



UDC 338.432

Development of integration structures in the agricultural sector of the economy in wartime conditions

Svitlana Kravchenko*

Doctor of Economics, Professor
National Scientific Centre "Institute of Agrarian Economics"
03127, 10 Heroiv Oborony Str., Kyiv, Ukraine
<https://orcid.org/0000-0001-5541-4495>

Mykola Malik

Doctor of Economics, Professor
National Scientific Centre "Institute of Agrarian Economics"
03127, 10 Heroiv Oborony Str., Kyiv, Ukraine
<https://orcid.org/0000-0001-9198-4460>

Oleksandr Shpykuliak

Doctor of Economics, Professor
National Scientific Centre "Institute of Agrarian Economics"
03127, 10 Heroiv Oborony Str., Kyiv, Ukraine
<https://orcid.org/0000-0001-5257-5517>

► **Abstract.** The activation of integration structures is of particular importance in the system of enhancing the solvency, competitiveness, and adaptability of the agricultural sector of the economy, as well as stabilising food security in the context of integration with the European community. The aim of the article was to substantiate the theoretical and methodological, socio-economic foundations, and the issues of developing integration structures in rural areas under extreme conditions of operation. The methodological basis of the research was grounded in the principles of modern institutional economic theory, functional and systemic analysis. Monographic, economic-statistical, graphical, structural-functional, and abstract-logical methods and approaches were employed to summarise the results. The current state, place and role of integration structures have been examined. A systematic analysis of the problems and trends in the functioning of integration structures during wartime has been conducted. The theoretical and methodological aspects of the functioning of integration formations have been considered. The reasons that hinder the activation of the integration movement in the agricultural sector of the economy at the present stage of development have been identified. The dynamics of the development of existing large entrepreneurial structures in Ukraine have been assessed, and negative aspects that need to be considered when organising and functioning of integration associations depending on the type and activity of the association have been identified. The role of international technical assistance and state support in stimulating and strategising the development of integration structures in Ukraine has been clarified. Opportunities and prospects for the development of the integration movement and the issues of sustainable development of integration structures have been identified. It has been established that one of the priority areas of regional policy is the development of integrated formations of the agribusiness holding type and cooperative structures in rural areas. The role of integration structures in the formation of social capital and sustainable development of rural territories in the post-war reconstruction of Ukraine's economy has been

► **Suggested Citation:** Kravchenko, S., Malik, M., & Shpykuliak, O. (2025). Development of integration structures in the agricultural sector of the economy in wartime conditions. *Ekonomika APK*, 32(2), 10-27. doi: 10.32317/ekon.apk/2.2025.10.

*Corresponding author



Copyright © The Author(s). This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (<https://creativecommons.org/licenses/by/4.0/>)

revealed. The informational material can be used in the development of programmes for the advancement of large entrepreneurial structures in the agrarian business of the regions

► **Keywords:** business entity; business structures; integrated formations; agrarian business; agroholding; cooperative

► Introduction

Identification of the peculiarities of the processes of development of integration entrepreneurial structures in the context of armed conflict is focused on solving socio-economic problems of peasants; ensuring financial and credit components of competitiveness of business entities; increasing productivity and efficiency of resource management; increasing gross added value; ensuring environmental safety of the high-quality raw material base; implementing modern methods of soil cultivation, rational water use, automation and mechanisation of production processes, modern methods of storage, processing and marketing of products, resource and energy-saving production technologies and digital technologies; using drones and modern monitoring systems; enhancing innovation of business activities, etc.

Noteworthy are the results of the assessment of the socio-economic mechanism of the functioning of entrepreneurship in agriculture in extreme crisis conditions, which are reflected by M. Nehrey & O. Trofimtseva (2022). It is particularly important to preserve the development of human capital in rural areas, given the decline in the purchasing power of citizens, labour migration, occupation of territories, shrinking domestic market niches of enterprises, breakdown of logistics chains, etc. Focusing on the need for the survival and development of cooperative-integration relations, V. Kyfyak *et al.* (2022) emphasise the importance of solving such a significant problem as the lack of sources of financing for their own business in a market environment. And the results of research by S. Pasko (2022) show that holdings or large integrated structures that support the environmental safety of a high-quality raw material base in the context of a system of "sustainable" governance and corporate social responsibility are generators of innovations in the development of entrepreneurship in agriculture. The results of the research by O. Chorna *et al.* (2022) substantiate the reasons for the difficulty of diagnosing the state of economic security of holdings, in particular, the hierarchy of agricultural holdings as business entities; fragmentation, unsystematic and lack of coordination of the processes of diagnosing the state of economic security of economic security components.

A group of scientists O. Shpykuliak *et al.* (2023b) revealed the state and trends in the development of entrepreneurship in agriculture in extreme operating conditions, the degree of restructuring and innovation of business entities, business preservation strategies, and a system for optimising the cost of resource provision for agricultural production. Factors hindering the development of business entities in agriculture include: a decline in the quality of demand for food in the domestic market and human capital in rural communities; imperfect investment and innovation support for innovations; lack of projects to support the development of non-agricultural and communal entrepreneurship in rural areas, etc.

Researchers A. Shevchenko & O. Petrenko (2023) revealed the main factors of inhibition and priority factors of socio-economic development of entrepreneurship in rural areas, reducing the level of unemployment of peasants and stimulating self-employment. The mechanisms for the development of investment and innovation technologies of business entities in agriculture and encouragement of start-up financing are substantiated. Small and medium-sized businesses need to form agricultural cooperatives; stimulate investment in organic agricultural production; and introduce scientifically based crop rotation systems, precision farming technologies, energy and resource-saving production technologies.

The results of research by T. Vlasenko (2023) substantiate the need to combine the processes of production, processing and sale of products of business entities into a technological chain, reveal the data on the scale effect, and focus on the formation of integrated structures in the agricultural sector of the economy and their advantages. Additional positive aspects of the functioning of integrated structures include optimisation of financial flows and the taxation system; diversification of production; elimination of regional intermediaries; minimisation of costs; and introduction of new technologies. The synergistic effect is the main advantage of agriholdings. The group of scientists O. Naumov & O. Naumova (2023) emphasises that clustering is the most effective form of integration of agricultural and agro-industrial production entities. The author substantiates the programme for the development of clusters as integrated agro-industrial formations and the implementation of strategic planning. The institutional regulation of agro-industrial production development is facilitated by overcoming the disparity in prices for products, solving socio-economic problems in rural areas, forming an adequate incentive policy, intensifying investment and innovation activity, specialisation of business entities for the raw material base of specific processing enterprises, etc. Researchers Y. Danko & N. Zhurbenko (2023) substantiate that the mechanism of agrarian clustering contributes to cost optimisation, efficient use of available resources, diversification of production, implementation of joint efforts and innovations of business entities. Clustering is a tool for creating competitive innovative agriculture in the context of high risk and European integration challenges.

The authors of P. Kutsyk *et al.* (2023) reveal the state of development of agricultural cooperation in modern conditions and European integration challenges and substantiate that: a) a high level of unity; care for its members; organisational, human, social capital are the advantages of cooperation; b) it is extremely necessary to form purchasing and selling, production, service, agricultural cooperatives; cooperatives for the provision of services. A group of scientists A. Panteleimonenko &

V. Honcharenko (2023) substantiated some of the difficulties of being unready to create a cooperative (lack of special training of existing peasant entrepreneurs; unwillingness to take personal responsibility; socio-psychological inertia of entrepreneurs; low trust in employees of the production process; lack of understanding of the benefits of mutual assistance; unwillingness to pay for services; rejection of “collectivist values”; lack of faith in systemic support from the state, etc).

N. Kryvenko (2024) suggests that the main goals of agrarian integration include solving social problems in rural areas; providing the population with high-quality, environmentally friendly and competitive products at an affordable price; rational use of resources; increasing exports; activating investment and innovation potential, etc. From the standpoint of functional analysis, I. Kosach (2024) substantiates theoretical and applied principles of strategic management of capitalisation of business entities. Attention is focused on the cost of business operation; geopolitical risks; market capitalisation of entrepreneurial activity; strategies of planning, motivation, communication, stimulation of investment attractiveness; the state of development of the financial and credit market; adaptability and success of the management decision-making system in financial management. The authors M. Ihnatenko *et al.* (2024) reveal the main factors of development of large innovative agricultural holdings and prove that the introduction of advanced technologies in the production process increases the efficiency of business entities, the level of product quality, storage and export capacities. Agriholdings based on public-private partnerships can be additional sources of investment for the development of small and medium-sized enterprises. And economist O. Demchenko (2024) focuses on the complexity of legal regulation of cooperatives; the peculiarities of integrating small and medium-sized producers; and improving information support.

However, a number of issues related to the mechanism of functioning of integration business structures in agriculture in extreme crisis conditions remain insufficiently researched and require further consideration. The purpose of the article was to evaluate and substantiate, from the point of view of the system-functional approach, the practical, theoretical and methodological foundations of the economics of the activity of integration business structures in the agro-industrial complex in wartime.

► Materials and methods

The research was based on the Law of Ukraine No. 1087-IV (2003); Law of Ukraine No. 3587-IX (2024); Law of Ukraine No. 3528-IV (2024). The information base also included the Economic Code of Ukraine No. 436-IV (2003); Land Code of Ukraine No. 2768-III (2001). In addition, the study used data from publications of national and international news agencies, in particular, Kernel Holding S.A. Annual report (2023); State Statistics Service of Ukraine (2024); Dynamics of the land bank (2024). The results of the works of Ukrainian and foreign scientists on the development of entrepreneurship and integration structures in agriculture in crisis conditions were taken into account (Kaletnik *et al.*, 2022; Kuttsyk *et al.*, 2023; Stender *et al.*, 2024).

System-functional analysis and positions of institutional economic theory are the theoretical and methodological basis of the study. Abstract and logical methods were used to determine the essence of the processes of survival of integration structures in rural areas and in agricultural business in the context of the crisis and, in particular, in the synthetic analysis of the peculiarities of the socio-economic mechanism of functioning of agricultural holdings and cooperative formations in extreme conditions. The article also uses structural-functional, statistical, graphical methods and approaches to generalising the results to establish cause-and-effect relationships in characterising the development of certain groups of large business structures and formulating conclusions.

The solution of a system of normal equations and the least-squares method were used to establish the parameters a_0, a_1 :

$$y = a_0 + a_1 \cdot x; \quad (1)$$

$$\begin{cases} a \cdot \sum x^2 + b \cdot \sum x = \sum x \cdot y, \\ a \cdot \sum x + b \cdot n = \sum y \end{cases} \quad (2)$$

where y – the theoretical values of the effective characteristic; a_0 – the start of the countdown under the condition that $x=0$; a_1 – the regression coefficient; x – the value of the factor feature; n – the number of observations.

As a result of solving the system, the values of the coefficients a_0, a_1 and analytical expression of the dependency were obtained:

$$y = a_0 + a_1 \cdot x. \quad (3)$$

Kramer's formulas was also calculated, which look like this:

$$x_1 = \frac{\Delta_1}{\Delta}; \quad x_2 = \frac{\Delta_2}{\Delta}, \quad (4)$$

where x_1 and x_2 – the unknown elements of the system; Δ – the determinant of the system matrix; Δ_1 and Δ_2 – the determinants of matrices A_1 and A_2 , respectively; A_1 and A_2 – the matrices obtained from the system matrix by replacing the corresponding column with the vector of right-hand sides of the system.

The coefficients of determination and correlation were calculated using the following substitute formulas:

$$r = \frac{\sum(t_{x_i} \cdot t_{y_i})}{n} = \overline{t_{x_i} \cdot t_{y_i}}; \quad (5)$$

$$t_x = \frac{x_i - \bar{x}}{\sigma_x}; \quad t_y = \frac{y_i - \bar{y}}{\sigma_y}; \quad (6)$$

$$\sigma_x = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n}}; \quad \sigma_y = \sqrt{\frac{\sum(y_i - \bar{y})^2}{n}}; \quad (7)$$

$$d = r^2, \quad (8)$$

where \bar{y} – the mean value of the resultant characteristic; \bar{x} – the average value of the factor trait; i – the experiment; r – the linear correlation coefficient; t_x, t_y – the intermediate indicators for calculation; σ_x – the standard deviation of the factor trait; σ_y – the standard deviation of the resultant trait; d – the coefficient of determination, the

calculation of which makes it possible to determine one of the shares of total variation, factor and resultant signs.

The use of the above equations and coefficients helps to establish how changes in agricultural policy and structures of cooperation between business entities affect economic performance. The period of 2012-2023 was taken for the study. Some indicators of economic activity of operating large business structures in agriculture for 2023 were not made public in order to comply with the requirements of the Law of Ukraine No. 2524-IX (2022) to ensure the guarantees of state statistics authorities regarding statistical confidentiality. To make the necessary calculations and establish a forecast for 2030 of annual changes in agricultural products sold by large business structures and net profit, as well as the impact of the total cost of sales Kernel Holding S.A. (Kernel Holding S.A. Annual..., 2023) net sales revenue was based on web versions Word, Excel and peculiarities of the trend analysis.

► **Results and discussion**

The country's socio-economic, organisational and management system is gradually adapting to functioning in extreme conditions, reputational and European integration challenges. In 2023, compared to 2022, the gross domestic product grew by 5.3%. Increased logistics and labour costs, a shortage of qualified personnel, and damage to energy facilities hinder the systematic planned strategic development of business entities and integration structures in the agricultural sector of Ukraine. It was found that the number of operating large business structures in agriculture over the past 12 years has increased almost 3 times in 2021, but in 2022, due to military aggression, it decreased by 20.41% (Fig. 1). The number of employed workers in large business structures was highest in 2015 (48.275 people) and lowest in 2017 (27.537 people). Due to the outbreak of hostilities, the total number of employed workers decreased by 20.43% (Fig. 2).

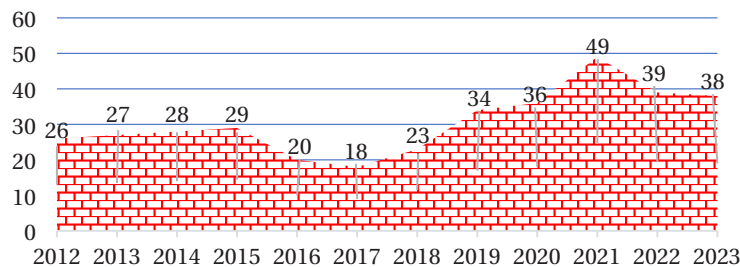


Figure 1. Operating large business structures, units

Source: State Statistics Service of Ukraine (n.d.)

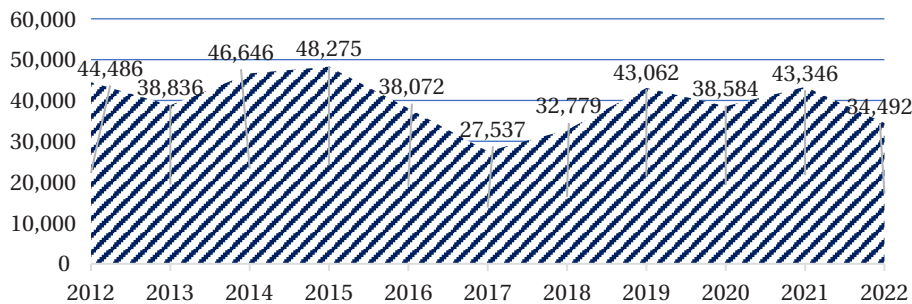


Figure 2. Number of employees in large business structures, persons

Notes: there is no data published for 2023

Source: State Statistics Service of Ukraine (n.d.)

In the period 2018-2022, the dynamics of changes in the key economic performance indicators of existing large business structures in agriculture is characterised by a sharp decline in net profit, profitability of operating and total activities, balance sheet, and an increase in production costs (goods and services), short-term bank loans in 2019 and 2022. It was found that during the wartime period of 2022-2024 alone, the loan portfolio of the real sector of Ukraine's economy decreased by 2.6 billion UAH. In particular, as of the beginning of April 2024, it stood at 787.549 billion UAH. However, loans to large businesses accounted for only 23.44% of this loan portfolio, and collateralised loans to agricultural businesses accounted for 14%. The quality of the loan portfolio is highest among rural entrepreneurs. In fact, the outbreak of the armed

conflict in Ukraine has had a negative impact on the socio-economic, organisational, managerial, financial and credit status of large agricultural businesses and the sustainable development of local communities. Thus, in 2022, the following indicators of economic activity of operating large business structures in agriculture decreased: net profit by -62.38%; profitability of all activities by -27.9%; capital in revaluation and additional capital by -18.43%; volume of products (goods, services) by -15.53%; social contributions by -15.36%; volume of products sold by -2.87%; retained earnings (uncovered loss) by -1.68%. Some statistics for 2023 have not yet been made public. In 2023, compared to 2018, net profit increased by +6.06%; current assets by +2.76 times; current liabilities and collateral by +2.03 times; equity by +2.28 times; depreciation by

+2.9 times. The level of profitability of all activities in 2023 decreased by –12.6% compared to 2018. However, in 2023, compared to 2021: a) net profit decreased by –4.04 times;

profitability by –4.93 times; equity by –1.5%; b) current assets increased by +8.88%; current liabilities and collateral by +0.15% (Table 1).

Table 1. Main indicators of economic activity of existing large business structures in agriculture (million UAH; in constant prices of 2016; end of year)

Indicators	2018	2019	2020	2021	2022	2023	2022 in % up to 2018
The volume of products (goods, services) produced	63,282.8	80,991.8	90,514.9	130,042.0	109,850.9	nd	+73.59
The volume of products sold	54,757.9	74,131.9	78,052.2	114,806.3	111,514.9	nd	+103.6
Value added by production costs	5,912.9	9,900.0	36,568.2	54,313.4	28,292.8	nd	+378.5
Net profit	11,217.5	5,026.2	8,677.6	48,273.2	18,158.9	11,941.8	+61.88
Profitability level of all activities, %	21.2	6.1	9.7	42.4	14.5	8.6	–31.60
Current assets	56,519.7	76,357.2	87,440.8	143,322.6	158,252.2	156,062.4	+179.9
Current liabilities and provisions	37,975.1	58,428.4	68,122.9	77,003.7	84,892.4	77,116.9	+123.5
Equity capital	63,650.0	91,592.9	99,557.1	147,381.6	145,514.8	145,162.8	+128.6
Costs of production (goods, services), including:	66,029.9	84,883.5	70,174.4	99,772.7	100,742.4	nd	+52.57
Amortisation	3,709.9	6,531.2	7,659.0	9,984.1	9,292.8	10,772.2	+150.5
Labour costs	3,993.9	6,787.1	6,797.9	8,782.6	7,575.4	nd	+89.67
Contributions to social activities	807.0	1,298.5	1,401.6	1,773.4	1,500.9	nd	+85.98
Personnel costs	4,800.9	8,085.6	8,199.5	10,556.0	9,076.3	nd	+89.05

Notes: nd – no data published

Source: State Statistics Service of Ukraine (n.d.)

The study revealed a functional relationship between the volume of products sold by operating large business

entities and their net profit for 2018-2022 in million UAH at constant prices of 2016 (Tables 2-3).

Table 2. Information data for establishing the relationship between profit indicators and the volume of products sold by operating large business structures

Indicators	2018	2019	2020	2021	2022	2023
Products sold, X_i	54,757.9	74,131.9	78,052.2	114,806.3	111,514.9	nd
Net profit (loss), Y_i	11,217.5	5,026.2	8,677.6	48,273.2	18,158.9	11,941.8

Notes: nd – no data published

Source: State Statistics Service of Ukraine (n.d.)

Table 3. Estimated values of intermediate indicators for establishing a linear dependence function

	x_i^2	x	y	y_i^2	$x_i y_i$
1	2,998,427,612.41	54,757.9	11,217.5	125,832,306.25	614,246,743.25
2	5,495,538,597.61	74,131.9	5,026.2	25,262,686.44	372,601,755.78
3	6,092,145,924.84	78,052.2	8,677.6	75,300,741.76	677,305,770.72
4	13,180,486,519.69	114,806.3	48,273.2	2,330,301,838.24	5,542,067,481.16
5	12,435,572,922.01	111,514.9	18,158.9	329,745,649.21	2,025,042,394.31
Σ	40,202,171,576.56	433,263.2	91,353.4	2,886,443,221.90	9,231,264,145.22

Source: authors' development based on formulas (1-4)

Using formulas (1-4), it was calculated and obtained the following results: $a=0.494683$; $b=-24,594.97$; $y=0.494683 \cdot x - 24,594.97$. It was found that with an increase in the volume

of agricultural products sold by large business structures by 1 million UAH, net profit increases by 0.494683 million UAH. Next, the correlation coefficient was calculated (Table 4).

Table 4. Estimated values for determining correlation and determination coefficients

	x	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	y	$y_i - \bar{y}$	$(y_i - \bar{y})^2$	t_x	t_y	$t_x t_y$
1	54,757.9	-31,894.74	1,017,274,439.667	11,217.5	-7,053.18	49,747,348.112	-1.52	-0.45	0.6840
2	74,131.9	-12,520.74	15,676,893,014.760	5,026.2	-13,244.48	175,416,250.470	-0.20	-0.85	0.1700
3	78,052.2	-8,600.44	73,967,568.193	8,677.6	-9,593.08	92,027,183.886	-0.14	-0.61	0.0854
4	114,806.3	28,153.66	792,628,571.395	48,273.2	30,002.52	900,151,206.350	1.46	1.92	2.8032
5	111,514.9	24,862.26	618,131,972.307	18,158.9	-111.78	12,494.768	0.41	-0.01	-0.0041
Σ			18,178,895,566.324			1,217,354,483.588			

Source: authors' development based on formulas (5-8)

Calculated using formulas (5-8), there is the following data: $R = 0.9127$; $D = 0.8330$. That is, in the period 2018-2022, 83.30% of the variation in net profit is

explained by the variation in the level of agricultural products sold by large business structures. The impact of other factors is not significant (Fig. 3).

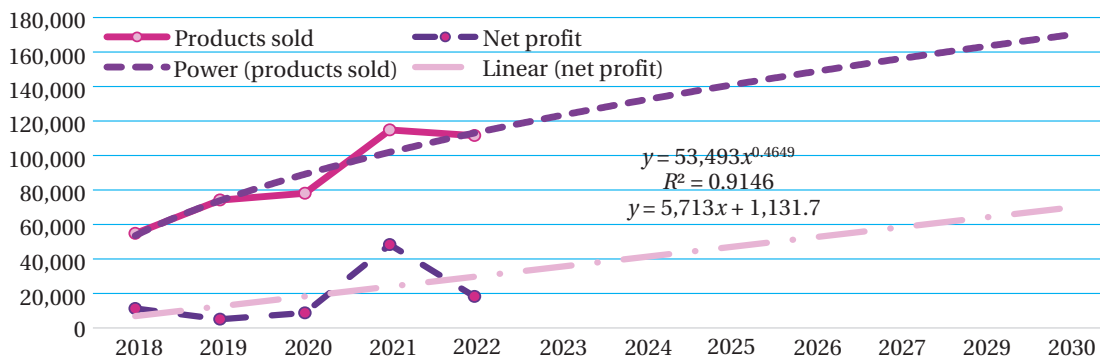


Figure 3. Forecast of changes in products sold by large business structures and net profit in 2030 (million UAH; in constant 2016 prices)

Notes: $y = 53,493 \cdot x^{0.4649}$ – a power function for predicting changes in products sold by large business structures in 2030; $y = 5,713x + 1,131.7$ – a linear function of forecasting changes in the net profit of large business structures in 2030; the correlation coefficient is 0.9146

Source: State Statistics Service of Ukraine (n.d.)

The activation of the institution of self-regulation contributes to cost optimisation, building social capital and improving the overall performance of business entities in the agricultural sector of the economy. In addition to mergers (vertical integration) or delegation of functions (horizontal integration) of business entities, the activities of functionally self-regulating associations of agricultural business entrepreneurs for some purpose of obtaining services (associative structures in advisory services, land management, wholesale sales of products, and agricultural land valuation) are stimulated. Among the integration associations of the association type (professional, sectoral, umbrella), the results of the activities of such sectoral associations as the Ukrainian Grain Association (n.d.); Association “Pig Farmers of Ukraine” (n.d.);

Association “Union of Poultry Farmers of Ukraine” (n.d.); Milk Producers Association (n.d.); Union of Dairy Enterprise of Ukraine (n.d.). The outbreak of the armed conflict in Ukraine also had a negative impact on the activities of sectoral integration associations. For example, compared to the pre-war year 2020, the following performance indicators of some existing sectoral integration associations decreased in 2023: “Ukrainian Grain Association” – current liabilities (–20.04%), non-current assets, fixed assets (–33.59%); Association “Union of Poultry Breeders of Ukraine” – long-term liabilities, targeted financing and collateral (–98.09%), non-current assets, fixed assets (–95.93); Association of Milk Producers – current liabilities (–99.49%), current assets, inventories (–06.03%), non-current assets, fixed assets (–89.53) (Table 5).

Table 5. Key performance indicators of existing sectoral integration associations of the association type, thousand UAH

Indicators	2020	2021	2022	2023	2023 in % up to 2020
Association “Ukrainian Grain Association”					
Assets	2,650,000	4,234,700	5,725,000	5,086,300	+91.93
Non-current assets. Fixed assets	153,300	59,300	211,600	101,800	–33.59
Current assets. Inventories	2,496,700	4,175,400	5,513,400	4,984,500	+99.64
Liabilities	2,650,000	4,234,700	5,725,000	508,630	–80.81
Long-term liabilities, earmarked funding and collateral	2,484,800	3,982,000	5,503,600	4,954,200	+99.38
Other current liabilities	165,200	252,700	221,400	132,100	–20.04
Income	4,779,700	6,387,700	6,109,800	6,387,800	+33.64
Association “Pig Farmers of Ukraine”					
Assets	1,035,600	1,223,300	2,350,900	2,149,600	+107.6
Non-current assets. Fixed assets	100	100	100	58,600	+586 times
Current assets. Inventories	1,035,500	1,223,200	2,350,800	2,091,000	+101.9
Liabilities	1,035,600	1,223,300	2,350,900	2,149,600	+107.6
Long-term liabilities, earmarked funding and collateral	1,035,600	1,161,700	1,391,800	1,962,800	+89.53
Other current liabilities	0	0	7,700	5,000	+

Table 5, Continued

Indicators	2020	2021	2022	2023	2023 in % up to 2020
Income	2,681,700	3,337,700	19,866,900	3,337,700	+24.46
Association "Union of Poultry Farmers of Ukraine"					
Assets	3,882,000	4,509,100	4,395,400	4,676,700	+20.47
Non-current assets. Fixed assets	1,251,400	917,200	167,600	50,900	-95.93
Current assets. Inventories	2,630,600	3,591,900	4,227,800	4,625,800	+75.84
Liabilities	3,882,000	4,509,100	4,395,400	4,676,700	+20.47
Long-term liabilities, earmarked funding and collateral	2,648,700	3,593,000	161,800	50,500	-98.09
Other current liabilities	2,923,000	2,720,500	1,743,900	2,720,500	-06.93
Milk Producers Association					
Assets	9,901,000	7,270,900	9,469,500	8,275,300	-16.42
Non-current assets. Fixed assets	1,232,000	518,400	145,200	129,000	-89.53
Current assets. Inventories	8,669,000	6,752,500	9,324,300	8,146,300	-06.03
Liabilities	9,901,000	7,270,900	9,469,500	8,275,300	-16.42
Long-term liabilities, earmarked funding and collateral	924,000	6,620,500	8,014,400	5,028,100	+444.2
Other current liabilities	6,626,000	87,900	130,800	99,500	-99.49
Income	7,554,000	51,653,200	14,131,300	51,653,200	+6.8 times
Association "Union of Dairy Enterprises of Ukraine"					
Assets	1,860,000		355,600	1,252,400	-32.67
Non-current assets. Fixed assets	45,000		19,800	0	-
Current assets. Inventories	141,000		335,800	1,252,400	+788.2
Liabilities	186,000		355,600	1,252,400	+573.3
Long-term liabilities, earmarked funding and collateral	158,000		340,500	1,252,200	+692.5
Other current liabilities	1,081,000		10,596,600	6,671,800	+517.2

Source: Clarity-project.info (n.d.)

As of May 2024, 33 million hectares (77.2%) of agricultural land were registered in the state land cadastre. Large businesses in the agricultural sector of the economy concentrate a significant area of agricultural land in their use (3,247.6 thousand hectares in 2023). Agricultural holdings

Kernel Holding Sa, MHP S.A., UkrLandFarming PLC (Avangardco IPL), Astarta Holding N.V. for this purpose, they raised funds from global stock exchanges. And the agricultural holding Agroprosperis LLC actively uses an investment fund NCH Capital (USA) (Table 6) (Dynamics of the land bank, n.d.).

Table 6. The size of land use of existing large agricultural business entities as of 01 January of each year, thousand ha

Business entity	2017	2019	2020	2021	2022	2023	2023 up to 2017
1 Kernel Holding S.A.	602.5	530.0	530.0	506.0	506.0	363.0	-239.5
2 MHP S.A.	370.0	370.0	370.0	370.0	370.0	362.0	-8
3 UkrLandFarming PLC (Avangardco IPL)	605.0	500.0	500.0	475.0	460.0	310.0	-295
4 Agroprosperis LLC	430.0	396.0	300.0	300.0	300.0	300.0	-130
5 Astarta Holding N.V.	250.0	250.0	235.0	220.0	220.0	212.0	-38
6 Continental Farmers Group	185.0	195.0	195.0	195.0	195.0	195.0	+10
7 Epicenter Agro	116.0	121.4	160.0	160.0	160.0	160.0	+44
8 Agricultural system technologies	50.0	110.0	110.0	150.0	150.0	150.0	+100
9 Harv East Holding LLC	97.0	127.0	127.0	127.0	127.0	127.0	+30
10 Industrial Milk Company S.A.	137.0	123.9	123.9	120.0	120.0	120.0	-17
11 Agroton PLC	151.0	110.0	110.0	110.0	110.0	110.0	-41
12 Agrein Holding Limited	127.0	110.0	110.0	110.0	110.0	110.0	-17
13 Ukrprominvest-Agro LLC	122.0	116.5	120.0	120.0	120.0	108.0	-14
14 Privat-Agroholding	100.0	85.0	85.0	85.0	85.0	85.0	-15
15 Trading company "Vitagro"	64.5	85.0	85.0	85.0	85.0	85.0	+20.5
16 TAS Agro LLC	88.0	83.0	83.0	83.0	83.0	83.0	-5
17 Agrofirma "Svitanok"	80.0	80.0	80.0	80.0	80.0	80.0	0
18 LNZ Group	60.0	80.0	80.0	80.0	80.0	80.0	+20
19 Agro Vista Holding	75.0	82.0	82.0	80.0	80.0	75.0	0
20 Nibulon S.A.	82.5	82.5	82.5	82.5	82.5	51.0	-31.5
21 Agro Generation	120.0	70.0	58.0	56.0	56.0	30.6	-89.4

Table 6, Continued

Business entity	2017	2019	2020	2021	2022	2023	2023 up to 2017
22 KSG Agro S.A.	33.0	27.0	21.0	24.0	24.0	24.0	-9
23 Milkiland N.V.	23.0	12.0	12.0	12.0	12.0	17.0	-6
24 Agroliga Group PLC	9.9	9.9	10.0	10.0	10.0	10.0	+0.1
Total land use size	3,978.4	3,756.2	3,669.4	3,640.5	3,625.5	3,247.6	

Source: Dynamics of the land bank (n.d.)

In general, as of the end of 2022, 109.5 thousand hectares of agricultural land were in circulation in the country, and as of the end of 2023 – 172.9 thousand hectares. The value of agricultural land is constantly growing. In the first half of 2024, 38% of land transactions were concluded by large businesses in the agricultural sector. In May 2024, the weighted average price of a hectare of agricultural land with the designated purpose “for commercial agricultural production” was 46.2 thousand UAH (end of 2023 – 37.7 thousand UAH).

In general, since the beginning of hostilities, the value of corporate business entities in the agricultural sector of the economy has significantly decreased and reflects the state of development of the crisis management system, the effectiveness of making and implementing adaptive strategic decisions to diversify

business models in the market environment. The study found that in 2023, the total capitalisation of corporate business entities was EUR 49,642.09 million, which is 25.2% (or EUR 16,721.19 million) less than in 2022. The main reasons for this are the intensification of the armed conflict and doing business in extreme operating conditions; deterioration of the overall environmental, social and economic situation in the country, trading conditions on stock exchanges and stock markets; currency fluctuations and a decline in the price of shares of agricultural holdings, etc. For example, in 2023, the capitalisation of corporate business entities decreased by: Kernel Holding S.A. – 46.91%; MHP S.A. – 32.81% (Fig. 4); IMC S.A. – 47.44%; Milkiland N.V. – 33.87; Agroton PLC – 24.82; KSG Agro S.A. – 23.69; Agroliga Group PLC – 17.72 (Fig. 5).

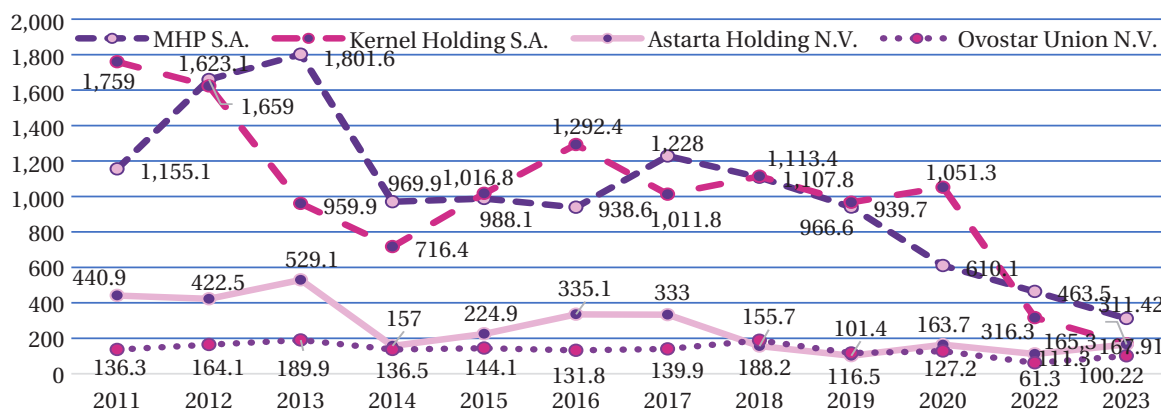


Figure 4. Changes in the capitalisation of public entities
MHP S.A., Kernel Holding S.A., Astarta Holding N.V., Ovostar Union N.V

Notes: as of the end of the year, million USD; 2023 – million EUR

Source: Capitalization (n.d.)

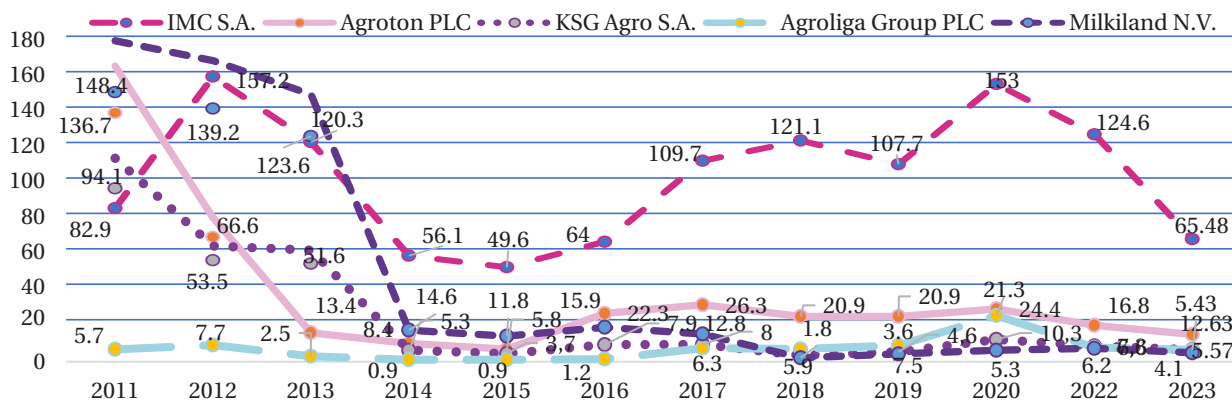


Figure 5. Changes in the capitalisation of public entities

Industrial Milk Company S.A., Agroton PLC, KSG Agro S.A., Agroliga Group PLC, Milkiland N.V.

Notes: as of the end of the year, million USD; 2023 – million EUR

Source: Capitalization (n.d.)

It was also found that the total capitalisation of corporate business entities MHP S.A., Kernel Holding S.A., Astarta Holding N.V., Ovostar Union N.V., Industrial Milk Company S.A., Agroton PLC, Ukrproduct Group Ltd, KSG Agro S.A., Agroliga Group PLC, Milkiland N.V., AgroGeneration for the first quarter of 2024 amounted to EUR 11,554.95 million, which is a decrease of 14.5% compared to the first quarter of 2023. For the second quarter of 2024, the total capitalisation of these large business entities was EUR 11,602.90 million, a

decrease of 13.3% compared to the second quarter of 2023. As of 29 July to 5 August 2024, a decrease in capitalisation was observed in Ovostar Union N.V. (-0.6%), AgroGeneration (-3.3%), Industrial Milk Company S.A. (-5.1%), Astarta Holding N.V. (-8.3%), KSG Agro S.A. (-11.1%), Ukrproduct Group Ltd (-12.6%), Milkiland N.V. (-20.3%); capitalisation growth was observed in MHP S.A. (+7.5%), Agroton PLC (+1.0%), Agroliga Group PLC (+3.6%), Kernel Holding S.A. (+4.3%), MHP S.A. (+7.5%) (Table 7).

Table 7. Changes in the capitalisation of public large business structures in the agricultural business in 2024, EUR million

Business entity	01.01	08.01	18.03	25.03	15.04	22.04	29.04	22.07	29.07	05.08	Correlation 05.08 in % up to 01.01
1. MHP S.A.	311.42	326.91	333.53	328.40	323.96	324.57	330.74	379.84	362.79	392.47	126.03
2. Kernel Holding S.A.	167.91	326.91	168.29	169.44	208.57	191.24	186.33	217.68	224.58	234.90	139.89
3. Astarta Holding N.V.	165.30	165.03	171.05	168.77	162.78	161.38	159.81	162.05	182.64	167.46	101.30
4. Ovostar Union N.V.	100.22	96.60	102.28	92.56	97.85	91.12	95.33	97.83	96.07	95.45	95.240
5. IMC S.A.	65.48	65.51	72.01	74.43	71.75	64.98	60.46	76.04	98.99	93.91	143.42
6. Agroton PLC	12.63	12.31	15.23	15.28	15.35	15.25	15.26	17.51	18.06	18.25	144.49
7. KSG Agro S.A.	5.57	5.60	5.44	5.40	5.36	5.17	4.94	8.72	8.99	7.99	143.45
8. Agroliga Group PLC	5.43	5.47	5.46	5.54	4.87	5.04	5.03	6.41	6.15	6.38	117.49
9. Milkiland N.V.	4.10	3.92	4.20	4.28	4.22	4.35	4.27	9.78	9.85	7.85	191.46

Source: Capitalization (n.d.)

One of the conditions for the development of large business structures in the agricultural sector of Ukraine in the face of reputational challenges is a systematic increase in publicity. In 2024, the following companies have the highest: reputational stability – Nibulon (43.25), Industrial Milk Company S.A. (42.40), MHP S.A. (41.33); image capital of corporate social responsibility – Nibulon (41.58), Kernel Holding S.A. (41.33), KSG

Agro S.A. (41.00); media activity – Industrial Milk Company S.A. (43.00), Nibulon (41.83), MHP S.A. (39.11); activity in the implementation of innovative approaches – Industrial Milk Company S.A. (40.40), Nibulon (38.92), Kernel Holding S.A. (37); systematic implementation of anti-crisis strategies of the business model – Nibulon (43.08), Kernel Holding S.A. (42.33), Industrial Milk Company S.A. (41.40), MHP S.A. (41.22) (Fig. 6).

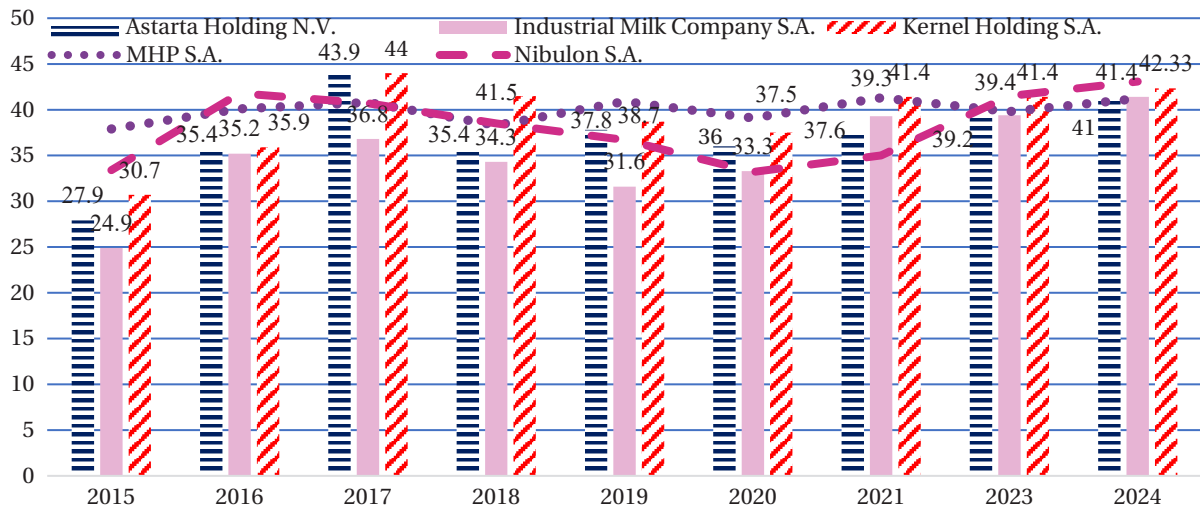


Figure 6. Results of the assessment of corporate reputation management of large enterprises in the agricultural sector of Ukraine in 2015-2024

Source: National rating of the quality of corporate reputation management "Reputation Activists" (n.d.)

It is established that the main task in the corporate reputation management system for large business structures is to solve problems with the lack of specialised specialists and ensure the social and psychological stability of employees. In particular, Kernel Holding S.A., MHP S.A., and Astarta Holding N.V. are implementing an internal programme “Kernel Growth – Leadership Development” and an educational project “Open Agro University”. In 2023, the total number of employees of Kernel

Holding S.A. was 10,733. This is a significant decrease compared to the pre-war year 2021 (11,256 people) and 2017 (16,103 people) (Fig. 7). In 2015-2023, the largest number of producers worked in farming by business type. In 2023, the number of employees in farming was 4,508, which is 51.99% less than in 2017 and 19.63% less than in pre-war 2021 (Fig. 8). In 2023, the average number of hours of training per employee at Kernel Holding S.A. increased to 30.4 hours, which is 3 times more than in pre-war 2020.

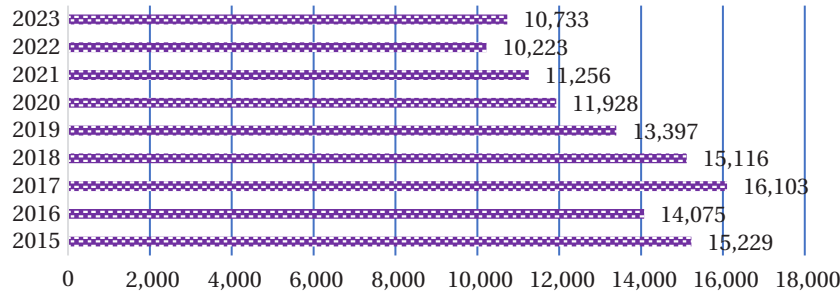


Figure 7. Dynamics of changes in the total number of employees in Kernel Holding S.A., people

Source: Kernel Holding S.A. Annual report (2023)

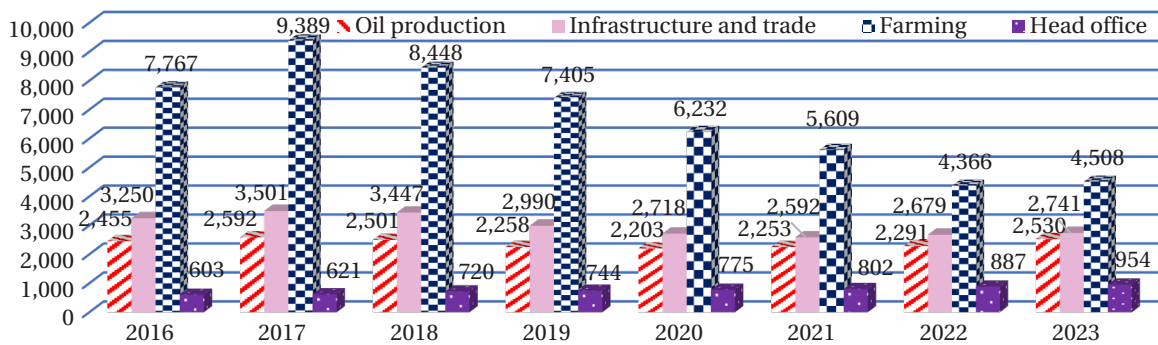


Figure 8. Dynamics of the number of employees by business area in Kernel Holding S.A., people

Source: Kernel Holding S.A. Annual report (2023)

In accordance with the sustainable development goals implemented by Kernel Holding S.A. in 2023, some of the key indicators in 2023 were: a) environmental capital, ESG area – investment rating for climate indicators: changes in the CDP (Carbon Disclosure Project) rating from D to B; b) human capital, ESG area – employment: 10,733 – total number of employees; 2,711 – number of new employees; 2,163 – number of staff turnover; employer rating – the 1st place in the agricultural sector of the economy, 2nd place among all business entities in the country; Forbes Ukraine version – Veterans’ adaptation programme, Top 25 companies; the 8th annual HR Brilliance Awards, HR team of the year 2023; c) social capital, ESG area – support for local communities: 12 million USD – support for the army, humanitarian aid (Kernel Holding S.A. Annual..., 2023).

It was found that in 2023, compared to 2021, Kernel Holding S.A.’s revenue from oil production increased by +9.21% or +161 million USD, and from farming activities by +5.78% or +38 million USD. However, in terms of the functioning of the “Infrastructure and Trade” market segment, in 2023, compared to 2021, revenue

decreased by –46.43% or by –2.255 million USD. In addition, it was found that in 2023, compared to 2021, sales volumes of products decreased, in particular: oil by –16.67% or by –228 million USD; produced by farms by –35.55% or by –1.020 million USD; in terms of the functioning of the “Infrastructure and Trade” market segment by –53.76% or by –4.308 million USD.

The main indicators of Kernel Holding S.A.’s economic activity for pre-war (MY 2020/2021) and war-time periods (MY 2021/2022, MY 2022/2023) were considered. In MY 2022/2023, net sales revenue decreased to 3,455,121 thousand USD or 38.24% (–2,139,679 thousand USD) compared to MY 2020/2021. The cost of goods sold has been negative: MY 2020/2021 = –4,821,872 thousand USD; MY 2021/2022 = –4,691,973 thousand USD; MY 2022/2023 = –2,704,014 thousand USD. The average annual value of property, plant and equipment decreased insignificantly in 2023 by –0.54% compared to the data of MY 2020/2021. In MY 2022/2023, the average annual output per employee of Kernel Holding S.A. decreased by 175 thousand USD or 35.21%.

The study also revealed the functional dependence of the impact of the cost of goods sold on the net

income from the sale of products of Kernel Holding S.A. for MY 2020/2021, MY 2021/2022, MY 2022/2023 in thousand USD as criteria for assessing the effectiveness

of managing the development of the potential of a public corporate business entity in the agricultural sector of the economy of Kernel Holding S.A. (Tables 8-9).

Table 8. Information for determining the impact of cost of goods sold on net income from sales of Kernel Holding S.A., thousand USD

Indicators	MY 2020/2021	MY 2021/2022	MY 2022/2023
Net revenue from sales of products, y_i	5,594,800	5,331,545	3,455,121
Cost of goods sold, x_i	4,821,872	4,691,973	2,704,014

Source: Kernel Holding S.A. Annual report (2023)

Table 9. Estimated values of intermediate indicators for establishing a linear dependence function

	x_i^2	x	y	y_i^2	$x_i y_i$
1	23,250,449,584,384	4,821,872	5,594,800	31,301,787,040,000	26,977,409,465,600
2	22,014,610,632,729	4,691,973	5,331,545	28,425,372,087,025	25,015,465,188,285
3	7,311,691,712,196	2,704,014	3,455,121	11,937,861,124,641	9,342,695,555,694
Σ	52,576,751,929,309	12,217,859	14,381,466	71,665,020,251,666	61,335,570,209,579

Source: authors' development based on formulas (1-4)

Formulas (1-4) were used and the following results were obtained: $a = 0.981288$; $b = 797,406.7$; $y = 0.981288 \cdot x + 797,406.7$. It was found that with an

increase in net income from sales of Kernel Holding S.A. products by 1 thousand USD, the cost of sales increases by 0.981 thousand USD (Table 10).

Table 10. Estimated values for determining correlation and determination coefficients

	x	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	y	$y_i - \bar{y}$	$(y_i - \bar{y})^2$	t_x	t_y	$t_x t_y$
1	4,821,872	749,252	561,378,559,504	5,594,800	800,978	641,565,756,484	0.7731	0.8408	0.6497
2	4,691,973	619,353	383,598,138,609	5,331,545	537,723	289,146,024,729	0.6390	0.5644	0.3606
3	2,704,014	-1,368,606	1,873,082,383,236	3,455,121	-1,338,701	1,792,120,367,401	-1.4121	-1.4052	1.9843
Σ			2,818,059,081,349			2,722,832,148,614			2.9946

Source: authors' development based on formulas (5-8)

Calculated using formulas (5-8), there is the following data: $R = 0.9982$; $D = 0.9964$. That is, in the period MY 2020/2021, MY 2021/2022, MY 2022/2023, 99.64% of the variation in net income from sales of Kernel Holding S.A. products is explained by the variation in the cost of sales. The most significant factors affecting the net income from sales are social

security contributions, direct labour costs, depreciation, cost of seeds and planting material, third-party services, and the cost of mineral fertilisers of Kernel Holding S.A. The forecast of the impact of the total cost of sales of Kernel Holding S.A. on the net income from sales of products in 2030 was calculated (Fig. 9).

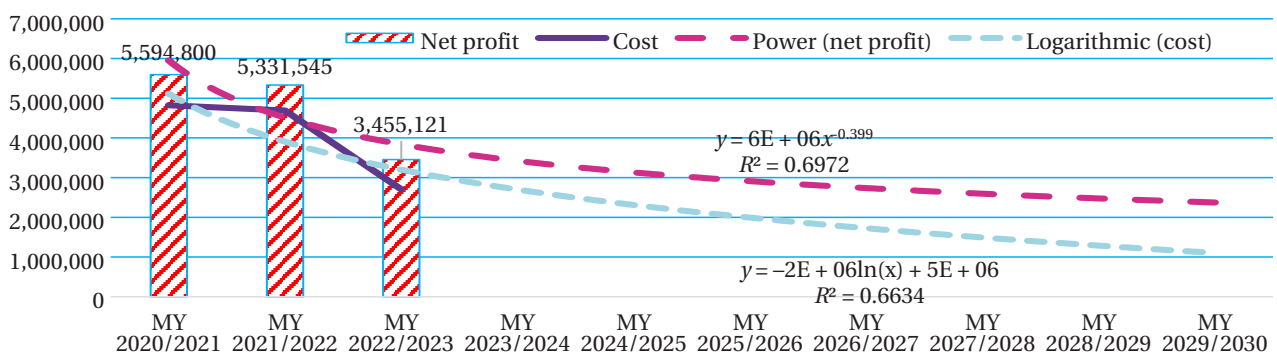


Figure 9. Forecast of the impact of the total cost of sales of Kernel Holding S.A. on net income from sales in 2030, thousand USD

Notes: $y = 6E + 06 \cdot x^{0.399}$ – a power function of the forecast of change in net income of Kernel Holding S.A. in 2030; the correlation coefficient is 0.6972; $y = -2E + 06 \ln(x) + 5E + 06$ – the logarithmic function of forecasting the impact of the cost of sales of Kernel Holding S.A. in 2030; the correlation coefficient is 0.6634

Source: Kernel Holding S.A. Annual report (2023)

Due to the beginning of the armed aggression of the Russian Federation and changes in the market environment, the following decreased: gross profit – by 29.72% (or by 269,157 thousand USD); profit from operating activities – by 36.24% (or by 249,833 thousand USD); profit before tax – by 31.62% (or by 170,150 thousand USD); net profit – by 40.92% (or by 206,948

thousand USD) (Fig. 10). The profitability of Kernel Holding S.A. in MY 2022/2023 increased to 124%, which is 10% more than in MY 2021/2022; and 5% more than in MY 2020/2021 (Fig. 11). It was found that in MY 2022/2023, compared to MY 2020/2021, the following decreased: autonomy ratio by –7.22%; current liquidity by –163.05%; absolute liquidity by –23.06% (Fig. 12).

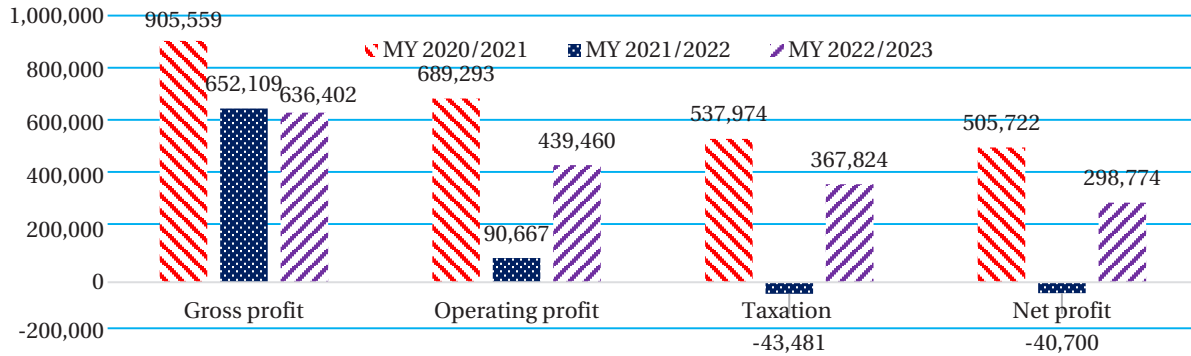


Figure 10. Dynamics of changes in gross profit, profit from operating activities, profit before tax, net profit in Kernel Holding S.A., thousand USD

Source: Kernel Holding S.A. Annual report (2023)

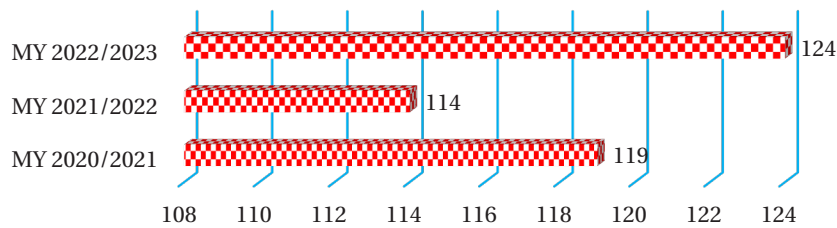


Figure 11. Dynamics of changes in product profitability at Kernel Holding S.A., %

Source: Kernel Holding S.A. Annual report (2023)

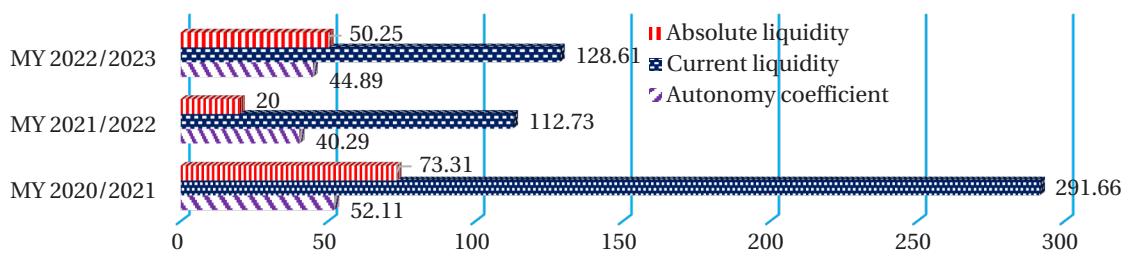


Figure 12. Dynamics of changes in absolute and current liquidity, autonomy ratio in Kernel Holding S.A., %

Source: Kernel Holding S.A. Annual report (2023)

The study of the theoretical and methodological foundations of functioning and survival of large entrepreneurial structures in rural areas in crisis conditions is a common problem. The analysis of the trends in the development of integration associations of farms and agrohholdings in the agricultural business confirms their special importance as those that timely adapt to any changes in the market environment in extreme conditions of functioning. The issues of development of integration structures in agriculture are considered in different interpretations in scientific and methodological publications.

The authors of the current study agree with the position of the scientist O. Khytra (2022), who reveals the role of integration synergy as an effect of combining the

potentials of business entities in the spatial and temporal combination of agricultural production resources. The authors of the current study agree that mergers (or acquisitions) make it possible to increase the competitiveness and adaptability of functioning, reduce the level of costs and increase the value of the integrative association, and expand the capacity of the market niche in the environment. H. Mazur (2022) studied the experience of stimulating the development of cluster structures, accelerating the integration processes of business entities, implementing cluster adaptation processes in the system of development of agro-food regional cluster associations, and proposed the structure of the region's food security cluster on the basis of providing citizens with

high-quality organic agricultural products and an infrastructure system for business support. A group of scientists A. Sumets *et al.* (2022) identified the components of the mechanism for managing environmental risks of business entities in agriculture in accordance with the functions, goals, methods, object, and subject of management; the functional and process essence of the links between the elements of the environmental risk management system and the multicriteria variability of choosing a solution to the problem are substantiated. On the positive side, the use of modelling methods for preventing environmental risks of agricultural holdings makes it possible to increase the share of organic products in the market environment; to increase the competitiveness of large business entities and access to EBRD loans or funds from grant programmes. In their study, H. Kaletnik *et al.* (2022) focused on the development of agricultural cooperatives as the most capable integration formations and a sustainable form of economic organisation in the renewable energy system. They agree that as a result of the entrepreneur's participation in the activities of an energy cooperative, the socio-economic benefits of the business entity's business in agriculture increase due to the growth of the added value of its products.

Also, R. Bezus & L. Kriuchko (2022) substantiate the need to intensify the creation and development of agricultural cooperatives based on medium, small or small producers in the market environment, which will qualitatively improve the efficiency of marketing and logistics activities of micro, small and medium-sized agricultural businesses. It should be emphasised that official state statistical sources do not contain information on the state of implementation of information and communication technologies or digital marketing tools for business entities in agriculture. A. Semysal (2022), in the process of studying the development of cooperative relations in dairy farming, found that in the current crisis conditions, the functioning of dairy cooperatives without ensuring their competitiveness and state support is impossible. The team of authors V. Lavruk *et al.* (2022) substantiated the expediency of establishing agricultural service dairy cooperatives in the system of separate servicing of dairy cows of households. The authors of the current study support the position of scientists that in order to increase the volume, quality and competitiveness of milk, increase the efficiency of purchase prices for milk, it is necessary to stimulate the socio-economic mechanism for the development of agricultural cooperatives.

The authors of the current study agree with the conclusions of I. Kryukova *et al.* (2023) regarding the margin of safety and strength of the system of functioning of business entities in agriculture in wartime and sustainable agricultural development. Scientists O. Halytskyi *et al.* (2023) revealed the conditions for strengthening the development of the resource potential and competitiveness of agricultural business entities (optimisation of management decision-making, sustainable socio-economic development, digitalisation, intensification of investment and innovation activities; infrastructure restoration; counteracting human resource migration and complications of product exports, etc.). S. Kucherenko *et al.* (2023) found that the process of ensuring guarantees of

competitiveness reflects the need to achieve the highest liquidity and solvency of working capital; information and analytical support for business development; improving the quality of operational and strategic planning; preservation of property; modelling the capital structure; optimising the use of aggregate resources; and compliance with environmental standards. Z. Koval (2023) assessed the strategic capabilities of business entities in extreme operating conditions, which help to avoid external threats to the market environment. The authors agree that the use of economic and mathematical modelling allows assessing the available resources of the enterprise and the likely challenges of the environment, as well as scenarios for adapting strategic planning to external threats.

In the course of their research Yu. Sahachko *et al.* (2023) proved that small entrepreneurship is the driving force behind the development of socio-economic and integration relations in the agri-food sector of the economy. Ye. Lanchenko & V. Ivchenko (2023) focus on the mechanisms for stimulating the development of small forms of rural management, in particular, on the efficiency of the functioning of individual entrepreneurs, farms and small businesses in the context of armed conflict. It is emphasised that the intensification of the development of small businesses contributes to solving the issues of unemployment, migration of internally displaced persons, food supply, etc.

O. Shpykuliak *et al.* (2023a) focus on the activities of integrated associative-type formations. The authors of the current study agree with the position of scientists that the development of the institution of self-regulation is an effective incentive to increase the added value of products; reduce transaction costs, direct public expenditures for the implementation of regulatory functions and the social cost of regulation. N. Klymenko *et al.* (2023) assessed the investment attractiveness of agriholdings and analysed the impact of shock risks on the restoration of their capitalisation. It was found that 56% of Ukrainian agriholdings have an insufficient level of capitalisation to fully restore their capitalisation, although all agriholdings overcame the shock period. O. Chorna & K. Sbitnieva (2023) prove that the stable development of rural areas in wartime is linked to the level, state and trends in the development of corporate social responsibility of agricultural holdings, social, environmental and humanitarian responsibility projects, innovative strategies to support the local population, and actions to restore areas affected by military aggression. I. Kytsyuk & I. Kovalchuk (2023) focused on the trends in the functioning of the European Clusters Alliance, on the peculiarities of the formation and development of the Ukrainian Clusters Alliance (founded on 24.05.2022) as a nationwide and multisectoral union of entrepreneurs seeking to develop digital technologies, industrial innovations; create a favourable investment and innovation climate; improve the culture of doing business; increase their own adaptability, sustainability, solvency, independence, liquidity and competitiveness as business entities. The driving force behind "Ukrainian Clusters Alliance" is the Association of Industrial Automation Enterprises of Ukraine.

In addition, the authors of the current study confirm the conclusions of a group of scientists S. Stender *et*

al. (2024), who, in the process of studying the factors and ways to improve the sustainability and productivity of business entities in agriculture, have focused on intensifying the use of such a strategic tool as a digital transformation system. The implementation of innovative approaches in the management decision-making system, in particular, blockchain technologies, contributes to positive changes in the supply chain, increasing the resilience of business entities to changes in climatic, social, economic, and environmental conditions. Y. Danko & D. Zhyvytskyi (2024) substantiate that an effective tool for increasing the competitiveness of business entities and production productivity, attracting investment, stimulating the development of cooperative associations, rural areas, infrastructure development, innovative growth, and diversification of production is the creation and functioning of dairy clusters. O. Zhylynska & N. Sviderska (2024) also reveal the peculiarities of increasing the effectiveness of the implemented organisational tools in the marketing system of business entities and provide recommendations to entrepreneurs in order to meet modern marketing needs.

Noteworthy are the results of the study by O. Vitryak & V. Tkachuk (2024), which emphasises the role, status and trends in the development of private farms and family farms, taking into account the experience of entrepreneurs in the USA, Canada and France. O. Poleva & V. Gavrilyuk (2024) reveal the process of reproduction and activation of the production potential of farms in wartime. The authors of the current study also support the results of the research of O. Skydan et al. (2024), which proves that the functioning and development of business entities in agriculture on the basis of constant and systematic growth of gross value added reflects the use of the EU experience. The authors emphasise the use of cybernetic modelling for management in the system of entrepreneurship in agriculture, taking into account the positions of increasing gross value added. V. Kyfyak & R. Dubinskyi (2024) identified the main fluctuations in the impact on the development of business entities: a) fluctuations in the hryvnia exchange rate, prices for agricultural products in foreign markets, socio-political crises and armed conflicts; b) loss of human resources; destruction of equipment and infrastructure). Researchers M. Melnyk & I. Leshchukh (2024) have revealed the characteristics of spatial integration based on agglomeration from the perspective of institutional support for balancing the interests of territorial communities, the main directions for formation (overcoming socio-economic disparities in spatial development; substantiation of mechanisms for stimulating and forms of spatially integrated economic development, promoting inter-municipal cooperation, implementing a system of public-private partnerships; developing priorities for smart specialisation of territories) and strategic priorities for integrated spatial development in extreme conditions of operation and post-war reconstruction.

Scientists S. Bilous & A. Bryvus (2024) relate the adaptation of agricultural production under conditions of martial law to the adequacy of changes in production processes to specific needs or to a reorientation towards the production of different goods. The resilience of production is ensured by timely reorganisation of business processes. Therefore, from the perspective of these

scholars, adaptability is essentially the ability to respond promptly to changes or to adjust to them. Researcher O. Toporkova et al. (2022), S. Kravchenko et al. (2024) substantiate that the adaptation processes of entities in large, medium, and small enterprises within agriculture are linked to the development of strategies for entrepreneurs to counter the impacts of extreme operational conditions and the challenges of Euro-integration. Scholars N. Heorhiadi & A. Kubant (2024) established in their research that the adaptability of the management system of an entrepreneurial entity in agriculture reflects the ability to make timely changes to activity plans. It is emphasised that systems of crisis, conflict, innovation, leadership, project, ecological, and strategic management are adaptive, as they possess flexibility in planning and execution; identification of threats; management of attitudes towards change; flexibility and responsiveness to changes; monitoring and feedback; minimisation of harm, and others.

It has been established that agricultural holdings (vertically integrated structures that contribute to increasing the adaptability, resilience, and competitiveness of large-scale production, the stability of supply chains, and the minimisation of costs) and agricultural cooperatives (horizontally integrated structures that promote the well-being of peasants, the viability of small agricultural producers, and the enhancement of their survival potential in a market environment under extreme operating conditions) are the most common integration structures in the agricultural sector of the economy. The conceptual platform for formulating the development strategy of integration structures is based on a systematic-functional approach with an integrative comprehensive assessment of resource potential, influencing factors, trends in agricultural development, and the specifics of the agro-industrial state of agricultural business.

► Conclusions

It is substantiated that employment issues in rural areas can be addressed through the development of integrative structures and associations of farm enterprises. The development of integrated entrepreneurial structures is based on their function – addressing the socio-economic problems of their entrepreneurial subjects. The main obstacles to activity include export difficulties, logistics, pricing, and financial issues. Only united entrepreneurial structures can function effectively and productively. This is also corroborated by the socio-economic indicators of the development of individual large entrepreneurial structures. To create conditions for the productive development of integrated entrepreneurial structures, it is necessary to: improve integration institutions (regulating integration legislation); establish a platform for the development of clusters and cooperatives (developing entrepreneurial subjects, family farms); take into account the experience of other countries for the purpose of comparing legislative frameworks; implement integration diplomacy (connections with foreign institutions); assist investors in information and consulting support; ensure predictability in agricultural policy; control the registration of integration associations, etc. It is essential to develop programmes for the development of cooperative associations of family

farms in the regions for the period up to 2030. The practical significance of the research lies in assessing the state of development of integration processes and the activities of individual large entrepreneurial structures. In further research, it is necessary to specify the main organisational and economic principles of the development of integration structures and cooperative associations in the context of post-war transformations.

► References

- [1] Association "Pig Farmers of Ukraine". (n.d.). Retrieved from <http://asu.pigua.info/>.
- [2] Association "Union of Poultry Farmers of Ukraine". (n.d.). Retrieved from <https://www.poultryukraine.com/>.
- [3] Bezus, R., & Kriuchko, L. (2022). Methodology for the study of the state of implementation of digital tools of external and internal marketing in agricultural cooperatives. *Bulletin of Kharkiv State University. Economic Sciences Series*, 45, 14-21. doi: 10.32999/ksu2307-8030/2022-45-2.
- [4] Bilous, S., & Bryvus, A. (2024). Adapting the business strategy of the enterprise to the conditions of a military conflict. *Economy and Society*, 61. doi: 10.32782/2524-0072/2024-61-106.
- [5] Capitalization. (n.d.). Retrieved from <https://ukragroconsult.com/tag/kapitalizaciya/>.
- [6] Chorna, O., & Sbitnieva, K. (2023). Study of the features and directions of the development of corporate social responsibility of agroholding in the conditions of wartime. *Bulletin of the Volodymyr Dahl East Ukrainian National University*, 4(280), 89-100. doi: 10.33216/1998-7927-2023-280-4-89-100.
- [7] Chorna, O., Khrystenko, L., & Ivchenko, Y. (2022). Diagnostic aspects of the economic security of agroholdings in determining their strategic development directions. *Bulletin of the Volodymyr Dahl East Ukrainian National University*, 6(276), 75-91. doi: 10.33216/1998-7927-2022-276-6-75-91.
- [8] Clarity-project.info. Official web-site. (n.d.). Retrieved from <https://clarity-project.info/edr/41155105/finances>.
- [9] Danko, Y., & Zhurbenko, N. (2023). Evaluation of agricultural enterprises production potential: Towards clusters. *Sustainable Development of Economy*, 2(47), 276-283. doi: 10.32782/2308-1988/2023-47-39.
- [10] Danko, Y., & Zhyvytsky, D. (2024). Development of dairy clusters as a tool for agricultural enterprises production diversification. *Bulletin of Sumy National Agrarian University*, 1(97), 40-45. doi: 10.32782/bsnau.2024.1.7.
- [11] Demchenko, O. (2024). Mechanism of influence of agricultural cooperation on the development of human capital of rural areas of Ukraine. *Ukrainian Journal of Applied Economics and Technology*, 9(1), 327-331. doi: 10.36887/2415-8453-2024-1-55.
- [12] Dynamics of the land bank. (n.d.). Retrieved from <https://flo.uri.sh/visualisation/1126261/embed>.
- [13] Economic Code of Ukraine No. 436-IV. (2004, January). Retrieved from <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC224361/>.
- [14] Halytskyi, O., Diachenko, O., & Reheda, D. (2023). [Management of resource provision of economic activities of agricultural enterprises](#). *Economic Bulletin of the Black Sea Littoral*, 4, 3-16.
- [15] Heorhiadi, N., & Kubant, A. (2024). Concept and types of enterprises management adaptation systems. *Economy and Society*, 62. doi: 10.32782/2524-0072/2024-62-1.
- [16] Ihnatenko, M., Levieva, L., Bilousov, E., & Bykalo, M. (2024). The impact of innovation strategies of large agricultural holdings and corporations on innovation and modernization of small and medium-sized agricultural enterprises. *Efficient Economy*, 5. doi: 10.32702/2307-2105.2024.5.23.
- [17] Kaletnik, H., Shpykuliak, O., Khvesyk, Yu., & Bilokinna, I. (2022). [The development of the cooperation in realizing of the potential of the renewable energy sources for the implementation of the "green" course and sustainable development of the rural areas](#). *Economics of Nature Use and Sustainable Development*, 12, 26-39.
- [18] Kernel Holding S.A. Annual report. (2023). Retrieved from https://www.kernel.ua/wp-content/uploads/2023/10/FY2023_Kernel_Annual_Report.pdf.
- [19] Khytra, O. (2022). The role of integration synergism in justification of the feasibility of merger or acquisition agreements. *Taurida Scientific Herald. Series: Economics*, 13, 16-2. doi: 10.32782/2708-0366/2022.13.2.
- [20] Klymenko, N., Voronenko, I., Nehrey, M., Rogoza, K., & Rogoza, N. (2023). Risk assessment of shock periods and investment attractiveness of agroholdings of Ukraine. *Agricultural and Resource Economics*, 9(2), 163-182. doi: 10.51599/are.2023.09.02.07.
- [21] Kosach, I. (2024). Theoretical and applied principles of strategic management of the agricultural enterprises' capitalization. *Efficient Economy*, 3. doi: 10.32702/2307-2105.2024.3.3.
- [22] Koval, Z. (2023). Assessment of strategic opportunities of the enterprise in conditions of uncertainty. *Technology Audit and Production Reserves*, 4(5(73)), 27-31. doi: 10.15587/2706-5448.2023.289288.
- [23] Kravchenko, S., Malik, L., & Bezhenar, I. (2024). Development of the business ecosystem in agricultural business in the conditions of European integration and wartime. In *Proceedings of the international scientific and practical conference "Business development in the context of European integration: Global challenges, strategic priorities, realities and prospects"* (pp. 169-171). Kharkiv: DBTU. doi: 10.5281/zenodo.11919079.
- [24] Kryukova, I., Havrilyuk, V., & Kaznovska, L. (2023). [Financial results of the activities of business subjects under the conditions of sustainable development](#). *Economic Bulletin of the Black Sea Littoral*, 4, 43-56.

► Acknowledgements

None.

► Funding

None.

► Conflict of interest

None.

- [25] Kryvenko, N. (2024). Agrarian integration: Theoretical foundations. *Ukrainian Black Sea Region Agrarian Science*, 28(1), 40-51. doi: [10.56407/bs.agrarian/1.2024.40](https://doi.org/10.56407/bs.agrarian/1.2024.40).
- [26] Kucherenko, S., Levaieva, L., & Krasnozhon, A. (2023). Financial and security factors of competitiveness of agricultural enterprises under martial law. *University Economic Bulletin*, 58, 68-73. doi: [10.31470/2306-546X-2023-58-68-73](https://doi.org/10.31470/2306-546X-2023-58-68-73).
- [27] Kutsyk, P., Semiv, S., Kutsyk, V., Poliakova, J., & Shevchyk, B. (2023). State, problems and priorities of the development of agricultural cooperation in Ukraine in the context of modern challenges. *Financial and Credit Activity Problems of Theory and Practice*, 1(48), 282-297. doi: [10.55643/fcaptop.1.48.2023.3956](https://doi.org/10.55643/fcaptop.1.48.2023.3956).
- [28] Kyfyak, V., & Dubynskyi, R. (2024). Institutional system of sustainable development of the agricultural sector: Mechanism of adaptation in conditions of fluctuations. *Sustainable Development of Economy*, 1(48), 220-227. doi: [10.32782/2308-1988/2024-48-31](https://doi.org/10.32782/2308-1988/2024-48-31).
- [29] Kyfyak, V., Verbivska, L., Alioshkina, L., Galunets, N., Kucher, L., & Skrypnyk, S. (2022). The influence of the social and economic situation on agribusiness. *WSEAS Transactions on Environment and Development*, 18, 1021-1035. doi: [10.37394/232015.2022.18.98](https://doi.org/10.37394/232015.2022.18.98).
- [30] Kytsyuk, I., & Kovalchuk, I. (2023). Programs of the European Union for support and stimulation of small and medium-sized businesses in Ukraine. *Scientific Bulletin of Poltava University of Economics and Trade. Series: Economic Sciences*, 4(110), 69-73. doi: [10.37734/2409-6873-2023-4-10](https://doi.org/10.37734/2409-6873-2023-4-10).
- [31] Lanchenko, Ye., & Ivchenko, V. (2023). Development of small forms of farming in the agrarian sector of the economy. *University Economic Bulletin*, 18(1), 19-28. doi: [10.31470/2306-546X-2023-56-19-28](https://doi.org/10.31470/2306-546X-2023-56-19-28).
- [32] Land Code of Ukraine No. 2768-III. (2001, October). Retrieved from <https://cis-legislation.com/document.fwx?rgn=8688>.
- [33] Lavruk, V., Slavina, N., & Lavruk, O. (2022). Management of the development of agricultural serving dairy cooperatives: Problems and prospects. *Agrosvit*, 9-10, 36-43. doi: [10.32702/2306-6792.2022.9-10.36](https://doi.org/10.32702/2306-6792.2022.9-10.36).
- [34] Law of Ukraine No. 1087-IV "On Cooperation". (2003, July). Retrieved from <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC045739/>.
- [35] Law of Ukraine No. 2524-IX "On Official Statistics". (2022, August). Retrieved from <https://zakon.rada.gov.ua/laws/show/2524-20#Text>.
- [36] Law of Ukraine No. 3528-IV "On Holding Companies in Ukraine". (2006, March). Retrieved from <https://cis-legislation.com/document.fwx?rgn=11326>.
- [37] Law of Ukraine No. 3587-IX "On Making Changes to Some Legislative Acts of Ukraine Regarding the Terms of Circulation of Agricultural Land". (2024, February). Retrieved from <https://www.zakon.rada.gov.ua/laws/show/552-IX#Text>.
- [38] Law of Ukraine No. 742-IV "On the Personal Peasant Economy". (2003, May). Retrieved from <https://cis-legislation.com/document.fwx?rgn=18044>.
- [39] Law of Ukraine No. 819-IX "On Agricultural Cooperation". (2020, July). Retrieved from https://zakononline.com.ua/documents/show/487358_777781.
- [40] Mazur, H. (2022). Clusterization in the management of economic security of the region in the conditions of martial law. *Scientific Bulletin of Vinnytsia Academy of Continuing Education. Series "Ecology. Public Administration"*, 2, 47-54. doi: [10.32782/2786-5681-2022-2.06](https://doi.org/10.32782/2786-5681-2022-2.06).
- [41] Melnyk, M., & Leshchukh, I. (2024). Strategic priorities of integrated spatial development on the basis of activation of agglomeration. *Modeling the Development of the Economic Systems*, 1, 163-169. doi: [10.31891/mdes/2024-11-23](https://doi.org/10.31891/mdes/2024-11-23).
- [42] Milk Producers Association. (n.d.). Retrieved from <https://avm-ua.org/uk>.
- [43] National rating of the quality of corporate reputation management "Reputation Activists". (n.d.). Retrieved from <https://repactiv.com.ua/magazine.pdf>.
- [44] Naumov, O., & Naumova, O. (2023). Scientific basis of institutional regulation of strategic development of agricultural production on the basis of clusterization. *Modeling the Development of the Economic Systems*, 4, 252-258. doi: [10.31891/mdes/2023-10-34](https://doi.org/10.31891/mdes/2023-10-34).
- [45] Nehrey, M., & Trofimtseva, O. (2022). Analysis of the agriculture sector of Ukraine during the war. *Bulletin of V.N. Karazin Kharkiv National University Economic Series*, 102, 49-56. doi: [10.26565/2311-2379-2022-102-06](https://doi.org/10.26565/2311-2379-2022-102-06).
- [46] Panteleimonenko, A., & Honcharenko, V. (2023). The "scissors" effect between the objective need and readiness of agricultural producers to participate in service cooperatives. *Taurida Scientific Herald. Series: Economics*, 16, 159-165. doi: [10.32782/2708-0366/2023.16.21](https://doi.org/10.32782/2708-0366/2023.16.21).
- [47] Pasko, S. (2022). Role and place of integrated agrarian formations in sustainable development economy. *Bulletin of Sumy National Agrarian University*, 2(92), 60-66. doi: [10.32782/bsnau.2022.2.8](https://doi.org/10.32782/bsnau.2022.2.8).
- [48] Poleva, O., & Gavrilyuk, V. (2024). Recreation of production potential of farms on the basis of implementation of innovations. *International Scientific Journal "Internauka". Series: Economic Sciences*, 2. doi: [10.25313/2520-2294-2024-2-9654](https://doi.org/10.25313/2520-2294-2024-2-9654).
- [49] Sahachko, Yu., Smihunova, O., & Podolska, O. (2023). Prospects for the formation of investment support for the technological growth of the agricultural sector of the Ukrainian economy in the post-war period. *Ukrainian Black Sea Region Agrarian Science*, 27(3), 62-70. doi: [10.56407/bs.agrarian/3.2023.62](https://doi.org/10.56407/bs.agrarian/3.2023.62).
- [50] Semysal, A. (2022). Development of cooperative relations in dairy cattle breeding in Ukraine. *Agrosvit*, 7-8, 47-52. doi: [10.32702/2306-6792.2022.7-8.47](https://doi.org/10.32702/2306-6792.2022.7-8.47).
- [51] Shevchenko, A., & Petrenko, O. (2023). Determinants of economic development of agriculture in Ukraine. *Modern Economics*, 38, 186-193. doi: [10.31521/modecon.V38\(2023\)-28](https://doi.org/10.31521/modecon.V38(2023)-28).

- [52] Shpykuliak, O., Ksenofontova, K., & Khmil, V. (2023a). Integrated formations of the associative type in the agrarian sector of the economy of Ukraine: Organizational and institutional analysis of development. *Agrarian Economics*, 16(3-4), 3-14. doi: [10.31734/agrarecon2023.03-04.003](https://doi.org/10.31734/agrarecon2023.03-04.003).
- [53] Shpykuliak, O., Pugachov, M., & Hryshenko, O. (2023b). Assessment of the effectiveness of development of agrarian entrepreneurship in modern economic conditions: Aspects of wartime and post-war recovery. *Modern Economics*, 41, 170-178. doi: [10.31521/modecon.V41\(2023\)-24](https://doi.org/10.31521/modecon.V41(2023)-24).
- [54] Skydan, O., Bugaychuk, V., Grabchuk, I., Sych, K., & Kubrak, S. (2024). Growth of value added as a factor in the development of Ukrainian agriculture in the context of accelerated integration into the EU. *Scientific Horizons*, 27(5), 143-158. doi: [10.48077/scihor5.2024.143](https://doi.org/10.48077/scihor5.2024.143).
- [55] State Statistics Service of Ukraine. (n.d.). Retrieved from <http://www.ukrstat.gov.ua>.
- [56] Stender, S., Tsvihun, I., Balla, I., Borkovska, V., & Haibura, Yu. (2024). Innovative approaches to improving the agricultural sector in the era of digitalization of the economy. *Scientific Horizons*, 27(3), 154-163. doi: [10.48077/scihor3.2024.154](https://doi.org/10.48077/scihor3.2024.154).
- [57] Sumets, A., Tyrkalo, Yu., Popovych, N., Poliakova, Ju., & Krupin, V. (2022). Modeling of the environmental risk management system of agrohholdings considering the sustainable development values. *Agricultural and Resource Economics*, 8(4), 244-265. doi: [10.51599/are.2022.08.04.11](https://doi.org/10.51599/are.2022.08.04.11).
- [58] Toporkova, O., et al. (2022). *Theoretical foundations in economics and management*. Boston: Primedia eLaunch. doi: [10.46299/ISG.2022.MONO.ECON.2.4.7](https://doi.org/10.46299/ISG.2022.MONO.ECON.2.4.7).
- [59] Ukrainian Grain Association. (n.d.). Retrieved from <https://uga.ua/>.
- [60] Union of Dairy Enterprises of Ukraine. (n.d.). Retrieved from <https://uadairy.com/>.
- [61] Vitryak, O., & Tkachuk, V. (2024). Economic development of individual peasant farms: State and trends. *International Scientific Journal "Internauka". Series: Economic Sciences*, 5. doi: [10.25313/2520-2294-2024-5-9904](https://doi.org/10.25313/2520-2294-2024-5-9904).
- [62] Vlasenko, T. (2023). Current trends in the development of corporate agricultural enterprises. *Herald of Khmelnytskyi National University. Economic Sciences*, 320(4), 49-54. doi: [10.31891/2307-5740-2023-320-4-7](https://doi.org/10.31891/2307-5740-2023-320-4-7).
- [63] Zhylynska, O., & Sviderska, N. (2024). Streamlining marketing activities: Essential tools for organizational success. *Technology Audit and Production Reserves*, 1(4(75)), 27-32. doi: [10.15587/2706-5448.2024.298828](https://doi.org/10.15587/2706-5448.2024.298828).

Розвиток інтеграційних структур в аграрному секторі економіки в умовах воєнного часу

Світлана Кравченко

Доктор економічних наук, професор
Національний науковий центр «Інститут аграрної економіки»
03127, вул. Героїв Оборони, 10, м. Київ, Україна
<https://orcid.org/0000-0001-5541-4495>

Микола Малік

Доктор економічних наук, професор
Національний науковий центр «Інститут аграрної економіки»
03127, вул. Героїв Оборони, 10, м. Київ, Україна
<https://orcid.org/0000-0001-9198-4460>

Олександр Шпикуляк

Доктор економічних наук, професор
Національний науковий центр «Інститут аграрної економіки»
03127, вул. Героїв Оборони, 10, м. Київ, Україна
<https://orcid.org/0000-0001-5257-5517>

► **Анотація.** Активізація діяльності інтеграційних структур має особливе значення в системі нарощування платоспроможності, конкурентостійкості та адаптивності аграрного сектору економіки, стабілізації продовольчої безпеки в умовах інтеграції із європейською спільнотою. Мета статті було обґрунтувати теоретико-методологічні, соціально-економічні засади, проблеми розвитку інтеграційних структур на селі в екстремальних умовах діяльності. За методологічну основу дослідження слугували положення сучасної інституціональної економічної теорії, функціонального та системного аналізу. Використано монографічний, економіко-статистичний, графічний, структурно-функціональний та абстрактно-логічні методи та підходи узагальнення результатів. Розглянуто сучасний стан, місце і роль інтеграційних структур. Проведено системний аналіз проблем і тенденцій функціонування інтеграційних структур в період воєнного часу. Розглянуто теоретико-методологічні аспекти функціонування інтеграційних формувань. Виявлено причини, що гальмують активізацію інтеграційного руху в аграрній сфері економіки на сучасному етапі розвитку. Оцінено динаміку розвитку діючих великих підприємницьких структур в Україні та виявлено негативні аспекти, які необхідно враховувати при організації та функціонуванні інтеграційних об'єднань в залежності від виду та діяльності об'єднання. З'ясовано роль міжнародної технічної допомоги та державної підтримки в стимулюванні та стратегії розвитку інтеграційних структур в Україні. Виявлені можливості та перспективи розвитку інтеграційного руху та проблеми стабільного розвитку інтеграційних структур. З'ясовано, що одним з пріоритетних напрямів регіональної політики є розвиток інтегрованих формувань агрохолдингового типу та кооперативних структур на селі. Розкрита роль інтеграційних структур у формуванні соціального капіталу та сталому розвитку сільських територій в післявоєнній відбудові економіки України. Інформаційний матеріал можливо використовувати при розробленні програм розвитку великих підприємницьких структур в аграрному бізнесі регіонів

► **Ключові слова:** суб'єкт підприємницької діяльності; підприємницькі структури; інтегровані формування; аграрний бізнес; агрохолдинг; кооператив