ths. UAH/ha	Profit, ths. UAH	Profit per 1 ha, ths. UAH/ha	Cost of mineral fertilisers per 1 ha, ths. UAH/ha	CEED
Low	234	1,763	23.41	22.71	32,719.44	26,348	5,351.18	3.64	3.45	0.66
Average	184	2,138	14.57	13.50	35,458.04	16,389	6,603.29	2.89	3.02	1.23
High	77	2448	14.41	13.69	44,075.02	16,190	7,977.35	2.50	2.59	1.73
Total	495	2116	17.46	16.63	37,417.5	19,643	6,643.94	3.01	3.02	1.21

Source: compiled by the author based on the data of financial reports of business entities of the industry [16]

Based on the analysis of the relationship between the growth of the level of diversification of agricultural production at the enterprise and the performance indicators of its activities, a number of statements were formed. The latter relate to the available theoretical developments in this context.

If the entire sample of 495 enterprises is divided on the coefficient scale, it will be uneven in terms of the number of enterprises that fall into each of the groups. The largest part of them, namely 234 enterprises, will be in the range from 0 to 1, which corresponds to a low level of

ecological and economic diversification and has an average value of this indicator at the level of 0.66. This group is characterised by the smallest average area at the level of 1763 thousand hectares and a high production cost per 1 ha, which is UAH 23,408 ths. At the same time, the average value of total profit for the year in this group is the lowest, while the profit per 1 ha of area is the highest and amounts to 3.64 ths. UAH/ha. Of particular note is that the cost of mineral fertilisers per 1 ha is also high and amounts to 3.45 ths. UAH/ha.

The second group, identified by the interval of the coefficient of ecological and economic diversification from 1 to 1.5, which corresponds to its average level, includes 184 enterprises with an average coefficient value of 1.23 and an average area of 2138 hectares. The determining factor is the fact that the production cost per 1 ha is almost twice as low as the indicator of the first group and amounts to 14.57 ths. UAH/ha. The average income per enterprise in this group is UAH 6,603 ths., but per hectare it is UAH 2.89 ths.

The third group, which contains 77 enterprises and is distinguished by the coefficient of ecological and economic diversification from 1.5 and above, is characterised by an average value of the studied coefficient at the level of 1.73 and an average area of 2448 hectares. At the same time, the production cost and the cost of products sold almost do not differ between the medium and high-level groups. The average profit per enterprise is also growing relatively in this group and amounts to UAH 7,977 ths., while per unit area it is the lowest and amounts to UAH 2.5 ths. It is worth noting a gradual decrease in the cost of mineral fertilisers per 1 ha with an increase in the coefficient of ecological and economic diversification.

Of particular interest for further study are examples of management in which the value of the coefficient of ecological and economic diversification is in the range above 1.5, which is typical for growing a much larger number of crops by an enterprise and is accompanied by a fairly high yield. The formed diagram of the range of dependence of profit per 1 ha at different levels of the coefficient of ecological and economic diversification in agricultural enterprises confirms the data of Figure 1 and details the average levels and maximum range of profit per 1 ha (Fig. 2).

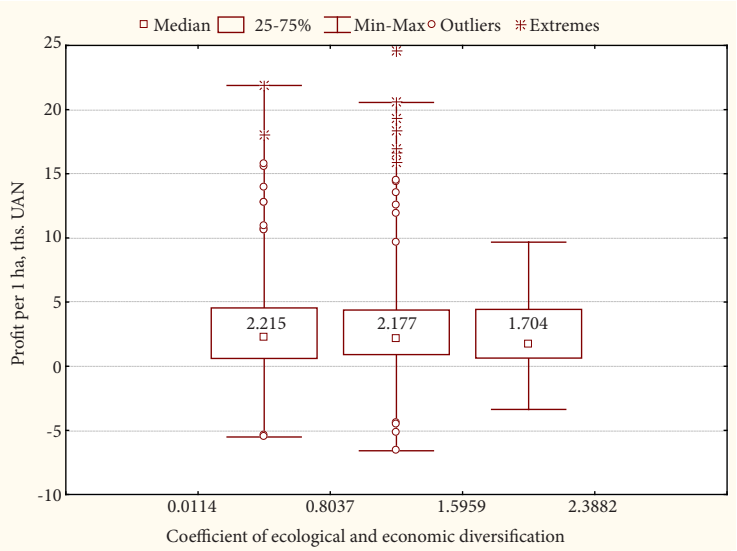

Figure 2. Diagrams of the profit span per 1 ha at different levels of the coefficient of ecological and economic diversification of agricultural enterprises of the Kharkivska Oblast

Source: compiled by the author based on the data of financial reports of business entities of the industry [16]

The scale diagram demonstrates the distribution of enterprises by the level of profit per 1 ha into three groups according to the coefficient of ecological and economic diversification, the median and the range where 50% of all values fall (from 25 to 75%, respectively). In accordance with this, there is a trend that can be traced by the average values and values of boxes, which indicates a decrease in the level of profit per 1 ha with an increase in the above coefficient.

The results obtained confirm the conclusions of researchers who have studied the issues of sustainable development. The consequences of implementing the principles of sustainability in agricultural production are a change in profitability in different time periods and an increase in the efficiency of using natural resources. An increase in the profitability of enterprises after the introduction of sustainable practices is noted in [20], other researchers claim a decrease in profitability in the short term, since new management principles increase production costs in the short term [21], which correlates with the findings of the study. Further profit growth, provided that agrobiodiversity is observed, can be detected over longer periods of time [21]. But the more obvious consequences are increased soil fertility, reduced soil, air and water pollution, and conservation and savings in the use of natural resources [22].

The search for a link between the economic and environmental components of sustainable development in agriculture requires the selection of mathematical tools for assessing critical levels based on biodiversity. Of particular relevance is the study [18], where the author, having established a significant number of available indicators for assessing diversity and inconsistency with the results of their measurement, claims that the most common indicator

of diversity is the Shannon-Weaver index. The index evaluates uncertainty as a result of the sampling process and is calculated using logarithms with a base of two – this is the minimum number of "yes/no" questions that are required on average to determine the identity of the selected species. Converting them to an effective number of species is key to a unified and intuitive interpretation of diversity.

In the present study, the coefficient of ecological and economic diversification is proposed for assessing agrobiodiversity, which is based on the mathematical expression of the Shannon-Weaver index and contains components of specific shares of acreage and marketable products to assess the impact of market and natural factors on its change and is radically different from others.

Conclusions

The increase in agricultural production is conditioned by an increase in demand for food on world markets. The intensification of agricultural producers' activities is often associated, firstly, with environmental problems, which are the due to the lack of knowledge about the relationship between biodiversity, ecosystem functions and ecosystem services, and, secondly, with the uncertainty of environmental trade-offs and thresholds in many areas. The search for directions for implementing sustainable development policies in agriculture has provided an understanding of the need to take into account the mutual influence of environmental and economic factors. Solving economic problems involves ensuring economic growth and adequate assessment tools. One of these solutions is to coordinate the level of diversification of acreage, as a result, the creation of biodiversity-friendly landscapes and structures of marketable products formed under the influence of market factors.

As a result of solving the tasks set, it is proposed to assess an agricultural enterprise's ecological and economic diversification based on the principles of sustainable development, which allows taking into account the level of diversity of crops grown in relation to the structure of marketable products. A comprehensive assessment of the state of an agricultural enterprise, taking into account the diversity and complexity of a combination of factors based on the coefficient of ecological and economic diversification, in contrast to existing approaches, is aimed at implementing the principles of sustainable development and provides for determining the combined impact of environmental and economic components on the efficiency of the enterprise. This allows taking into account the dependence of the company's activities on the agrobiodiversity of the cultivated area and market fluctuations in demand, which affect the structure of marketable products. At the same time, data from the annual financial statements of agricultural business entities were used for the calculation. The results of data processing showed that enterprises with a high value of the coefficient of ecological and economic diversification (from 1.5 and above) had lower profit indicators per 1 ha, but the average profit value per enterprise of this group was relatively higher. In addition, as the coefficient increased, the cost of mineral fertilisers decreased, which may be the result of the introduction of sustainable practices in the activities of agricultural enterprises.

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Рівень еколого-економічної диверсифікації: методика оцінювання аспекту сталості сільськогосподарських підприємств

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Анотація. Економіка екосистем та біорізноманіття як глобальна ініціатива у межах Програми ООН з охорони навколишнього середовища підкреслює важливість застосування системного підходу до оцінювання природних ресурсів та необхідність впровадження нових форм економічного зростання, що забезпечить сталий розвиток підприємств. Наявні практики господарювання сільськогосподарських підприємств, такі як монокультура, створюють постійне одноманітне навантаження на ґрунти та призводять до зменшення вмісту гумусу, сприяють ерозії, проте залишаються високоприбутковими. Зміна форм економічного зростання на користь впровадження сталих практик на зразок органічного виробництва, сталої інтенсифікації, ековиробництва потребує відповідних джерел фінансування, високого рівня екологічної свідомості та комплексних методик оцінювання еколого-економічних чинників. Метою дослідження є обґрунтування методичного підходу до комплексної оцінки еколого-економічної диверсифікації підприємства на основі принципів сталого розвитку, що дозволяє врахувати рівень різноманіття вирощуваних культур у взаємозв'язку зі структурою товарної продукції. Для досягнення мети були використані дані діяльності сільськогосподарських підприємств Харківської області, а також монографічний, графічний та статистичний методи дослідження. Аналіз та обробка даних здійснювалися за допомогою спеціалізованих програм Microsoft Excel та Statistica 10. У роботі представлено розроблений та апробований коефіцієнт еколого-економічної диверсифікації, що дозволяє оцінити рівень агробіорізноманіття посівних площ та товарної продукції сільськогосподарських підприємств за результатами господарювання за 2019 рік. В основу коефіцієнта покладена теорія інформації в контексті застосування індексу Шеннона-Уівера. Унаслідок пошуку залежності між коефіцієнтом еколого-економічної диверсифікації та прибутком у розрахунку на 1 га, твердження щодо поступової втрати прибутковості під час зростання кількості видів вирощуваних сільськогосподарських культур підтверджено. Проте існують підприємства, які під час розширення структури посівних площ утримують прибутковість. Практична значимість отриманих результатів полягає в оцінці можливості адаптації структури посівних площ до ринкових умов із урахуванням екологічних та економічних чинників

Ключові слова: сталий розвиток, біорізноманіття, монокультура, сільськогосподарське підприємство, коефіцієнт еколого-економічної диверсифікації, економічна ефективність

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Terminological Framework for the Study of Circular Bioeconomy

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Abstract. In the context of increasing global environmental challenges associated with anthropogenic destructive impact on the environment, the bioeconomic direction of sustainable development in combination with a closed production cycle becomes relevant, the development of which would help to overcome the imbalance of the ecological and economic system and minimise the burden on the environment. Therefore, the purpose of this study is to comprehensively consider the prerequisites for the establishment of a framework of categories for combining green concepts of sustainable development, in particular, to substantiate the theoretical and methodological foundations for interpreting the fundamental features of circular bioeconomy to form a specific vision of the issue. The methodological basis of the study is general scientific and special theoretical and empirical methods, in particular inductive and deductive, heuristic method, graphic, analysis and synthesis, etc. At the empirical level, descriptive, comparative, and observational approaches are used. The theoretical level covers the historical, abstract-logical, hypothetical, formalisation method as a manifestation of logical thinking and theoretical generalisation for formulating the results of the study. This study systematises the ideas of leading scientists on the positioning of circular economy and bioeconomy, highlights similarities and differences in the process of combining concepts, identifies fundamental generic and specific features, establishes complementary relationships to generate the author's position and formulate a fundamental vision of the problems of circular bioeconomy. The practical significance of the study is conditioned by scientific substantiation of the terminological platform of the problems of circular bioeconomy. Further research is aimed at developing criteria for regulating the bioeconomic system with subsequent evaluation of results

Keywords: concept, circular economy, bioeconomic model, convergent similarity, divergent difference, fundamental features

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Introduction

The increasing global environmental problems associated with pollution and sudden climate change necessitate the search for rational ways to minimise the anthropogenic destructive impact on the environment and overcome the imbalance in the ecological and economic system. In this context, the latest biotechnological achievements have become attractive for the economy and environmental protection, which gave an impetus to the development of bioeconomic science, whose teachings are focused on promoting the idea of producing food and non-food products based on renewable biological resources with an emphasis on their circular manifestation. Therefore, the key tasks of scientific research are the need to systematise the opinions of leading scientists on the positioning of circular economy and bioeconomy, identify similarities and differences in the combination of these concepts, identify fundamental generic and specific features and establish their complementary relationships to establish the author's position on the problem and formulate the definition of circular bioeconomy.

Over the past decade, there has been an active increase in scientific publications devoted to the establishment of a bioeconomic model both in the Ukrainian and international educational space. Gradual popularisation is explained by the accelerated scientific and technological development and the constant increase in environmental challenges in society. The growth of scientific papers since 2015 is more than 50% annually [1]. An active scientist whose research is related to bioeconomy is a doctor of environmental sciences S.V. Mohan [2], who has more than 25 publications in the field of innovative Biotechnologies on the international platforms Web of Science and Scopus, which allowed the Indian engineer, according to Stanford University's calculations, to take the 29th place in the ranking of the world's best scientists. Distinguished scientist of the Indian Institute J.L. Pandey [3], is the author of over 1200 publications in the field of bioeconomy, the author considers the implementation of theoretical concepts in practice. The papers by D. D'amato, associate professor of the Department of Forest Sciences of the Helsinki Institute [4], played a major role in the establishment of public consciousness about the need to produce and consume products on a biological basis. The papers by L. Kelleher, M. Henchion, E. O'Neill [5], R. Meyer [6] and other scientists deserve no less attention, since they cover an in-depth analysis of the updated concept and consider the trends of its development in different directions. Among the Ukrainian scientists, the papers by V.V. Baidala [7], O.G. Vdovichenko [8], M.V. Dobrivska [9] V. Krutyakova, T. Babynets, V. Targoni, O. Bondarenko [10], S.M. Fedina, B.L. Kovalyov, B.M. Ignatchenko [11] and others.

The activation of scientists and practitioners contributed to the implementation of innovative bioeconomic developments in the practice of economic activity. The importance of the applied value of the bioeconomy is determined by the rapid pace of its development, mainly in the developed countries of the world, in particular Finland, Italy, France, Germany, Denmark, Norway, the USA, the Netherlands, etc. Achieving bioeconomic principles of management allows the state to maintain a high level of food security through the production of safe industrial and food products, efficiently consume natural capital and minimise dependence on fossil raw materials, overcome energy dependence, increase employment and intellectual activity, improve the quality of life and well-being of the population as a whole. At the same time, the development of innovative, resource-efficient and low-carbon bioeconomy is possible if the principle of circularity is observed, since basic natural biological resources are constantly depleted, which determines the need for efficient and economical use in compliance with the maximum waste-free production based on the implementation of closed-cycle technologies and provided that the product's service life can be extended. This problem requires increased attention, because it plays a crucial role in this study, the *purpose* of which is to substantiate the theoretical, methodological and applied foundations for the establishment of the author's understanding of circular bioeconomy. It is based on the systematisation of the opinions of leading scientists on the composition of the concepts of circular economy and bioeconomy, highlighting their convergent similarity and divergent differences on the way to their combination, establishing fundamental features with the allocation of generic and specific characteristics for their own interpretation of the inclusive concept of "circular bioeconomy", which is viewed through the plane of economic activity with the dominance of the biological and circular aspect.

Materials and Methods

The scientific hypothesis of the study is the assumption that the combination of fundamental features of circular and bioeconomy would allow forming an integrating concept, which is based on economic activity with the development of the biological and circular aspect. Achieving its practical implementation necessitates the application of a clear research methodology. Therefore, the establishment of scientific truth is carried out with such scientific approaches as a systematic, aimed at a comprehensive study of socio-economic phenomena and processes associated with a closed system of management on bioeconomic principles; the dialectical approach provides knowledge of the subject of study on the laws of unity and struggle for the possibility of combining concepts, the transition of quantitative changes to qualitative, which is used if necessary to scale concepts, negation of objections – to explicate convergent similarity and divergent difference of circular and bioeconomy; the synergetic approach is considered from the standpoint of the effectiveness of integrating concepts.

In the course of the study, empirical and theoretical approaches were used, in particular historical, which describes the evolutionary perspective of scientific views understanding of circular and bioeconomy; abstract-logical, which allows one to establish complementary relationships

between concepts, identify fundamental basic features based on identified similarities and differences between circular economy and bioeconomy, formulate conclusions; the hypothetical method is used for argumentation of results; formalisation as a manifestation of logical thinking, is reflected in the construction of complementary relationships of fundamental features of circular bioeconomy; theoretical generalisation contributes to the interpretation of the definition based on the results of the study. At the empirical level, a descriptive method is used to explicate the graphical representation of the closed-loop bioeconomic model and detail the characteristic characteristics of circular bioeconomy; the comparative method allows one to determine the convergent similarity and divergent difference between the analysed concepts; observation involves studying the prerequisites for forming the author's position.

General scientific and special methods of scientific knowledge, which are characterised by theoretical and empirical character, are used in research to systematise bioeconomic and circular content in order to demonstrate theoretical generalisations (inductive and deductive methods of scientific knowledge); generating creative ideas allows one to implement a heuristic method aimed at solving scientific problems, in particular, visualisation of research using the Euler circle, the argumentation of the relationships of circular bioeconomy through the Euler-Venn diagram, interpretation of the circular manifestation of the bioeconomic model; the graphic method is aimed at visual reproduction of the obtained scientific results, namely, the schematic representation of concepts, graphic representation of circular bioeconomy by generic and specific features, and so on.

The advantage of this study is the author's approach to the search for a terminological platform for interpreting the definition of "circular bioeconomy", which consists in configuring the scientific views of leading scientists, systematising the similarities and differences of concepts to outline an integrated paradigm and identify basic fundamental features, which allowed forming the author's own vision of the problem of understanding circular bioeconomy. Further research is aimed at developing a methodological model based on the introduction of criteria characteristics for regulating the bioeconomic system.

Results and Discussion

The study of the conceptual foundations of the establishment of circular economy and bioeconomy [12] gives grounds to assert that scientists understand the essence of definitions in different ways, giving a certain degree of their own internal diversity. Many foreign researchers suggest interpreting the content of concepts as interrelated, since it is believed that they are united by a common economic, environmental, and social goal [4], for which the green economy is a comprehensive umbrella [13]. Modern European researchers L. Hetemäki, M. Hanewinkel, B. Muys, M. Ollikainen, M. Palahí, A. Trasobares [14] prove that the basic features of circular and bioeconomy have a synergistic effect, which is manifested in the establishment of an integrative concept of circular bioeconomy.

Michael Carus, director of the private German *Nova-Institute* [15], has a slightly different view, arguing that the circular and bioeconomy have similar goals that intersect closely, but are not a complete part of the other. From his standpoint, the concept of bioeconomy goes beyond the circular and covers many more aspects. Hence, M. Carus suggests that "waste from agriculture, forestry, fisheries and other organic process residues can only be integrated into the circular economy through a bioeconomic strategy".

Quite a thorough study of scientific opinions on the exposition of the concepts of circular and bioeconomy is presented in the papers by P. Stegmann, M. Londo, M. Junginger [16] (Fig. 1).

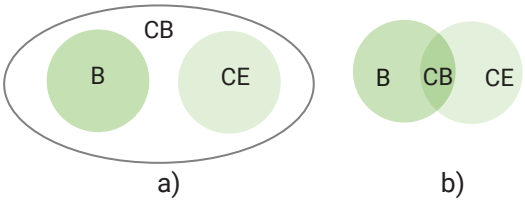

Figure 1. Explication of complementary concepts of circular economy and bioeconomy
Source: compiled by the authors based on studies [14-17]

According to Euler circle theory, a visual illustration reflects the relationship between interrelated concepts. Thus, figure a) visualises the position of D. D'Amato [4], L. Hetemäki [14] et al. on the interpretation of circular bioeconomy. Accordingly, the subordination of circular economy and bioeconomy is depicted, which are disjointed, but depend on the integrating concept. Figure b) shows the compatibility of concepts at a partial intersection, where feature characteristics form a circular bioeconomy. At the same time, opposite individuals remain behind separate ideas of circular and bioeconomy. Well-known proponents of the theory are the aforementioned German researcher M. Carus [15] and doctor of environmental sciences of the Indian university V. Mohan [17], whose papers are devoted to the study of the problems of bioeconomic science.

The controversy among scientists and the divergence of their opinions on the positioning of the concepts of circular and bioeconomy made it advisable to conduct the study. The establishment of the author's vision of the terminology requires identifying convergent similarities and divergent differences in the interpretation of circular economy and bioeconomy on the way to the development of an integrating concept. According to the academic explanatory dictionary, convergence is interpreted as "the

coincidence of features, properties in phenomena that are not related to each other and independent" [18, p. 256]. At the same time, the opposite in its meaning is divergence, denoted as "divergence of features and properties" [19, p. 270]. The relative similarities and differences between the concepts of circular and bioeconomy are shown in Figure 2.

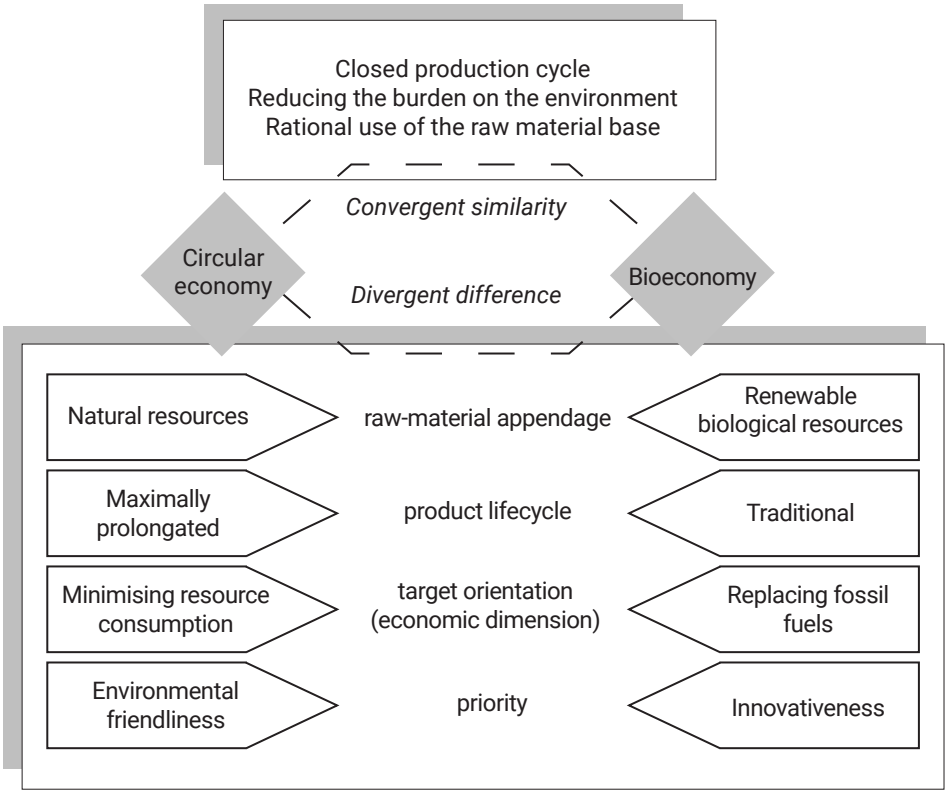

Figure 2. Convergence and divergence in the study of circular economy and bioeconomy
Source: compiled by the author

Taking into account the fact that circular economy and bioeconomy are concepts of sustainable development that promote green growth in the economic, environmental and social dimensions, their relative similarity is considered primarily in matters of efficient consumption of raw materials, in particular, the increase in the use of recycled materials. An important vector of development of modern society, which lies in the plane of the concepts of circular and bioeconomy, is a closed production cycle, which will minimise the amount of accumulated waste, reduce the consumption of fossil resources and reduce the burden on the environment.

The divergent difference is identified in four main areas, namely: raw-material appendage, product life cycle, target orientation (economic orientation) and priority. For example, renewable biological resources in the interpretation of bioeconomy are objects of labour [20], while circular economics considers the entire range of natural resources in closed cyclic production. From the standpoint of life cycle analysis, products and materials should maintain the longest possible service life, which can be achieved through repeated use of goods, their repair, overproduction with partial changes in functions or design. Bioeconomic production is determined by the introduction of innovative biotechnological developments in the production process, but the dominant characteristic of the circular economy is environmental sustainability and preservation of environment, which should be considered at the stage of designing industrial chains and consumption models. The goal of the bioeconomy is to replace fossil fuels and reduce greenhouse gas emissions, but the value of a circular economy is considered to be minimising the use of raw materials.

The key goal of the circular economy is the rational management of household and industrial waste of organic and inorganic origin for the sake of economical consumption of natural resources and reducing pressure on the environment. At the same time, the bioeconomy is developing in rural areas with an emphasis on the economic effect of introducing innovative biotechnological developments for the search for renewable energy sources. This suggests that the concept of a circular economy is global in relation to the bioeconomy, which covers the organic segment. Therefore, the author's position according to the above-mentioned theory is reduced to the recognition of circular bioeconomy as an integral part of circular economics. At the same time, it is worth noting that the starting point on the way to circular bioeconomy is the paradigm of bioeconomic science (Fig. 3).

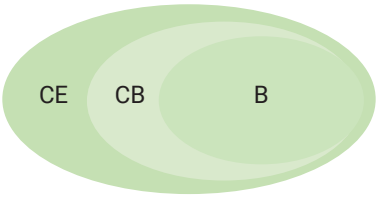

Figure 3. Methodological exposition of the concept of circular bioeconomy
Source: compiled by the author

The need to combine concepts is conditioned by the fact that the development of innovative, resource-efficient and low-carbon bioeconomy is possible if the principle of circularity is observed, since basic natural biological resources are constantly depleted. Efficient and economical use causes the need for a closed cycle with the most waste-free production and an extended service life of the product (Fig. 4).

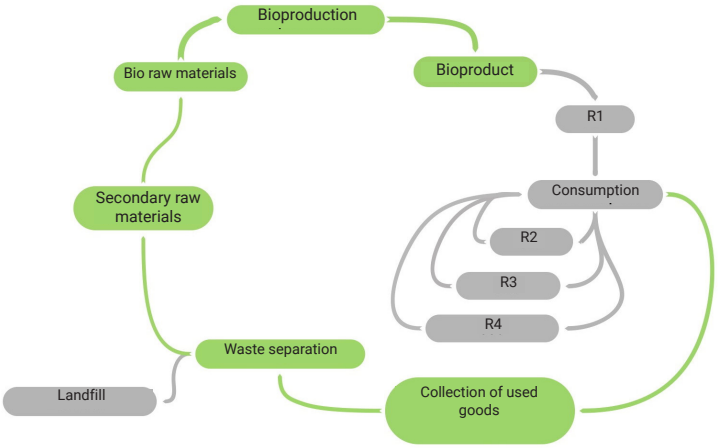

Figure 4. Circular manifestation of the bioeconomic model
Notes: R1 – reduced in needs; R2 – repeated consumption; R3 – recycling; R4 – recovery.
Source: compiled by the author using the Coggle web application

The closed production cycle allows producing products from bio-raw materials, which after consumption can be easily transformed into secondary ones for reuse in the next production process. An important aspect is to redefine the need to purchase goods in order to reduce unnecessary needs (R1). Life cycle prolongation occurs through reuse (R2), recovery after repair (R4), or recycling (R3), which characterises the circular manifestation. Consequently, the implementation of the closed-loop bioeconomic model allows completely disposing and recycling of all materials, minimise waste and effectively use available natural resources.

The conducted study gives grounds to assert that the establishment of the terminology of circular bioeconomy should be reduced to a combination of fundamental features of the concepts of circular economy and bioeconomy, which are the basis of the integrating concept (Fig. 5).

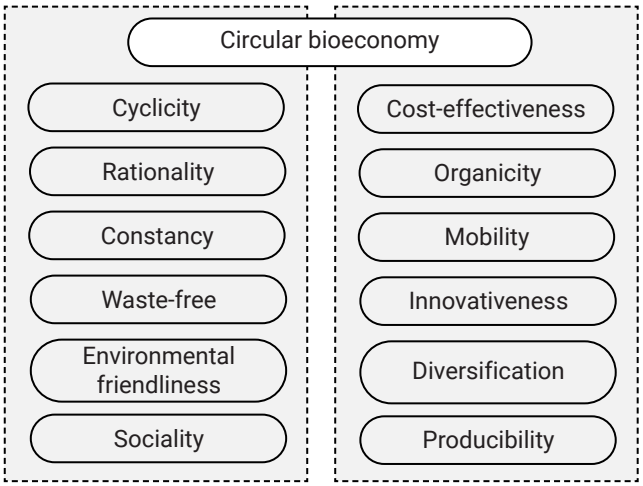

Figure 5. Fundamental features of circular bioeconomy
Source: compiled by the author

Translated from Latin, "principles" (principium) is denoted as "the beginning, basis, that is, the starting point of any scientific system, theory, ideology" [21]. At the same time, the "attribute" reflects "features, properties, features of someone or something" [22]. Taking into account the above, it is proposed to identify the fundamental characteristics of the functioning of the bioeconomic model, which is characterised by an economic character, which indicates effective management of residues of organic and inorganic origin [23, p. 22] with an approach to waste-free production. The principle of environmental friendliness is expressed through the preservation of resources and the multiplication of natural capital. Cyclical manifestation is caused by the prolongation of the value of goods during the life period [24] and the rethinking of the need to consume a significant amount of resources and reserves, which is seen through the plane of the principle of rationality.

The general list of fundamental features includes those that are highlighted in the scientific paper of R.Z. Lyubachivska, in particular, manufacturability, which is conditioned by the rapid pace of technological change in accordance with the production process and environmental requirements; sectoral diversification, which indicates the penetration of biotechnology in all areas of production; mobility as an opportunity to search for modern projects through the scientific and information space and the social principle of conscious attitude to the environment [25]. In addition to the above, it is worth highlighting innovativeness as a requirement for the introduction of biotechnological innovations in production turnover and organicity, which indicates the consumption of resources of the plant and animal world that have the ability to reproduce themselves. The principle of sustainability is designed to ensure production from renewable biological resources in a balanced economic and ecological growth with a responsible attitude to the environment.

Taking into account the above-mentioned fundamental features of circular bioeconomy, it is proposed to clearly illustrate the similarities and differences in the relationships between them using the Euler-Venn diagram. According to the conducted research, the basic principles define economy (Ec), environmental friendliness (Ef), sociality (S), and innovativeness (I), which are reflected in the form of four circles, the intersection of which shows their interdependence. All planes coincide at a key point in circular bioeconomy (Fig. 6).

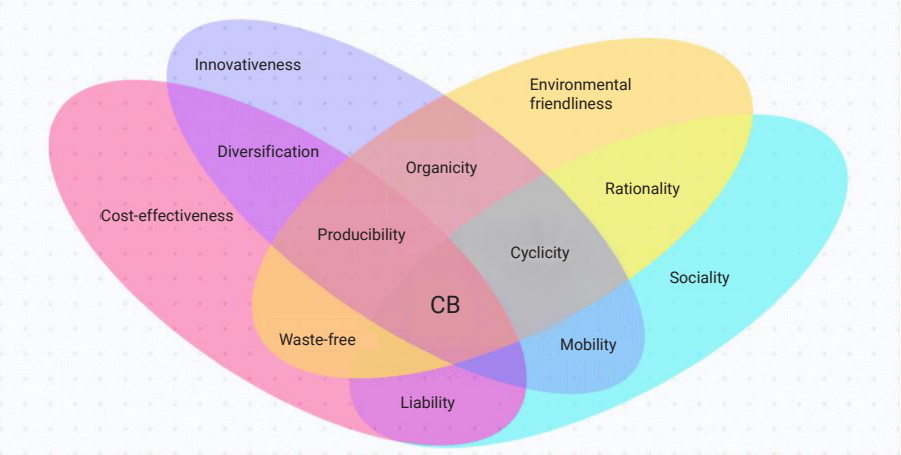

Figure 6. Complementary relationships between the fundamental features of circular bioeconomy (CB)
Source: compiled by the author

Next, the results of this study are substantiated using mathematical operations [26], where the intersection of planes is denoted as ∩. Therefore, the diagram can be decoded as follows:

$$I \cap Ec = \text{Diversification},$$

which indicates the development of the principle of diversification at the intersection of the planes of innovation and economy.

$$I \cap Ef = \text{Organicity},$$
$$Ef \cap S = \text{Rationality},$$
$$I \cap S = \text{Mobility},$$
$$Ef \cap Ec = \text{Waste-free},$$
$$Ec \cap S = \text{Responsibility}.$$

The union of planes designated as U reflects the following identity:

$$(I \cap Ef) \cup (I \cap Ec) \cup (Ef \cap Ec) = \text{Producibility},$$
$$(I \cap Ef) \cup (I \cap S) \cup (Ef \cap S) = \text{Cyclicity}.$$

Thus, the interrelation between the fundamental features indicates the need to take them into account in the process of scientific interpretation of circular bioeconomy, since the "concept" is interpreted as "a way of reflecting reality, in which the subject is revealed through a set of essential features" [27, p. 137]. In addition, it is worth paying attention to the identification of basic fundamental features, in particular, economy, innovativeness, environmental friendliness and sociality, which underlie the definition, which is formed as "an integral set of thoughts expressed with the help of certain general and essential features of the object" [28, p. 6].

According to the method of identifying generic and specific features, it is worth highlighting economy among the above-mentioned, which is a generic characteristic and the basis of the concept of circular bioeconomy (Fig. 7).

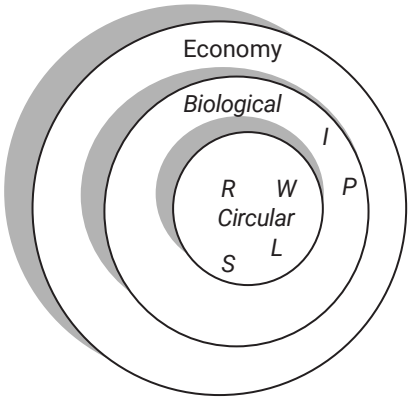

Figure 7. Visualisation of the definition of "circular bioeconomy" by generic and specific features
Note: O – organicity, M – mobility, D – diversification, I – innovativeness, P – producibility, R – rationality, W – waste-free, E – environmental friendliness, C – sociality, L – liability
Source: compiled by the author

Economics as a generic feature of circular bioeconomy subordinates biological as specific, and an order of magnitude lower – circular. Consequently, the author's position of the interpretation of circular bioeconomy at the initial stage reduces to an economic science that has specific features of biological and circular (Fig. 8).

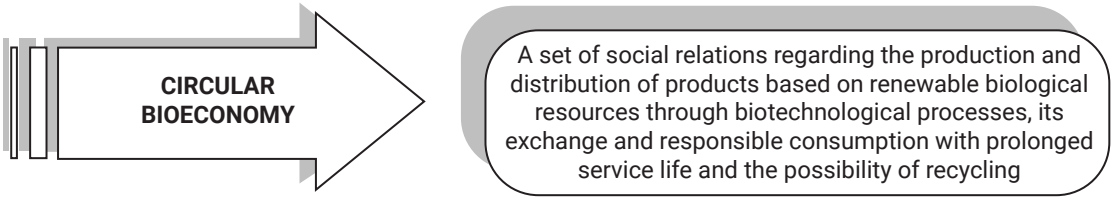

Figure 8. Scientific interpretation of the concept of "circular bioeconomy"
Source: compiled by the author

The author's interpretation consists in defining circular bioeconomy as a set of social relations regarding the production and distribution (economic feature) of products based on renewable biological resources using biotechnological processes (biological feature), its exchange and responsible consumption with prolonged service life and the possibility of recycling (circular feature).

Conclusions

Thus, the polemic of scientists on the problem of positioning the concepts of circular economy and bioeconomy on the way to the development of an integrating concept has become a prerequisite for the study of convergent similarity and divergent difference to argue the author's vision of the framework of categories. The substantiation of the need to combine concepts within which it is possible to achieve maximum processing of organic materials, minimise production waste and use available natural resources economically allowed identifying the basic features of circular bioeconomy and establishing complementary relationships between them. Among the available characteristics, it is worth highlighting the basic ones, in particular, economy, environmental friendliness, innovativeness, and sociality, which formed the basis of generic (economic) and general (biological and circular) characteristics. This fact allowed the author of this study to form the scientific interpretation of the concept of "circular bioeconomy:, the basis of which is economic activity with an emphasis on the biological and circular aspect, which, unlike the previous definitions, is interpreted as a set of social relations regarding the production and distribution of products based on renewable biological resources through biotechnological processes, its exchange and responsible consumption with an extended service life and the possibility of recycling.

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Термінологічна платформа дослідження циркулярної біоекономіки

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Анотація. В умовах посилення глобальних екологічних викликів, пов'язаних з антропогенним деструктивним впливом на навколишнє природне середовище, актуальності набуває біоекономічний напрям сталого розвитку в поєднанні із замкнутим циклом виробництва, розвиток якого дасть змогу подолати дисбаланс еколого-економічної системи та мінімізувати навантаження на довкілля. Тому метою наукового дослідження є комплексний розгляд передумов становлення категоріального апарату щодо поєднання зелених концепцій сталого розвитку, зокрема обґрунтування теоретико-методологічних засад інтерпретації принципових ознак циркулярної біоекономіки задля формування власного бачення проблематики. Методологічною основою дослідження є загальнонаукові та спеціальні методи теоретико-емпіричного характеру, зокрема індуктивний і дедуктивний, евристичний метод, графічний, аналізу і синтезу тощо. На емпіричному рівні наукового дослідження використовується описовий, порівняльний та метод спостереження. Теоретичний рівень наукового дослідження охоплює історичний, абстрактно-логічний, гіпотетичний, метод формалізації як прояв логічного мислення та теоретичне узагальнення для сформулювання підсумків проведеного дослідження. У статті систематизовано думки провідних науковців щодо позиціонування циркулярної та біоекономіки, виокремлено схожості та відмінності в процесі поєднання концепцій, ідентифіковано принципові родові та видові їх ознаки, встановлено комплементарні взаємозв'язки задля генерування авторської позиції та формулювання власного бачення проблематики циркулярної біоекономіки. Практична цінність проведеного дослідження полягає у науковому обґрунтуванні термінологічної платформи проблематики циркулярної біоекономіки. Подальші дослідження націлені на розробку критеріальних характеристик регулювання біоекономічної системи з подальшою апробацією результатів

Ключові слова: концепція, циркулярна економіка, біоекономічна модель, конвергентна схожість, дивергентна відмінність, принципові ознаки

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Substantiation of an Economically Feasible Option for Ordering Unmanned Aerial Vehicles for Joint Aviation Groups

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Abstract. This study offers a solution to one of the problems that arise in the routine practice of the Head managers of the Ukrainian Armed Forces and Ministry of Defence – budgetary units when making management decisions. Namely, the search for the most economical (cost saving) option for placing an order between several potential contractors to save budgetary funds, minimise possible risks of exceeding the customer's costs, and organisation of rational spending of financial resources. The purpose of the study is to determine the mechanisms for rapid replenishment of losses of defence products due to the early distribution of defence orders among manufacturers with savings in budgetary funds. To solve the stated problem, an approach was proposed using a statistical method of quantitative risk analysis based on two indicators: the probability of savings and the risk of not receiving the expected savings. An example of using the proposed approach is given for two alternative options for placing an order for unmanned aerial vehicles to create joint aviation groups between three potential contractors. The proposed mechanism for summarising calculations in the final table, acceptable for analysis and allows making the final decision in the management link. In contrast to the approaches used in developed economies, the proposed approach takes into account the capabilities of the manufacturer in terms of production volumes and short deadlines for the production of defence products. Notably, the approach in question can be applied if there are more than two alternative options for the distribution of orders and for more than three potential contractors

Keywords: expected value of savings, probability of savings, risk of not saving, fluctuations of possible savings, variation coefficient of savings

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Introduction

In recent times, in the context of a significant increase in funding of the Armed Forces of Ukraine [1-4], of particular relevance is the issue of reasonable distribution of budgetary funds between contractors and the leadership of the Armed Forces (AF) – budgetary units. The tasks of the department for the organisation of rational spending of financial resources by the relevant authorities have been repeatedly mentioned in state and departmental regulatory and execution documents [5-12]. There is a certain practice in the headquarters of multi-stage executive decision-making to justify the cost indicators when contracting orders. However, this practice is mainly based on many years of empirical experience of data preparers and final decision makers and therefore depends largely on the human factor. Therefore, the issue of improving the data origination for decision-making to rationally use the limited budgetary resources is relevant and has not only departmental but also state importance.

Issues of state importance of reasonable and rational spending of limited budgetary financial resources for the Armed Forces of Ukraine are stated not only in the above Ukrainian regulations and policy documents [13-15]. These issues are also considered in scientific and professional environment in recent years in the works of Ukrainian scientists. V.P. Horbulin [16], I.M. Ivanova [17], I.V. Pavlovsky, I.B. Chepkov, V.K. Borokhvostov, I.V. Borokhvostov, O.M. Ryabets [18], B.O. Demidova, O.P. Korosteleva [19]. The foreign experts [20-22] also considered the issue of pricing and cost savings at the stage ordering products, but the authors do not always take into account the volume and timeliness of production. Current views on the importance of the price factor in world and Ukrainian arms trade and changes in approaches to pricing of defence products are systematically considered at the political, expert and scientific levels. In particular, in the materials of the "Defence enterprises League of Ukraine", which unites more than 120 privately owned enterprises and is the vast majority of the defence-industrial complex of Ukraine [23-26]. In addition, as of the end of 2020, the League's enterprises fulfilled two thirds of the state defence order (SDO).

The military administration understands the importance of the problem of economical use of financial resources when placing orders to meet the needs of the Armed Forces. The solution to the problem mainly represents the constant improvement of practical experience based on the analysis and overcoming of the identified shortcomings, at the stage of individual scientific developments. This requires the development of simple, not cumbersome scientific approaches for use in the daily practice of troops.

The *purpose of the study* is to develop a practical approach to the choice of options for ordering UAVs for combat use in joint aviation groups, while saving the financial resources of the customer and minimising the risks of its cost overruns when making management decisions.

Methodological Framework

When making management decisions on the placement of SDO there is a need to assess the most economically feasible options for placing orders between several potential contractors to save budgetary funds and prevent (minimise) possible risks of exceeding costs. For the public contracting authority, savings are a certain analogue of increasing profits for a commercial customer. That is, there is a need to assess (forecast) the consequences of successful or unsuccessful selection of possible options for placing an order. This, in turn, leads to savings or to an excess of expenditures of the state customer – budgetary funds. One approach to solving such a management problem may be to use a statistical method of quantitative risk analysis. This method involves analysis of the statistics of savings (profit) in management decisions to determine two indicators:

1) the probability of obtaining the result, i.e. – savings (profit);

2) the risk of not obtaining the result, i.e. – the expected (projected) savings.

For its part, the magnitude of the risk of not receiving the expected savings is measured by two indicators:

1) the average expected savings;

2) fluctuations (variability) of the possible result, i.e. – possible savings.

The average (arithmetic mean) expected value of the savings is related to the uncertainty of the result – the possible savings. It is defined as the weighted average of all possible savings $E(x)$, where the probability P of each individual result (individual component of savings) is used as the frequency or weight (weighting factor) of the corresponding value x of the individual result. In general, this can be written as follows (Eq.1):

$$E(x) = P_1 x_1 + P_2 x_2 + ... + P_i x_i + ... + P_n x_n \quad (1)$$

where: x_i – the size of a separate component of savings during the implementation of a measure i ($i = 1,\ldots, n$) from the group of measures n, UAH.; P_i – the probability of the measure i.

Results and Discussion

Assume that SDO requires 200 unmanned aerial vehicles (UAVs). Due to a number of factors, such as limited production capacity of potential contractors, short deadlines due to the immediate need of the UAV, problems with order payment and other factors, it is not possible to place an order to the one contractor. However, there is an option to distribute the order between the three potential contractors. Preliminary agreements have been reached with each of the possible contractors, which will assist the customer in the emergence of certain savings of financial resources – budgetary funds. There are two possible options for placing a SDO between three contractors. Each of the options differs in the number of UAVs acceptable for the manufacture and the amount of

possible savings for the customer. It is necessary to choose a more economical and less risky option for the customer to place a SDO.

If the expected levels of savings from each contractor are well known and can be measured in monetary terms when deciding on the choice of contractors and the number of UAVs to be ordered. The final results of the savings can be calculated as a certain sum of expected levels of savings from each contractor. At the time of deciding on the choice of contractors and the number of UAVs to be ordered, the levels of savings can be defined not as accurate but as possible, i.e., as probable. Thus, probabilistic approaches to assessing the situation can be applied to quantitatively substantiate the decision on the order.

Option 1. According to this variant of distribution of SDO between contractors it is supposed that 90 units of UAVs from 200 are ordered to one contractor, with savings of 20 thousand UAH on each UAV (probability of savings – 90 : 200 = 0.45). The second contractor is ordered 60 units of UAVs out of 200, with savings of 25 thousand UAH on each UAV (probability of savings – 60 : 200 = 0.30). The third contractor is ordered 50 units of UAVs out of 200, with savings of 30 thousand UAH for each UAV (probability of savings – 50 : 200 = 0.25). The average expected value of savings per UAV unit for the first option of order distribution between the three contractors is:

$E(x)$ = 20.0×0.45+25.0×0.30+30.0×0.25 = 24 ths. UAH.

Option 2. According to this variant of SDO distribution, 95 UAVs out of 200 are ordered to one contractor, with savings of 19 thousand UAH on each UAV (probability of savings – 95 : 200 = 0.475). The second contractor is ordered 55 units out of 200, with savings of 22 thousand UAH on each UAV (probability of savings – 55 : 200 = 0.275). The third contractor is ordered 50 units out of 200, with savings of 32 thousand UAH on each UAV (probability of savings – 50 : 200 = 0.25). The average expected value of savings per unit of UAVs in the second option of the order distribution between the three contractors is:

$E(x)$ = 19.0×0.475+22.0×0.275+32.0×0.25 = 23.075 ths.UAH.

The average value represents a generalised quantitative characteristic and does not allow making a final decision in favour of one of the considered options for the distribution of orders. For the final decision it is necessary to estimate fluctuations (range of deviations, variability) of indicators, i.e., to define a measure of fluctuations of possible result, i.e., – savings. The fluctuation of the possible result is the degree of deviation of the expected value of the result from its average value. To determine it, usually the variance or standard deviation is calculated. The variance is the weighted average of the squares of the deviations of actual values of the results from their average expectations (Eq. 2):

$$\sigma^2 = \frac{\sum(x-\bar{x})^2 A}{\sum A} \quad (2)$$

where: σ^2 – variance; x – expected value for each case of observations; $\bar{x}$ – expected average (arithmetic mean) value; A – frequency of cases or the number of observations.

For the case under consideration, x – expected value, and $\bar{x}$ – average expected value of savings for each UAV from the selected order placement option; A – the number of UAVs selected for the order of each of the performers for a particular order. The standard deviation is determined by the equation (3):

$$\sigma = \sqrt{\frac{\sum(x-\bar{x})^2 A}{\sum A}} \quad (3)$$

The variance σ^2 and the standard deviation σ are measures of absolute oscillation. They are measured in the same units as the changeable subject. For the given example the changeable subject – savings (profit) of the contractor in UAH for the UAV unit. To analyse the degree of deviation of the expected value from the average value, the variation coefficient (the ratio of standard deviation to the expected average value) (Eq. 4):

$$v = \frac{\sigma}{\bar{x}} \cdot 100 \quad (4)$$

where: v – variation coefficient, %.

In general, the coefficient of variation allows comparing features that fluctuate and have different units of measurement. The larger the variation coefficient, the stronger the fluctuation; in the second example – savings, that is, the greater the risk in obtaining the expected savings. Using the statistical method of quantitative risk analysis, the following estimates of the variation coefficients have been established:

– up to 10% – weak fluctuation;
– 10…25% – moderate fluctuation;
– over 25% – strong fluctuation.

For this instance, the standard deviation (SD) of the savings is equal to:

• for the *1st option* of distribution of the order between three contractors:

$$\sigma_1^2 = \frac{(20-24)^2\cdot 90+(25-24)^2\cdot 60+(30-24)^2\cdot 50}{200} = 16.5 \text{ ths. UAH.},$$

$$\sigma_1 = \sqrt{16.5} = 4.06 \text{ ths.UAH.};$$

• for the *2nd option* of distribution of the order between three contractors:

$$\sigma_2^2 = \frac{(19-23.075)^2\cdot 95+(22-23.075)^2\cdot 55+(32-23.075)^2\cdot 50}{200} = 28.12 \text{ ths.UAH}$$

$$\sigma_2 = \sqrt{28.12} \approx 5.3 \text{ ths.UAH}.$$

Coefficient of variation (risk factor):

• *for the option 1:* v_1 = (4.06÷24)×100 = 16.9%;
• *for the option 2:* v_2 = (5.3÷23.075)×100 = 22.9%

That is, for the initial conditions of both possible options for placing an order, the variation coefficients are in the range of values of moderate fluctuation. However, the variation coefficient of the savings, during the distribution of SDO between three contractors, in *option 1* is less than in *option 2*. Therefore the 1st option of distribution of orders is less risky and more expedient. In general, for *option 1*, two factors are more positive: a higher average value of expected savings and a lower risk of obtaining savings compared to *option 2*. Using the variation coefficient to determine the lower and upper limits of deviation of the

expected savings from its average value for comparable options for SDO distribution, the following figures are obtained in thousands of UAH for one UAV unit (Table 1).

Absolute average and threshold values of expected savings for possible options for placement of SDO indicate the priority of *option 1* over *option 2*. For clarity, the final results of the calculations can be summarised in a comparative table of possible options for SDO placement to substantiate the economically priority option. This approach can be used in the presence of more than two alternative options for the distribution of orders (Table 2) and for more than three potential contractors. For orders of more expensive objects and for bigger budget allocations the units of measurement can be not thousands, but millions of UAH.

Table 1. Determination of the lower and upper limits of deviation of the expected savings from its average value for the options for SDO distribution

Option of order distribution	The lower limit of expected savings	The average value of the expected savings	The upper limit of expected savings
1	19.94	24	28.06
2	17.8	23.07	28.35

Table 2. Comparative table of possible options for placement of SDO and substantiation of the priority option

Option for SDO distribution between potential contractors	Potential contractors for SDO						Indicators of quantitative analysis of savings for different options for SDO placement (per order unit)						
	I		II		III								
	Number of order units	Savings per order unit, ths. UAH	Number of order units	Savings per order unit, ths. UAH	Number of order units	Savings per order unit, ths. UAH	Average value of savings, ths. UAH	Variance of savings σ^2, ths. UAH	Standard deviation of savings σ, ths. UAH	Variation coefficient of savings v, %	Lower limit of possible savings, ths. UAH	Upper limit of possible savings, ths. UAH	Priority of possible options for SDO placement
1.	90	20	60	25	50	30	**24**	16.5	4.06	**16.9**	**19.95**	28.06	**1**
2.	95	19	55	22	50	32	23.07	28.12	5.3	22.9	17.8	28.35	2
...	...	...	...	...	...	...	...	...	...	...	...	...	...

Conclusions

An approach to the estimation of possible options for the placement of SDO for the products of industrial enterprises has been considered. It can be viewed as an additional technique for substantiation of a choice for the Customer of the most economic and least risky variant. Furthermore, the proposed approach does not cancel or replace the existing rules of preparation for contracting orders. At the same time, it does not contradict sustainable approaches and can be used as an additional mechanism of preliminary study by the Customer of the conditions on the market of production offers. If necessary, it can be used as one of the final measures in preparation for the final decision on the distribution of the order. In addition, the proposed method is quite appropriate in terms of short deadlines and low production capacity of the necessary defence products, it allows avoiding non-supply during the active phase of the armed confrontation to replenish the forces and means of the Armed Forces.

Further development of the proposed approach may be associated with the formalisation of it as an algorithm and development of software for the generation of a final comparative table of possible order options. Thus, a source of initial reference information (databank) on production programmes and production capacities of contracting enterprises with a certain nomenclature and range of products that the customer needs can be created.

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Обґрунтування економічно доцільного варіанту замовлення безпілотних літальних апаратів для спільних авіаційних груп

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Анотація. У статті пропонується рішення однієї з проблем, що виникає у повсякденній практиці керівного складу Збройних Сил та Міністерства оборони України – розпорядників коштів під час прийняття управлінських рішень. Актуальність дослідження полягає у визначенні механізмів швидкого поповнення втрат оборонної продукції завдяки завчасному розподіленню оборонного замовлення серед виробників із заощадженням бюджетних коштів. Мета статті полягала у розробленні найбільш економного (заощадливого) варіанту розміщення замовлення між декількома потенційними виконавцями із завданням економії бюджетних коштів, мінімізації можливих ризиків із перевищення витрат замовника та організації раціонального витрачання фінансового ресурсу. Для розв'язання проблеми запропоновано підхід із використанням статистичного методу кількісного аналізу ризиків на підставі визначення двох показників: імовірності отримання економії та ризику неотримання очікуваної економії. Наведено приклад використання запропонованого підходу для двох альтернативних варіантів розміщення замовлення безпілотних літальних апаратів для створення спільних авіаційних груп між трьома потенційними виконавцями. Запропонований механізм зведення розрахунків у підсумкову таблицю, прийнятну для аналізу та прийняття остаточного рішення у ланці управління щодо замовлень продукції. На відміну від підходів, що використовуються у країнах із розвиненою економікою, у запропонованому підході враховуються можливості виробника щодо обсягів виробництва продукції та стислість термінів виготовлення продукції оборонного характеру. Зазначено, що розглянутий підхід може бути використаний і за наявності більш ніж двох альтернативних варіантів розподілу замовлень та для більш ніж трьох потенційних виконавців замовлення

Ключові слова: очікуване значення економії, імовірність економії, ризик неотримання економії, коливання можливої економії, коефіцієнт варіації економії

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Structural Modelling of the Relationship Between the Vulnerability of Ukrainian Regions to COVID-19, Environmental Status and Factors of Readiness of the Medical System

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Abstract. The division of the regions of Ukraine into "red", "orange", "yellow" and "green" zones are the consequences of the differentiated regional impact of the pandemic caused by the COVID-19 virus, but the reasons for such different vulnerabilities have not been clarified yet. The purpose of the study is to construct a system of regression equations containing implicit variables that are common characteristics of industries and help to analyse relationships in a complex system. The methodological tools of the study were: review of current scientific trends using VOSViewer 1.6.10, the main component method, which allows selecting the most significant factors and model with structural equations that reflect the relationship between the three areas of activity. 25 oblasts of Ukraine were selected as the object of the study, since they have different levels of vulnerability to the pandemic and can become a model for studying the regional differentiation of any country. The study presents the results of an empirical analysis of the structure of three areas of activity of the country. Modelling of structural equations to establish the relationship between the factors of vulnerability of the regions of Ukraine from the COVID-19 pandemic, the environmental state and the state of readiness of the medical system is carried out. It is theoretically substantiated that there is a direct connection between the studied areas: environmental, medical and epidemiological, and that deterioration in one industry leads to deterioration in another. The results obtained prove that it is possible to influence the differentiated course of the pandemic, but not after the event. A consistent increase in funding from the state budget for healthcare would have a greater effect, with sufficient financial support for environmental protection. The choice of state strategies must be approached comprehensively, because a narrow reform of the system, such as medical, will not give the maximum effect, without an innovative policy in the field of ecology

Keywords: pandemic, econometrics, ecology, medicine, principal component method

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Introduction

The pandemic caused by the SARS-CoV-2 virus in China in 2019 forced a change in the direction of scientific thought and re-assessment of human values. In Ukraine, the first patient was identified on March 3, 2020, and as of April 6, 2021, 13,398 new cases were registered per day. Regional differentiation is of interest for the study, for example, 51, 99 and 85 new cases of the disease were registered per day in Chernihivska, Kirovohradska and Ivano-Frankivska Oblasts, respectively, but in Odeska, Lvivska, and Kyivska Oblasts there were 1,436, 1,105 and 1,432 new cases, respectively [1]. It is inappropriate to look for reasons in social behaviour, because such differentiation occurs within the same country, with the same mentality, culture, and social habits. The disease affects different people in different ways, for some it passes in a mild form, and for others hospitalisation with artificial lung ventilation is necessary. The pandemic also revealed weaknesses that existed in the medical sphere of any country or region, and pointed out the lack of provision of medical institutions to counteract the large influx of patients.

In order to counteract the consequences of the pandemic, the government of Ukraine has allocated additional funds for the healthcare sector, compared to previous years, 2.7 times more funds were allocated in 2020 compared to 2019 [2]. In general, there is a tendency to increase state budget expenses on healthcare during 2016-2021, which is a positive indicator of the government's attitude to the health of its citizens. In contrast to the healthcare sector, spending on the environmental sector during this period has decreased in dynamics, compared to 2016, the volume of spending decreased by 25% compared to 2020. The general trend of reducing funding for environmental protection with increased emissions into the air and water has a negative impact on the overall state of public health of citizens, which negates the increase in spending on healthcare that fights the consequences of poor ecology, viruses, bacterial diseases, etc.

The pandemic situation in Ukraine has revealed low financial security of most primary and secondary healthcare institutions and other unresolved problems related to the redistribution of funds between industries. That is why there is an urgent need to develop methodological approaches for choosing strategic decisions in the context of budget allocation among industries, taking into account the difficult epidemiological situation. Therefore, with the spread of the disease, there are more and more questions in the scientific community to which there is no clear answer.

Table 1. Expenditures from the state budget of Ukraine in the field of health and environmental protection, mln. UAH for 2014-2021

	Environmental protection	% of total expenses	Healthcare	% of total expenses
2014	2597	0.60%	10580.8	2.46%
2015	4053	0.70%	11450.4	1.98%
2016	4771.6	0.70%	12456.3	1.82%
2017	4739.9	0.56%	16729.1	1.99%
2018	5241.2	0.53%	22617.9	2.29%
2019	6316.2	0.59%	38561.6	3.59%
2020	6636.8	0.52%	124925.3	9.70%
2021 (by 1.04)	846.3	0.31%	34693.7	12.57%

Source: compiled by the authors based on [2]

The purpose of the study is to establish causal relationships between the environmental sphere, the readiness of medical institutions to receive a large number of patients and the vulnerability of Ukrainian regions to the COVID-19 pandemic.

This objective made it necessary to solve the following *tasks*:

– to form the optimal composition of indicators by performing the method of principal components, which can best describe the variability of such latent variables as ecology, medicine, and vulnerability of regions to the consequences of a pandemic;

– to develop a methodology for modelling structural equations of regional indicators of vulnerability to COVID-19, environmental status and readiness factors of the medical system;

– to study the relationship between the above factors, to establish the adequacy of the existing relationship;

– to assess the level of dependence of the studied parameters on each other.

Literature Review

The SARS-CoV-2 pandemic has forced a large number of scientists around the world to change the vector of scientific research. For example, the authors [3] investigate the causal relationship between a pandemic and environmental emissions through the introduction of quarantine restrictions in many countries around the world. The authors [4] are looking for causal links between the deterioration of people's psychological health and the pandemic. Researchers [5] proved a direct relationship between the state of atmospheric air pollution with solid particles and the risk of severe consequences of COVID-19, by performing the Poisson regression. The authors [6] proved that the severity of the disease in the first stages is directly proportional to the state of air pollution with solid particles, which negatively affects the

human respiratory system. Therefore, indeed, many scientists have theoretically substantiated the relationship between the ecology of the region and the vulnerability of the population living there.

Regional differentiation was also considered in [7], the authors investigated mortality from COVID-19, identifying seasonal fluctuations in the context of one country, in order to predict the next waves of diseases. Researchers [8] have proposed models that offer an effective measure to prevent the spread of the disease while there is no herd immunity caused by vaccination. Scientists [9] used regression-correlation analysis to search for a link between the socio-economic vulnerability of the population, which is built based on the age structure of citizens, income level and commitment to maintaining social distance and the pandemic. In [10], the risk of a stock market collapse is analysed due to the growth of morbidity in the world and this dependence is theoretically substantiated. The team of authors [11] analyses the differentiated course of COVID-19 disease, and examines the cause of opioid use and race and ethnicity. The study [12] constructed a forecast of the course of the pandemic, taking into account the possible number of infections that are asymptomatic, because they further affect the prevalence of infection, due to their invisibility. Thus, a large number of studies are focused on finding causal relationships between the consequences of the pandemic on other areas of people's lives, apart from the deterioration of well-being.

The central place in many studies is occupied by the healthcare sector, which is first to accept negative consequences and is a litmus test of humanity's readiness to counteract the epidemic. Thus, in the study [13], the authors put in the first place the problem of medical personnel who are most likely to become infected and solve the problem by asynchronising the work of doctors. The researchers [14] made a detailed bibliographic description, in which the main subject is medical personnel, and especially nurses. The authors [15] developed an algorithm based on the Markov chain Monte Carlo to facilitate the systematisation of patient calls depending on the diagnosis of acute respiratory diseases in order to protect, first of all, medical personnel.

The analysis of scientific publications confirms that this topic related to the global pandemic, its causes, consequences and ways to overcome it is relevant. The VOSViewer 1.6.10 software was used to systematise and visualise case studies related to the concept of COVID-19. In Figure 1, 5 clusters of different colours and sizes are highlighted. The first group (Red) is associated with a person, social consequences, the occurrence of depression, cultural transformations, education. The second group (Green) is associated with healthcare, mutation, genetics, that is, the root cause of the virus. The next group (Blue) combines medicine, pharmacology, and ecology. The Yellow group indicates changes in the demographic structure of society, the quality of the air, and overall mortality. The Lilac group focuses on climate, tourism, and combines research metrics for research.

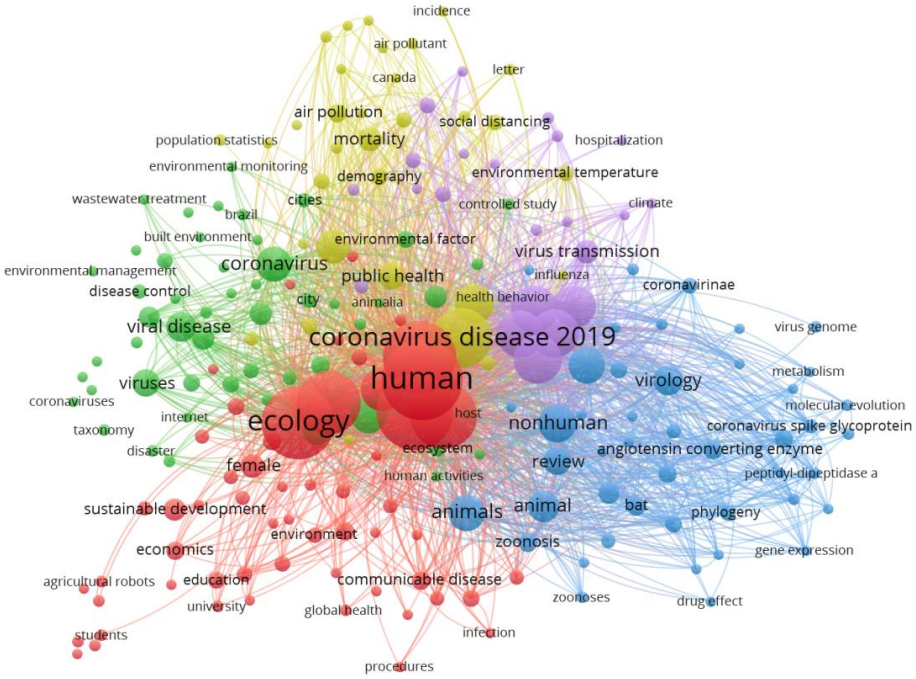

Figure 1. Distribution of the concept of "COVID-19" and related terms in publications was built using the VOSViewer 1.6.10 software

Figure 2 shows a diagram indicating the frequency of mention of the term "COVID-19" in scientific papers of different countries. The leaders are undoubtedly the United States, Great Britain, China, Canada and Italy. These countries are among the top-10 countries [1] affected by the pandemic, which is the reason for such interest among the scientific society.

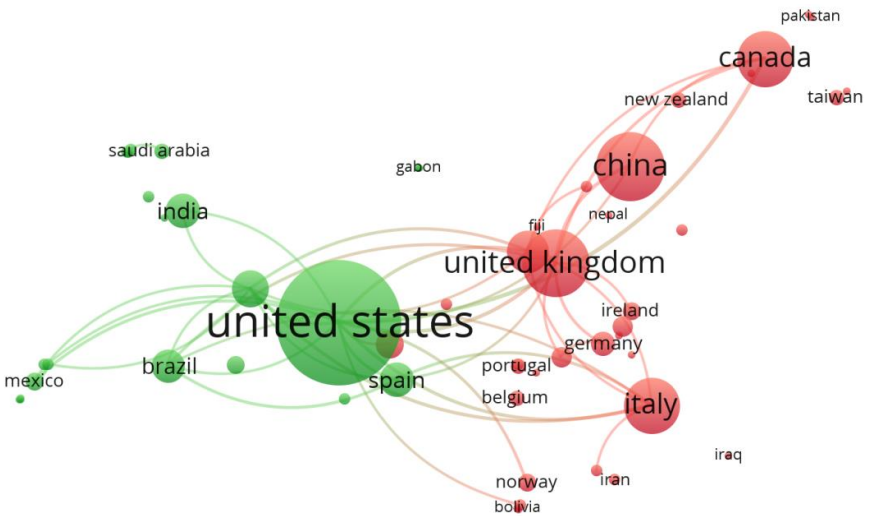

Figure 2. The territorial distribution of the use of the concept of "COVID-19" and related terms in publications is constructed using the VOSViewer 1.6.10 software

Materials and Methods

To achieve the purpose of the study, the following sequence of actions was chosen: collecting and analysing statistical data reflecting implicit variables – ecology, medicine, and vulnerability to the pandemic; conducting a method of principal components to select the most influential indicators; normalising data to minimise a large range of input data; conducting causal modelling with structural equations and checking the adequacy of the constructed model.

Stage 1. Collection and analysis of statistical data. 24 oblasts of Ukraine and the city of Kyiv were selected as the object of the study. At this stage, the identification of indicators that were most likely able to characterize the state of the environment (12 indicators) was carried out: costs and capital investments for environmental protection, the volume of waste generation, its disposal and incineration, emissions of pollutants into the atmosphere from mobile and stationary sources of pollution, carbon dioxide emissions, the volume of waste accumulated during operation in specially designated places [15]. The state of readiness of medical institutions was characterised by such indicators (11 indicators) [16] as the number of hospitalisations and contracts for medical services for the population under the programme of medical guarantees, the number of beds for hospitalisation and the volume of infectious diseases from them, the number of medical teams, infectious diseases specialists, anaesthesiologists, internists and junior medical personnel, the number of pharmacies that are places of the release of medicines by electronic prescriptions under the government programme "affordable medicines". The number of infected people (C_zahv), deaths (C_pomerlyh), and infectious beds occupied by patients with COVID-19 (C_lizhka) was selected as indicators of regional vulnerability from the pandemic [1].

To perform modelling with structural equations, a small number of explicit variables are used to form latent variables of a certain sphere of complex state structure. Therefore, a selection was made among a large number of obvious environmental and medical factors.

Stage 2. Factor analysis for selecting factors. Within the framework of the multivariate model and the absence of an explicit exogenous variable, the principal component analysis was performed to identify the indicators that most effectively demonstrated the variability of the entire structure. Eigenvectors and corresponding values were found to identify the least necessary number of variables that most fully characterised the medical and environmental spheres. The Principal Components & Classification Analysis module in STATISTICA software is used. Table 2 shows the result obtained when using the algorithm for constructing principal components. The first column indicates the number of factors that correspond to the component, that is, according to the Kaiser criterion, three indicators were selected for the study, for which the eigenvalue is greater than one, that is, it explains more than one variable. As a result, 88% of the total variance was explained by three variables: the number of contracts for medical care for the population under the medical guarantee programme (M_medgar), the number of anesthesiologists (M_anest) and the number of intensive care beds (M_lizhka). For environmental factors, two factors were selected in a similar way: emissions of carbon dioxide (E_diox) and pollutants from mobile sources of pollution (E_vykydy) into the atmosphere.

Table 2. Eigenvalues of vectors of 11 indicators of the medical services sector

	Eigenvalue	Cumulative eigenvalue	Percentage of cumulative variance
1	7.369417	7.36942	61.4118
2	1.734243	9.10366	75.8638
3	1.451868	10.55553	87.9627
4	0.938864	11.49439	95.7866
5	0.229066	11.72346	97.6955

Source: developed by the authors

Stage 3. Data normalisation. To perform modelling with structural equations, data normalisation is performed through a large data span (1):

$$\rho = x_{max} - x_{min} \quad (1)$$

where x_{max} – the highest value of a row of 25 oblasts of Ukraine, x_{min} – the lowest value of a row. Next, the study considers the minimax normalisation of data (2), which reduces all values to a range [0;1], where the value 1 – corresponds to x_{max}, and 0–x_{min}, while the general trend and variability of values are not lost.

$$x^* = \frac{x - x_{min}}{\rho} \quad (2)$$

This type of normalisation allows not losing the variability of factors and easily interpreting the results of the study, taking 1 for 100 %.

Stage 4. Modelling with structural equations. Having three groups of indicators: regional vulnerability to pandemic (*Cov*), environmental sphere (*Eco*) and readiness of medical institutions for a large influx of patients (*Med*), a system of simultaneous equations is used to describe a complex system and build causal relationships. The Cov index is chosen as an exogenous variable, and the general form of a system of structural equations is determined, which contains three latent variables that characterise the sphere as a whole and eight explicit independent variables and consists of nine linear equations (3):

$$\begin{cases} C_{lizh} = a_1 Cov + \partial_1, \\ C_{zahv} = a_2 Cov + \partial_2, \\ C_{pomerl} = a_3 Cov + \partial_3, \\ E_{vyk} = a_4 Eco + \varepsilon_1, \\ E_{diox} = a_5 Eco + \varepsilon_2, \\ M_{medgar} = a_6 Med + \varepsilon_3, \\ M_{anest} = a_7 Med + \varepsilon_4, \\ M_{lizhka} = a_8 Med + \varepsilon_5, \\ Eco = a_9 Cov + z_1, \\ Med = a_{10} Cov + a_{11} Eco + z_2. \end{cases} \quad (3)$$

where a_i, i=1..11 – the unknown coefficients, $\delta_{1,2,3}$, $z_{1,2}$, $\varepsilon_{1,2,3}$ – model errors and the free coefficients of the corresponding equations of the system of structural equations. Figure 3 shows a scheme of simultaneous equations in the form of the classical Lister Karl Joreskog model, consisting of three smaller composite models, but the greatest weight is the regression relationship between ecology (*Eco*), medicine (*Med*), and pandemic (*Cov*).

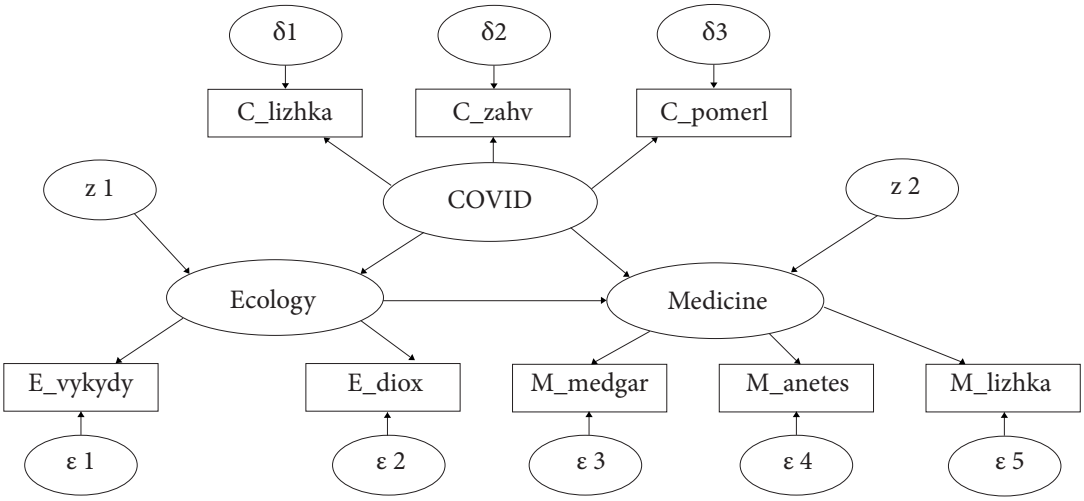

Figure 3. General scheme of the structural equation model for studying the relationship between the development of medical, environmental state and regional vulnerability to the pandemic

Source: developed by the authors

Results and Discussion

The study uses 8 explicit variables, the relationships between which are quite complex. By constructing implicit (latent) variables that characterise the entire sphere completely, it is possible to find connections between hidden variables. Explicit variables will be considered the consequences of the complex influence of latent ones, assuming the presence of errors. Using the above algorithm, the solutions of system (3) are found, which are represented in system (4):

$$\begin{cases} 1)\ C_{lizh} = 0{,}212 Cov + 0{,}014, \\ 2)\ C_{zahv} = 0{,}222 Cov + 0{,}029, \\ 3)\ C_{pomerl} = 0{,}231 Cov + 0{,}001, \\ 4)\ E_{vykydy} = Eco + 0{,}018, \\ 5)\ E_{diox} = 0{,}552 Eco + 0{,}07, \\ 6)\ M_{medgar} = Med + 0{,}028, \\ 7)\ M_{anest} = 1{,}089 Med + 0{,}024, \\ 8)\ M_{lizh} = 1{,}096 Med + 0{,}013, \\ 9)\ Eco = 0{,}19 Cov, \\ 10)\ Med = 0{,}222 Cov + 0{,}496 Eco + 0{,}001. \end{cases} \quad (4)$$

The assessment of the obtained parameters allows for the conclusion that the increase in the level of vulnerability of the region from the pandemic by 1% corresponds to an increase in the number of beds occupied by patients with COVID-19, the level of morbidity and the number of deaths from this disease by 0.21, 0.22, and 0.23%, respectively. The obtained regression equations show that all three indicators uniformly characterise regional vulnerability to the pandemic. The fourth equation of system (4) indicates that the state of the ecological sector of society is directly proportional to the indicator of the amount of emissions into the environment from mobile sources of pollution with a coefficient of 1. Environmental degradation in the region by 1% corresponds to an increase in carbon dioxide emissions by 0.55 %. The sixth equation shows a direct proportional relationship between the improvement in the state of readiness of medical institutions to receive patients and the increase in the number of contracts for medical care of the population based on medical guarantees. A 1% increase in the quality of medical services corresponds to an increase in the number of anaesthesiologists and the number of beds by 1.1% at the same time. The ninth and tenth equations of system (4) describe the relationship between implicit variables and describe a direct proportional relationship between all the areas considered. The deterioration of the situation with the pandemic by 0.19% follows from a decline in the environmental situation in the region by 1%. In the event of an increase in vulnerability to COVID-19 by 0.22 %, and the environment by 0.5%, the burden on the medical sector would increase by 1%.

Among the found coefficients and free terms of the regression equations of system (4): 18 out of 21 have significant t-statistics ($p<0.05$). To assess the quality of model fitting, the reflector matrix (5) was used, which is the difference between covariance matrices based on empirical data (I) and theoretical (R) of dimensions 8×8, because it can only be constructed for explicit variables:

$$\varepsilon = I - R \quad (5)$$

The reflector matrix value should be contained within [-1;1], Table 3 shows the average absolute real value, not counting the diagonal zero values of 0.21, is close enough to zero and indicates that the model is resilient to scale changes.

Table 3. Reflector matrix – the value of differences between the empirical and theoretical values of the constructed model

	E_Vykydy	E_Diox	M_MedGar	M_Aneste	M_Lizhka	C_lizhka	C_Zahvor	C_Pomerl
E_Vykydy	0.000	-0.134	-0.066	0.534	-0.041	0.305	-0.575	-0.018
E_Diox	-0.034	0.000	-0.312	0.148	-0.039	0.077	0.131	-0.004
M_MedGar	-0.059	-0.761	0.000	0.247	-0.058	0.111	-0.202	-0.007
M_Aneste	0.371	0.443	0.285	0.000	-0.067	-0.263	0.215	-0.026
M_Lizhka	-0.068	-0.162	-0.125	-0.126	-0.000	-0.225	-0.341	0.072
C_lizhka	0.391	0.390	0.209	-0.489	-0.260	0.000	0.613	-0.024
C_Zahvor	-0.345	0.309	-0.197	0.169	-0.170	0.287	-0.000	0.006
C_Pomerl	-0.224	-0.186	0.053	-0.309	0.560	-0.231	0.120	-0.000

Source: developed by the authors

After analysing the final statistical indicators, it is concluded that the constructed model (4) is adequate. The Maximum Residual Cosine indicator is zero, which means that the iterative process converged successfully, and the number of iterations performed is 11. The ICSF Criterion and ICS Criterion tend to zero, which indicates that the model is resistant to multiplication by a constant scale multiplier. The indicator χ^2=44,119 is greater than the corresponding Tabular value of 28.9, with 18 degrees of freedom at the significance level of 0.05. Therefore, this relationship is not random and the results of the model can be considered. The level of $p=0.001<0.05$ and RMS Standardised Residual $0.085<0.1$, which also confirms the adequacy of the constructed model. The study also analyses the measures of non-central trends in the constructed model (Table 4), indicating the degree of adequacy of the model based on non-central statistics χ^2 and indicating the lower and upper limits of the confidence interval, as well as a point estimate of the indicator. The non-central distribution parameter, the Stinger-Lind's index, the Macdonald non-centrality index, and the Gamma indices went beyond the norm, which indicates a low quality of fitting this model.

Table 4. Non-central trend indexes for checking the quality of the constructed model

	Lower limit (90%)	Point estimation	Upper limit (90%)
Non-centrality parameter	0.244	0.823	1.724
Stinger-Lind's index	0.116	0.214	0.309
McDonald's non-centrality index	0.422	0.663	0.885
Gamma distribution index	0.699	0.829	0.943
Adjusted gamma distribution index	0.398	0.659	0.885

Source: developed by the authors

Thus, after analysing all the criteria for checking the adequacy of the constructed model (4), the study has come to a general conclusion that despite the insufficient quality of non-centrality indices, the model is resistant to scale changes, has significant coefficients, and is adequate according to the criterion χ^2.

The conducted research theoretically proves that there is a relationship between such spheres of society as ecology and medicine. In order to assess the state of the entire industry – a latent variable, the optimal number of factors was selected that allow assessing all the variability of this implicit indicator. In addition, the study examines the causes of differentiated vulnerability to the effects of the pandemic in different regions of the country. The conducted modelling with structural equations proves that the decentralisation introduced in Ukraine has consequences in the context of a different distribution of funds among the regions, which is reflected in the increase in differentiation of payments to support the environment, medicine and other industries. The authors [2; 4-5] also considered the relationship between the COVID-19 pandemic and the environment, and the authors [3; 7; 10] analysed the medical field. This study confirms and combines the results, because it considers three areas at once as a whole, and not individual indicators. However, the issues of studying the impact of the social sphere, cultural indicators and age distribution of the population on regional vulnerability to the pandemic remained unresolved. Consideration of these issues would allow compiling a rating of areas that require state support, in particular funding, and have an impact on the vulnerability of regions to COVID-19. After all, supporting only one industry would not give one hundred percent effect without comprehensive consideration of any problem. Only a systematic consideration of the problem allows overcoming adversity, using entire state budget to the maximum.

Conclusions

By modelling structural equations, the relationship between the factors of vulnerability of the regions of Ukraine from the COVID-19 pandemic, the environmental state and the state of readiness of the medical system is proved. It is theoretically substantiated that this dependence is direct in nature. If the state of the region's ecology worsens by 1%, the population's vulnerability to the pandemic worsens, in terms of morbidity and mortality by 0.19%. If the burden on the medical sector increases by 1%, there will be a proportional increase in the burden on the environment and vulnerability to COVID-19 by 0.5 and 0.22%, respectively.

The results obtained prove that approaches to choosing strategies to overcome current and future epidemiological waves should be approached comprehensively. Support for one industry does not give 100% results, without support for related areas, which is demonstrated by the results of the study. As an example, with the emergence of the pandemic, the medical sector received significant state financial support, but there was still a significant differentiation in the vulnerability of the regions of Ukraine. This indicates, according to the results of the study, the importance of financing the state of the environment for maintaining public health at the proper level. This would allow making adjustments in advance in the state and regional policy in relation to the medical sphere, ecology to carry out management not only in the event of threats after the fact, but also to plan in advance and prevent any negative impacts – after the event. A systematic review of the relationships between different areas of the state would allow identifying a set of parameters for prioritising initiatives in the context of overcoming the negative manifestations of future epidemiological waves.

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Структурне моделювання взаємозв'язку між вразливістю регіонів України від COVID-19, екологічним станом і чинниками готовності медичної системи

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Анотація. Розподіл областей України на «червону», «помаранчеву», «жовту» та «зелену» зони є наслідками диференційованого регіонального впливу пандемії, викликаної вірусом COVID-19, проте причини такої різної вразливості досі не з'ясовані. Основною метою проведеного дослідження є побудова системи регресійних рівнянь, що містять неявні змінні, що є загальними характеристиками галузей і допомагають проаналізувати взаємозв'язки у складній системі. Методичним інструментарієм проведеного дослідження стали: огляд сучасних наукових тенденцій за допомогою VOSViewerv.1.6.10, метод головних компонентів, який дає змогу відібрати найбільш вагомі чинники та моделювання структурними рівняннями, що відображають взаємозв'язок між трьома сферами діяльності. Об'єктом дослідження обрані 25 регіонів України, оскільки саме вони мають різні рівні вразливості від пандемії та можуть стати зразком для дослідження регіональної диференціації будь-якої країни. У статті представлено результати емпіричного аналізу дослідження структури трьох сфер діяльності країни. Здійснено моделювання структурними рівняннями щодо встановлення взаємозв'язку між чинниками вразливості регіонів України від пандемії COVID-19, екологічним станом і станом готовності медичної системи. Теоретично обґрунтовано, що між досліджуваними сферами: екологічна, медична та епідеміологічна існує прямий зв'язок, та погіршення в одній галузі призводить до погіршення в іншій. Отримані результати доводять, що впливати на диференційований перебіг пандемії можна, але не постфактум. Послідовне збільшення фінансування з державного бюджету сфери охорони здоров'я матиме більший ефект, при достатньому фінансовому забезпеченні охорони навколишнього середовища. До вибору державних стратегій необхідно підходити комплексно, адже вузьке реформування системи, наприклад медичної, не дасть максимального ефекту без інноваційної політики у сфері екології

Ключові слова: пандемія, економетрика, екологія, медицина, метод головних компонентів

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Securities Custody Services: International Experience

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Abstract. The relevance of the study is explained by the underdevelopment of the securities market in Ukraine, which barely started establishing the institutions and mechanisms of a market economy. Ukraine has a decentralised system of depository services, which hinders the development of the stock market, because the decentralised system of accounting for rights to securities complicates the procedure of transactions and increases risks. The purpose of the study was to investigate the international experience of securities depository in the rapidly expanding securities markets, especially in Eastern Europe and Asia, their technology, identifying their new functionality and dominant models of their architecture in the context of regulation, interaction of market participants and protection of their property rights. The main methods of study of international experience in the provision of securities custody services were empirical, analytical, and inductive methods, which together allowed describing the systems of securities circulation in different countries, analysing them to identify common features that are important for their implementation in Ukraine for integration into the global system of redistribution of financial resources. The study considered various securities storage systems, national depository systems, covered the features of national mechanisms of interconnection of all participants in the securities market, identified conceptual problems of securities market organisation in Ukraine, substantiated the need to adapt international experience for institutional development of the national depository system of Ukraine. The materials of the study have practical value for the development of the depository system in Ukraine as a basis for the functioning of the securities market, compatible with technological international depository systems in full functionality, which guarantees investors' property rights and enables Ukraine to become a full-fledged redistributor of global financial resources and, accordingly, to attract investments for economic development pursuant to international rules and standards of "transparent" functioning of securities markets, thus putting institutional barriers to corruption influences. The comparative analysis of depository systems of different countries allowed covering weaknesses in the existing depository system of Ukraine, outlining the conceptual approaches to legislative and organisational actions on its development

Keywords: securities, custodians, depository activities, Central Depository, international experience

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Introduction

Securities trading on global capital markets dates back more than a century. Along with the evolution of the capital market with constantly growing trading volumes, the securities storage model (holding) is also being transformed from a direct storage system to an indirect one, and securities have become mostly immobilised in the form of an electronic account, instead of a physical (documentary) form. Under the direct storage system, investors own securities and, directly exercise all rights related to the securities that they own, thereby avoiding the risk of storage or loss of securities held by the intermediary. Placement and operations with securities under this system provide for the issuance of physical certificates of ownership of securities to the beneficial owner, that is, the investor, and is registered directly in the share register.

To reduce the risks and costs of storage, beneficial owners have started hiring a custodian of securities who will act on the transaction on their behalf. This was the reason for the development of an indirect storage system, when beneficial owners of securities hold securities with market intermediaries (nominees), which include securities brokers, custodian banks, and, subsequently, central depositories (CD). Securities are held in nominal accounts on behalf of market accounts intermediaries acting on behalf of the beneficial owners. The names of the nominees will appear in the share register instead of the names of the beneficial owners, thereby levelling relations between the issuer and the beneficial owner. Indirect storage systems are additionally classified into single-level and multi-level ones. In a multi-level indirect storage system, the upper level is often central depositories (CD), while the lower levels consist of financial services firms such as brokers and custodians, which act as candidates for investors. The disadvantage of this system is the possible violation of the investor's interests, for example, abuse of account by the nominee and ascertaining the rights of shareholders in the event of default or bankruptcy of the intermediary managing the nominal account.

A new modified indirect securities storage system is currently being implemented, which offers property protection benefits such as a direct storage system, and efficiency and cost savings benefits for investors such as an indirect storage system. In both an indirect storage system and a modified storage system, securities are immobilised or devalued and are held in securities accounts with the Central Securities Depository (CSD). In the modified storage system, investors can open personal accounts with the Central Securities Depository, and changes in ownership are registered in the issuer's share register after settlements with securities transactions are made. In other words, issuers maintain direct relationships with investors in a modified storage system, as in a direct storage system. The movement of securities is often carried out directly through registration forms or through their personal accounts in the CSD, with updates of ownership rights after settlements with securities are made in electronic form. However, the transition to a modified storage system often requires significant expenditures, market development, and a certain level of technological development.

According to the International Organization of Securities Commissions (IOSCO), an indirect storage system is widely accepted as a reference system for the safekeeping of securities worldwide, provided adequate protection against abuse. *The purpose of the study* is to analyse the International Securities Market and related depository activities in Eastern Europe and Asia.

Theoretical Overview

To improve the process of interaction between all participants in securities and clearing settlements, reduce risks, and improve the management of the depository activity system (official website of the Group of Thirty), a number of organisations have been created in the world that develop international standards for building systems for accounting for property rights, executing securities transactions, and provide appropriate recommendations. These include: the Group of Thirty (Group 30, G-30) [1], the Association of European Central Securities Depositories (ECSDA), the International Organization of Securities Commissions (IOSCO), the International Securities Services Association (ISSA), the Bank for International Settlements (BIS), the Committee of European Securities Regulators (CESR), the European Central Bank (ECB), the Asia-Pacific Central Securities Depository Group (ACG), the Giovannini Group (GG) [2].

The National Central Securities Depositories are the core of the modified indirect securities storage system. Currently, in developed countries of the world, 95% of the stock market is serviced by central depositories. In Europe, there are 41 central depositories that are full members of European Association of Central Securities Depositories, and all over the world in general – more than a hundred [3]. When analysing the composition of owners of CSD in the EU countries, the following groups can be distinguished [3]:

– 15 countries have a single Central Depository for corporate and government securities: Austria, Cyprus, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Sweden, and the United Kingdom;

– 10 countries have a single Central Depository of corporate securities and one depository in the central bank structure for servicing transactions with government securities: Belgium, Bulgaria, Greece, Ireland, Latvia, Poland, Portugal, Romania, Slovakia and Slovenia;

– there are three depositories in the Czech Republic (two corporate securities depositories and one central bank depository for government securities). Both corporate securities depositories are owned by private sector participants;

– Spain has four depositories (for corporate and government securities). In all four Spanish depositories, control belongs to the private sector (the central bank's share is 5%) [3].

Among the post-Soviet countries (except the Baltic states), only four have a single Central Depository of corporate and government securities, in two of which 100% control belongs to the private sector (Georgia and Moldova), in the Central Depository of Kazakhstan, the private sector is the majority owner (the central bank has a 49% share

in the Central Depository), and Belarus the Central Depository is completely state-owned. In Russia, there are two depositories of corporate and government securities, one under 100% control of private sector participants, and in the other, also private, the central bank has a significant share of equity capital, which does not exceed 50% [3]. The process of creating a Central Depository in Ukraine has been slowed down since 2009, although its creation is extremely necessary for integration into the global economy and access to global financial markets. The study of the experience of other countries in forming a Central Depository and its interaction with other participants in the securities market can become the basis for making management decisions on this issue that are adequate to the conditions of Ukraine.

Securities services, an important and permanent part of the capital industry, have not been fully investigated. The processes of securities circulation, as a rule, were studied by highly specialised specialists, banking and exchange analysts, and almost did not reach the level of theoretical generalisation. The rapid development of the securities market in recent decades has attracted attention to it, but so far information about its processes is mainly at the level of research by banking and specialised organisations.

Materials and Methods

This paper is largely a theoretical generalisation of the empirical stage of research on the subject matter, which involves collecting information about the state of affairs of the modern securities market, the structure of markets, their features, development trends, primary processing of facts, selection from all facts typical, the most repeated and expressing the main trends in the development of the world securities market. The methodological framework of the study included the scientific papers of foreign researchers in the field of the international securities market, its regulation, and institutional mechanisms of its operation. At the same time, the principle of unity of theory and practice was applied.

To achieve the purpose of this study, the following methods were used: *theoretical generalisation* (to analyse the functions and features of the International Securities Market); *dialectical approach* (to determine the specifics and changes taking place in the International Securities Market); *historical and logical approach* (to analyse the evolution of securities storage systems); *analysis and synthesis* (to identify the components of the institutional environment of the securities market and their interaction with each other in the context of the impact on the market operation); *induction and deduction* (to analyse the elements and structure of modern securities markets, in particular, the storage of securities); *scientific abstraction* in all sections of the study.

The use of *the induction method* is more inherent in the study of the empirical stage, to which this paper belongs. The study also applied *isolation abstraction method,* which allowed identifying a key element of modern securities markets, namely the CSD, as well as identifying from all aspects of the markets an element of mechanisms for interaction between the Central Depository and other market entities, describing the operation of these mechanisms in different countries of the world, which can later become the basis for comparative analysis. This method was also used to group European member countries of the European Association of Central Securities Depositories (ECSDA) based on the composition of owners of Central Securities Depositories. The use of all these methods in a complex allowed describing the systems of securities circulation in different countries of the world, analysing them in order to identify common characteristics, which is important for their implementation in Ukraine for integration into the global system of redistribution of financial resources.

The study highlighted a new modified indirect securities storage system as the dominant characteristic of the modern world securities market, which provides the advantages of property rights protection and efficiency for investors. The core of this system is the creation of national CSDs, which control the registration procedures for the movement of securities at all stages, ensuring their maximum transparency, which is important for protecting property rights [1; 4-6].

The paper noted that the development of national securities markets within this system is based on two main models – the American (US), where the main custodians of securities are special investment structures outside the traditional banking system, and the European, where traditional banks are assigned the main function of the custodian of securities. The study also noted such trends of modern securities markets as a rapid increase in the number of transactions, the need for the same rapid maintenance in compliance with all the rights of owners, the distribution of costs and profits of all entities in the process of transactions, the expansion of the range of financial services (for example, the development of custodial services) in the conditions of their technologisation [7-9].

As one of the main tasks of regulating the securities market, the study considered the need to maintain a balance between the speed of all registration procedures in the process of transactions with securities and their control over accuracy and timeliness. Excessive regulation of the securities market slows down the speed of capital movement in the world and makes it less attractive compared to other sectors of the economy, insufficient control over the registration procedures for the movement of securities creates excessive risks for their subjects to comply with their property rights [10]. Interrelation mechanisms between national CSDs and other securities market entities, not only in the form of generalised models, but also with the characteristics of each country, are understudied in the Ukrainian economic literature. If the experience of the operation of the US and European Securities Markets was addressed by Ukrainian authors, then the experience of Asian and Australian countries with their new rapidly growing markets has not been sufficiently reflected. These questions became the main subject of this study.

Based on the research paper by the World Bank [2] and F. Brekevelt [11], this study reviewed the mechanisms of interaction between national CSDs and securities market

participants in such countries – Australia, Mainland China, the European Union, the United States, Hong Kong, India, Korea, Singapore, Taiwan. This provides an opportunity to get acquainted with the experience of the securities market operation in different countries of the world on different continents. A comparative analysis was carried out and the key fragments were identified – mechanisms of interaction between national central securities depositories and securities market entities. This approach revealed the difference between the "old" and new securities markets, their features depending on the level of economic development, technology development in the country, and political characteristics (Mainland China, Hong Kong, and Taiwan – differences and interaction with China and other countries of the world) and can be useful, both for other researchers and for making managerial decisions.

Results and Discussion

Securities markets, an integral important element of which is the storage of securities, are developing quite rapidly in the world – they cover new markets in Eastern Europe, Asia and other continents, the scope of financial instruments offered is expanding, and new technologies are emerging. The urgent needs of the securities market require the specialists involved to respond quickly to provide recommendations on regulation, control, and improvement of accounting systems. Theoretical understanding of these processes is somewhat slower. Thus, Central Securities Depositories in Europe began to be created on the initiative of the G-30 in 1989 and today have become the core element of securities markets in the world [1]. They address various aspects of the establishment of central depositories, compare existing models of securities market regulation, analyse experience already gained, and provide recommendations for new markets in developing countries. According to the classification criteria of existing models of regulation of securities markets, regulatory models are distinguished by the level of role of banks in storing and ensuring the movement of securities, the level of participation of self-governing organisations in the process of creating standards, rules for regulating the securities market and its operation, the level of state participation, and participants in the securities market in the creation of central depositories.

The paper [7] of the chosen topic analyses the common features and differences of the American and European regulatory systems. The author notes that in the American system there is monopolisation of securities markets at the level of participants, commercial banks are prohibited from investment activities, and investment banks – commercial; strict regulation, a high level of control over the behaviour of market participants by the state. The European system with a central depository is defined by complete centralisation of the market at the level of legislation, banks are allowed to combine banking operations with activities on the securities markets, minimal state participation in regulation, and a low level of control and supervision.

R. Franzioni, analysing the evolution of processes on stock exchanges, points to a change in the role of commercial banks in the American system – a restriction under the Glass-Steagall law and an increase in the Graham-Leach-Bliley law in 2000 [12]. The leading role of self-governing organisations (SGO) in creating standards and rules for the operation of the securities market is also noted (the main international organisations are listed in the introduction). However, self-governing organisations in most countries are participants in the creation of central depositories.

In the world practice, there are different models of regulation of the securities market – those where the main functions are performed by state bodies, only a small part of the powers is transferred to associations of professional participants in the securities market, and those where most of the powers are transferred to self-regulating organisations. However, the process of effective self-regulation should be based on a powerful structure of professionals who aim to maintain the reputation and gain prestige of a certain firm in the market. That is, the sphere of self-regulation can only be based on established business ethics, a system of negotiations and approvals, development of which takes time [10]. In the law of Ukraine "On state regulation of the securities market in Ukraine" [13], there are five such models:

1) without SGOs (Australia, Austria, Brazil, Italy, Spain, India, Turkey, France, Czech Republic, Sweden, etc.);

2) with a single SGO (on a functional basis) (New Zealand, Poland, Korea);

3) rejection of the SGO model (UK);

4) multiplicity of SGOs (based on functional characteristics) – Japan, Norway;

5) multiplicity of SGOs (on a mixed basis) – Canada, USA.

Making recommendations for countries that are starting to create securities market institutions, experts of the International Monetary Fund (IMF) note that the optimal model for creating a central depository would be a mixed public-private model. However, the Central Depository can only be owned and operated by private individuals if these legal entities able to solve public interests. Otherwise, it would be better if the central bank owned and operated the Central Depository.

For Australia, according to the author, the creation of a Central Depository (central counterparty) of securities markets user-based ownership is a more expensive but less risky model than models based on other forms of ownership. The creation of a securities market in Kazakhstan, which would allow its participants to enter the international capital markets, is the subject of research by Professor K.J. Lee [5]. His proposals relate to the relationship between the corporate governance structure and privatised state-owned enterprises (SOEs) as a way to reform SOEs in the transition period of the economy, using the experience of Central Asia. Companies around the world are conducting initial public offerings (IPOs) to reform SOEs and increase the liquidity of private companies. However, the issue of securities on the stock exchange is supposed to be carried out with the involvement of the National Welfare Fund. The proposals take into account the popular IPO system introduced in previous years.

In the study by Deloitte [14], the problem of operation

of the securities market was identified, which depends to a large extent on the prompt processing of transactions with securities and simplification of control over them. "Global trade volumes are still high, according to a McKinsey study from the very beginning of 2018. In the financial services industry (FSI), only the securities services industry has shown low single-digit revenue growth in recent years. Therefore, operational efficiency becomes one of the main drivers for reducing costs and increasing margins for custodians and depositories" [14]. The solution to this problem is proposed through the use of new information and financial technologies, such as distributed ledger technology (DLT) and the expansion of custodial services, in particular regarding the circulation of bitcoins. Accelerating the speed of transactions through the development of technology can have a significant economic impact on the global economy. Thus, "according to the data obtained, DLT can reduce the transaction costs of insuring insurance contracts by only USD 2-4 billion and expenses related to clearing and settlements with securities will decrease by USD 11-12 billion. The analysis shows that DLT can reduce the cost of banking infrastructure related to cross-border payments and securities trading by USD 15-20 billion. The World Economic Forum even estimates that by 2027, blockchains will store up to 10% of the value of global GDP" [14].

Issues of development of securities market institutions, its legal and regulatory framework as a key institution are considered in [9]. The scientific literature of Ukraine neglects the issues of building the architecture of national depository systems and mechanisms of interrelation of all participants in the securities market. If the experience of storing securities in the United States and European countries is analysed by Ukrainian scientists, then the experience of Asian and Australian countries is still insufficiently introduced into scientific circulation. In this context, the papers by the World Bank [2] and F. Brekevelt [11] are of particular interest. They include the analysis of securities storage systems in different countries of the world, built taking into account national characteristics, show the mechanisms of interaction between CSDs and other sub- securities market projects, ensuring the transparency of its operation, and mechanisms to protect the ownership of securities. A brief overview of securities storage systems in different countries of the world, such as Australia, Mainland China, the European Union, the United States, Hong Kong, India, Korea, Singapore, Taiwan. The study considers the international experience of these countries in more detail.

Australia. In Australia, there are two types of registers for storing securities – the CHESS sub-register and the issuer-funded sub-register. Securities are dematerialised, meaning paper certificates are not issued by both sub-registers, although the securities exchange (ASX) can still offer them. The main register for a particular company is compiled using consolidated registers of custodians registered in both the CHESS sub-register and the issuer-funded sub-register. CHESS stands for Clearing House Electronic Sub-Register System, which is managed by the ASX Settlement Pty Limited Exchange and performs two main functions – facilitates clearing and ensures trading in shares and providing an electronic sub-register of shares of companies listed on the exchange. Once the agreement is concluded, CHESS transfers ownership of the shares electronically, while facilitating the transfer of money for these shares to participants through their respective banks (delivery vs. payment or DVP settlements). CHESS participants are brokers, custodians, institutional investors, and settlement agents who perform settlement operations, trading mainly for themselves or in an agency on behalf of their clients.

To own shares in the CHESS sub-register, an investor enters into a sponsorship agreement with an authorised CHESS participant acting as a "chess sponsor" (usually a stockbroker or settlement agent, such as a custodian) to manage the investor's investment packages in the CHESS sub-register on behalf of the investor. The shares are held in the investor's name, and the shares of all securities are consolidated in a single account under a unique securities holder identification number (HIN). Investors can own shares through multiple CHESS sponsors, and the investor is given a different HIN for each of the CHESS sponsors. The ASX repository provides investors with independent stock movement reports so that they can track their assets in CHESS. The investor must notify the CHESS sponsor of any changes to their personal information, such as their registration name and address.

Shares held by investors who do not have CHESS sponsors or have purchased shares without their identification number will automatically be registered electronically in the issuer-funded sub-register. The sub-register funded by the issuer is maintained by the company that issued the shares. Most companies use the stock register to administer the sub-register on their behalf. For each share sponsored by the issuer, the issuer will assign the investor a unique securities reference number (SRN). That is, the investor will have a separate SRN for each issuer of the securities they own. Investors who want to trade these securities must transfer the securities from an issuer-sponsored account to CHESS, giving instructions to the stockbroker to do so. For each security held by the investor, a separate deposit application will be sent to the investor using the register of shares of the relevant issuer. The investor will need to notify the relevant stock registers of any changes in their personal information.

Thus, the Australian market uses both a direct storage system (through a sub-register sponsored by issuers) and a modified system for storing and conducting operations with securities (through a CHESS sub-register). The CHESS system, which has been operating for 25 years, is going to be replaced by DLT technology, which is usually called "blockchain". It is assumed that the new system will provide timely, secure and simplified access to the register of owners (for issuers), financial assets (for end investors) and related information.

Mainland China. Investors must open securities accounts in their real names with the China Securities Depository and Clearing Corporation (CSDC) in order to trade and hold the securities. Securities are held in dematerialised electronic form without physical certificates. Opening an

account is carried out through authorised institutions, usually securities companies. Investors can be individuals, legal entities, partner companies, or investment institutions that work with securities. A securities investor's account consists of a master account and sub-accounts. The master account has a unique identification number that links to the accounts, together providing a comprehensive view of the investor's securities ownership. Information about the investor's identity includes the investor's name, identity document type, and number. The Central Depository (CSDC) [15] is responsible for storing information about the securities account for investors and the register of shares of issuers of securities. The register of shares contains the name of the shareholder, the securities account number, the owner's identification number and address of the owner, and the details of the holding.

Shares held by custodians of securities and agencies for their clients are deposited with the Central Depository, which is a joint-stock company, where the shareholders are the state, state legal entities, non-state legal entities, including individuals, foreign individuals and foreign legal entities. The registration rules of the Central Depository allow registering securities in the names of nominees. The nominee enjoys legal rights to be a shareholder when providing a corresponding order to act on behalf of the beneficial owners. The Central Depository has the right to request the nominee to provide detailed information about the beneficial owners.

European Union (EU). The EU includes many developed Western markets that use common practices involving nominees and custodian banks. The latter serve both retail and institutional investors. They act as holders of securities and processors of transactions in financial instruments, in particular clearing and settlement of transactions, on behalf of their clients. Some of them are considered "important custodians" because they play an important role in the above-mentioned responsibilities for major global investors and largely seek to internalise clearing and settlement of transactions of their investor clients, rather than redirecting them to the appropriate CSD. To ensure such generally accepted market practices, the EU authorities imposed strict rules on large custodians and used additional safeguards to eliminate specific clearing and settlement risks in such circumstances.

In the EU, the Committee of European Securities Regulators (CESR) [15] and the European Central Bank (ECB) have established a set of standards for clearing and securities settlements that are compatible with the CPSS-IOSCO recommendations for securities settlements of the system. According to EU standards, securities should be immobilised or dematerialised and transferred as much as possible by depositing books in the Central Depository [16]. To protect the integrity of securities issues and the interests of investors, the Central Depository must ensure that the issue, storage and transfer of securities is carried out properly. The vast majority of European stocks have been dematerialised, and where physical certificates are available, they are replaced by electronic entry of books into security accounts. As cross-border investments have become popular in Europe, cross-border storage chains involving multiple intermediaries are common, starting with a Central Depository through local custodians, global custodians, and the last intermediary serving the end investor. For the most part, large institutional investors have up to four intermediaries, including the Central Depository. Intermediaries typically use "all-round" or "combined nominee" accounts with a Central Depository or other intermediary level at which they hold securities of more than one investor in the account. In the context of issuer-investor relations represented by "direct" or "indirect" participation, different European markets use different models.

Direct storage system with investors and nominees' accounts (for example, Sweden) – an investor (whether Swedish or not) can choose the holder of the securities to hold them in their accounts with the Central Depository (registered to the owner) or to keep them in a cash account with a member of the Central Depository who, for his part, holds the securities in a nominal account with the Central Depository (registered to the nominee). The legal owners of securities are certified in the books of nominees. Swedish nominees are required to report their clients (main owners) to the Central Depository, allowing the issuer to be informed of all their shareholders. In a direct storage system with two-level registers (for example, Spain), the Central Depository maintains a central register with accounts of professional participants, such as banks or other intermediaries. Each participant manages the implementation of a detailed register of securities in the name of their clients. Both registries are updated based on daily trading and settlement data. According to Spanish law, the persons included in any of these registers are shareholders.

In an indirect storage system with a single-level register (for example, Germany and France) – the central depository provides accounts only to professional participants or first-level clients, such as custodian banks and other financial institutions, such as central depositories in other countries. Usually, domestic investors are clients of Central Depository participants, while international end investors can use other banks in storage chains. These storage chains typically consist of up to four or more intermediaries between the Central Depository and the end investor. In some countries, depository banks are required to disclose information about the issuer's final investors as of the recording date in the event of shareholder rights being exercised.

Indirect storage model without a permanent register (for example, Italy) – members of the Central Depository, usually banks, maintain securities accounts for their clients (end investors or other banks). The register of shares is not a "permanent" register, as it is updated with end-investor data in special cases, such as a general meeting of shareholders, where participants are invited by the Central Depository to transmit end-investor data.

In a mixed storage model with a permanent register (for example, in the United Kingdom and Ireland) – investors can hold shares directly in the register in dematerialised or materialised form, or an intermediary can be used to

hold shares on their behalf. The Register of shares includes only persons who are shareholders. Investors who trade securities through an intermediary can arrange to enter their name directly in the register. In the UK, part of the Register of shares is maintained by the Central Depository, and this part is reflected in the company's register, which makes it unnecessary to transfer the data of final investors to exercise the rights of shareholders. The rapid growth of economic activity between citizens and economic entities of different countries, especially in Europe, has put on the agenda the need to resolve the issue of cross-border securities movement. This issue is currently in the focus of attention of the European Parliament, the European Commission, other European organisations and relevant national institutions of European countries [15].

Hong Kong. In Hong Kong, securities are often held by investors through intermediaries, including brokers and custodians. The Central Clearing and Settlement System (CCASS) is used by the Central Depository. It accepts deposits of physical securities certificates from participants for placement and secure storage. Investors (individuals, joint ventures, or corporations) can apply to become investor participants (IP) in HKSCC. Each IP is allocated one "universal" promotional account, while each other participant has one checking account for settlement purposes and one account that entitles them to receive benefits. Broker or custodian members can open separate shares (SSA) with a service statement from HKSCC for their investor clients. Shareholders of client investors will be registered by HKSCC in these accounts, separately from those participants who open and manage accounts. For investors-clients, HKSCC provides statements on the movement of shares in accounts and receives corporate communications, in particular annual reports and notifications on corporate activities directly from stock registrars.

The transfer of securities after performing an operation on the HKEX securities market is made "to" and "from" the stock accounts of clearing participants (intermediaries) electronically, by recording in the CCASS book. At the second level – the transfer of securities "to" and "from" IP shares. Accounts can be initiated either by the IRA itself or through its intermediary participants (clearing parties, custodian participants, lender, or mortgagee) in the form of Investor Settlement Instructions (ISI). Shares held in the CCASS depository are registered in the name of the HKSCC limited nominees, a general nominee that exercises the rights of shareholders over their securities and acts on instructions received from members. Participants can opt out of physical share certificates from the CCASS depository. Issuers may require HKSCC to provide them with information about CCASS shareholder security, including names, addresses, and IP shareholder information.

India. In India, Securities exist in the form of a physical certificate, but they need to be dematerialised, that is, converted to electronic form, for trading on the stock exchange. Dematerialised securities are held in the accounts (Demat accounts) of beneficiaries in two depositories – the national securities depository (NSDL) and the centre of depository services (India) (CDSL), which have limited liability. Securities can be "rematerialized" – electronic balances held in a Demat account are converted back into physical certificates. After dematerialisation, the issuer of securities is registered (through its agent) with the depository as the owner of the securities, and the investor as the beneficial owner.

The investor (beneficial owner) opens a beneficiary account with a registered depository participant (DP) NSDL or CDSL and can close the account at its own discretion as a bank account. Accounts can be opened jointly with other individuals. Depository participants can be banks, brokers, custodians or financial institutions approved by the Securities and Exchange Board of India (SEBI), the market regulator. Multiple beneficiary accounts can be opened with the help of one or more depository participants (DP), without any restrictions. The documents required to open an account include proof of identity, which is very often a PAN card, and proof of address. PAN is a permanent account number, which is a unique 10-character alphanumeric identifier issued by the Department of Income Tax of India to each judicial authority defined by the Indian Income Act of 1961. [12]

Communication between depositories and investors is carried out indirectly through the depository participant. An investor with an open Demat account is provided with the client's account number and Client ID, which must be used together with the depository participant ID (DP) to perform operations with securities. Securities transactions are settled via electronic transfers as follows: securities are transferred from the merchant client's account to the clearing participant's account for clearing, for example, the NSE clearing of the National Stock Exchange of India (NSE). The buyer receives securities on his account from the account of the clearing participant after delivery to the settlement house in the specified locality. Deliveries are made according to the delivery instructions (which may be permanent). Clients can also pay through the custodians of their securities. At the clearing member's choice, settlements can also be made directly by delivering securities to the investor's account (such a mechanism is available for clearing operations on both the NSE and the Bombay Stock Exchange (BSE).

Korea. The Korean Securities Depository (KSD) is the Central Securities Depository in Korea, which is responsible for the initial transfer of securities between accounts, delivery of securities, and payment after settlement of securities transactions. Securities that exist in physical (printed) form and securities that can be deposited in KSD are fixed by KSD. An investor can directly open an account with KSD, deposit and hold securities in their own name, or do so through a depositor. The latter who deposits and holds securities in the investor's KSD must maintain an "investor account book" that records the names and addresses of investors, as well as the type and number of securities deposited and the names of issuers. KSD must prepare and maintain a "depositor's account book" and create the difference between the depositor's share and the investor's deposit. Any

person listed in the investor's book of accounts and in the Depositor's book of accounts is considered the owner of the relevant securities (the "beneficial shareholder").

Deposited securities are registered in the name of KSD in the securities register by the issuer, and when the depositor or his investors buy or subscribe to the securities, the issuer of the securities must register such securities in the name of KSD on behalf of the depositor or his investor. KSD can exercise the rights to deposited securities at the request of the depositor or its investors. At the request of the issuer, in accordance with the requirements of Korean economic legislation, KSD must notify the issuer of the beneficial shareholders. The Issuer or transfer agent must prepare and maintain the register of beneficial shareholders, and the total block of shares of the shareholder, together with information from the register of physical certificates on the exercise of the shareholder's rights [16].

To trade on the Korea Exchange (KRX), an investor must first open a trading account in the investor's name through a securities company licensed by the Financial Services Commission (FSC), which is a member of KRX. Therefore, non-resident foreigners must first register their personal information with the Financial Supervisory Service (FSS) and obtain an Investor Registration Certificate (IRC). A KRX member who opens a trading account for an investor must classify an investor as either a "professional investor" or a "regular investor", depending on the investor's level, investment experience with the investor's financial products and assets. Settlements with securities transactions are made at two levels – between KRX and KRX participants, as well as between KRX members and their investors. Delivery of securities and money is carried out by KSD by book-entry between accounts.

Singapore. The Central Depository (CDP) in Singapore serves as the Central Depository and is the counterparty (CCP) for all transactions made on the Singapore Exchange (SGX) securities market. Physical certificates are deposited in the CDP before being sold. The Singapore market uses both direct and indirect corporatisation systems. Investors (individuals or corporations) may hold shares directly in a direct securities account or indirectly in a sub-account of a depository agent's securities account opened with CDP. The CDP will treat the holder of a direct securities account as the absolute beneficial owner of the securities held in that account. Each depositor (other than the depository agent) must not have more than one direct securities account maintained on its own behalf with the CDP. The depository agent must open and maintain a separate sub-account for each of its clients and separate its clients' holdings in these sub-accounts from each other and from the inventory in its own account. Each sub-account must contain the account number of the depository agent and the sub-account number.

Depository agents may include trading members of the Singapore Exchange (SGX), clearing members of the Central Depository (CDP), registered trust companies, Singapore-licensed banks, or a trading bank approved by the Monetary Authority of Singapore. A depository agent can also be a nominated company that holds shares on behalf of its investor clients. Most brokers in Singapore offer nominee or custodian services to investors for lower brokerage fees for trading securities than brokerage services for investors with direct CDP shares. The CDP may assign agents and service providers, including custodians, to store deposited securities. All securities deposited with the Central Depository (CDP) are registered in the name of the Central Depository (CDP) or its designated entities. CDP has a direct relationship with depositors (including end investors who have opened direct securities accounts) only in relation to the details of securities and transactions, and not to actions with securities [17].

Taiwan. The Taiwan depository Clearing Corporation (TDCC) is the Central Securities Depository in Taiwan. All types of securities listed are immobilised or dematerialised in the TDCC. TDCC is a registrar and transfer agent for publicly traded companies. Organisations that can become participants by opening an account with TDCC to work with securities, deposits, withdrawals, and non-cash transfers include the Taiwan Stock Exchange (TWSE), securities firms, custodian institutions, securities issuers, foreign depositories or clearing houses, and other institutions. The TDCC participant must provide the appropriate identification of the parts owned by the participant or the participant's clients for depositing securities in documentary or non-cash form. The participant must provide detailed information about each of their clients, including the name, address, national identification number of the client (person or organisation), or a single identification number of the organisation. The use of keepers is common in Taiwan. Each custodian opens a single TDCC account with all custodian customer accounts opened as sub-accounts under this umbrella in officially approved customer names. The securities are held in sub-accounts and re-registered by the TDCC until the date of recording the corporate action. Designated registration in the custodian's name is prohibited when storing physical certificates outside the TDCC. Physical possessions are registered in the name of the beneficial owner.

To calculate net purchases/sales of clients through a securities firm, a non-cash transfer of securities is made between the client's depository account with the firm and the firm's current account, as well as between the firm's current account and the TWSE current account. When a custodian institution that is a member of the TDCC is used, a non-cash transfer of securities for trading settlement is made between the custodian institution's Depository Account and the custodian institution's account opened for the securities firm. Special requirements apply to foreign investors for trading on the Taiwanese stock market. Following the abolition of the Qualified Foreign Institutional Investor system (QFII) in 2003, foreign Chinese and foreign investors must register with TWSE to obtain an "investor ID" before opening a trading account with a local securities firm. Registration can be carried out through an agent bank. Foreign investors are divided into four categories: 1) offshore foreign institutional investors; 2) offshore foreign Chinese and foreign individual investors; 3) onshore foreign institutional investors;

4) individual investors from overseas Chinese and foreign territories.

United States (United States of America). The main central depository in the United States is the Depository Trust Company (DTC), which was established in 1973. DTC corporation has now become the largest Central Depository organisation in the world. Almost all municipal securities and the vast majority of U.S. stocks and corporate bonds, use DTC as their Central Securities Depository (CSD). To ensure economies of scale, DTC has launched the Fast Automated Securities Transfer (FAST). FAST minimises the transfer of certificates and streamlines the processing of transfers by recording undocumented securities in the issuer's books of the transfer agent. To create conditions for the dematerialisation of securities, DTC has created a Direct registration system (DRS), which allows investors to choose whether to store securities in non-documentary form by the issuer [18]. However, although there has been a significant drop in the number of physical certificates deposited under the DTC code, direct ownership of physical certificates still prevails in the United States. In order for the US to remain completely paperless, a rule must be submitted for exchanges that would exclude the possibility of issuing physical unit certificates for new companies that are planned to be included in the list. Nowadays investors can hold securities in the United States in three ways:

1. Securities are immobilised by the DTC and registered by the DTC with their issuers or transfer agents, with the investor's name recorded in the book of his brokerage firm as the beneficial owner of the Securities and the name of the brokerage firm recorded in the DTC ownership record. The DTC holds the securities as the holder of an entry in the issuer's securities register. Brokerage firms provide regular account statements to investors who are beneficial owners.

2. Through the Direct registration system (DRS), DTC securities are stored electronically by the investor in the investor's own name directly in the issuer's books or the issuer's transfer agent's books. The investor receives an application from the transfer agent, which provides proof of ownership of the stock certificate, that is, the securities are devalued. There is direct corporate communication between the Issuer or its transfer agent and the investor. To sell securities held through DRS, an investor must transfer the Securities electronically from the investor's account with the Issuer (or its transfer agent) to the broker-dealer's account via DTC. Data transfer agents that use DRS are also registered users of the FAST app. They keep outstanding balances in electronic form for all DTC positions and update information about the relationship with the DTC on a daily basis.

3. With paper certificates – investors can keep paper certificates, but they must deliver the certificates to the broker three days before the stock is sold. The broker will then deposit the certificates to their DTC account. Ownership will be registered in the name of the DTC nominee electronically. When buying shares, the investor can withdraw a physical certificate from the DTC, which will be registered in the investor's name and address [18].

In the United States, it is common to use custodian banks, especially institutional investors. Integration processes in Ukraine are developing very slowly. The main reason for the lack of transnational operations in relation to securities is the lack of correspondent relations between depositories due to the inadequacy of depository entities. In Ukraine, the largest depository system is the National Depository System with limited functionality, while most countries of the world have CSDs that interact with each other, guaranteeing the order and security of transnational operations with securities. Approaches to the development of the securities market and, in particular, depository activities in Ukraine are contradictory. Some fragments of the securities market were created with the help of American specialists, while others were created with the help of French ones. In the United States, the main custodians of securities are investment banks that do not have traditional banking functions to service the economy, investment funds, and holding companies. Banks, on the other hand, have very limited functions regarding the storage and circulation of securities. In Europe, it is banks that play a key role in the storage and circulation of securities. On a technical level, using the experience of both is useful. The lack of a conceptual approach and the use of elements of different systems of storage and circulation of securities, which have fundamental differences, hinders the creation of the holistic system.

Conclusions

Analysis of securities storage systems and their circulation in different countries of the world allows the study to draw the following conclusions. In all countries of the world where work is carried out with securities, the most common is a modified indirect system for storing securities. With the development of technology, the documentary (physical) form of securities is gradually replacing them with a dematerialised form, that is, an electronic record. In many countries of the world, an indirect system of securities storage co-exists with a direct system (a classic example is the United Kingdom).

The essence of the modification of the indirect securities storage system is the presence of a Central Securities Depository, which controls the registration of securities turnover at all stages. In most countries of the world where work is carried out with securities, national central depositories have already been established, and mechanisms for interaction between the Central Depository and other participants in the securities market are being developed and improved. There is usually a direct relationship between the level of economic development and the availability and operation of the Central Depository.

There is a tendency among global markets to adopt a transparent market surveillance model that requires the identification of intermediary clients, i.e., final investors, for each order and transaction. The transparent approach introduced in each market should be developed in such a way as to correspond to its own structure and market practices. In Ukraine, where there is a decentralised system of depository services, the creation of a Central Securities

Depository is an urgent problem. The process of its creation was slowed down and stopped in 2009-2010. The existing decentralised system of depository services in Ukraine, which has not fundamentally changed since the 1990s, hinders the development of the stock market, because it complicates the procedure for making transactions and increases risks.

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Діяльність з надання послуг щодо зберігання цінних паперів: міжнародний досвід

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Анотація. Актуальність дослідження зумовлена наявністю низького рівня розвитку ринку цінних паперів в Україні, яка тільки формує інституції і механізми ринкової економіки. В Україні діє децентралізована система депозитарного обслуговування, що стримує розвиток фондового ринку, адже децентралізована система обліку прав на цінні папери ускладнює процедуру здійснення угод та збільшує ризики. Метою дослідження є вивчення міжнародного досвіду депозитарної діяльності щодо цінних паперів в умовах швидкого розширення ринків цінних паперів, особливо в країнах Східної Європи і Азії, їх технологізації, виявлення їх нових функціональних можливостей та домінуючих моделей їх архітектури в контексті регулювання, взаємодії суб'єктів ринку та захисту їхніх прав власності. Основними методами дослідження міжнародного досвіду діяльності з надання послуг щодо зберігання цінних паперів є емпіричний, аналітичний та індуктивний методи, що у комплексі дозволили описати системи обігу цінних паперів у різних країнах світу, проаналізувати їх з метою виділення спільних характеристик, що важливо для впровадження їх в Україні для інтеграції в світову систему перерозподілу фінансових ресурсів. У статті розглянуті різні системи зберігання цінних паперів, національні депозитарні системи, розкриті особливості національних механізмів взаємозв'язку всіх учасників ринку цінних паперів, виявлені концептуальні проблеми організації ринку цінних паперів в Україні, обґрунтовано необхідність адаптації міжнародного досвіду для інституційного розвитку національної депозитарної системи України. Матеріали статті мають практичну цінність для розвитку депозитарної системи в Україні, як основи функціювання ринку цінних паперів, сумісної з технологізованими міжнародними депозитарними системами у всій повноті функціональних можливостей, що забезпечує гарантії прав власності інвесторів і дає нагоду Україні стати повноцінним суб'єктом перерозподілу світових фінансових ресурсів, відповідно до цього залучати інвестиції для розвитку економіки за міжнародними правилами і стандартами «прозорого» функціювання ринків цінних паперів, цим самим формуючи інституційні бар'єри корупційним впливам. Зроблений порівняльний аналіз депозитарних систем різних країн дозволяє виявити слабкі місця у наявній депозитарній системі України, намітити концептуальні підходи до законодавчих та організаційних дій з її розвитку

Ключові слова: цінні папери, зберігачі, депозитарна діяльність, Центральний депозитарій, міжнародний досвід

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