Received: 24/03/2023. Revised: 18/06/2023. Accepted: 17/07/2023

EKONOMIKA APK

https://doi.org/10.32317/2221-1055.202304025

Ekonomika APK, 30(4), 25-35

UDC 331.522.4.004

Diversification of entrepreneurial activities in the agricultural sector of Ukraine's economy in the post-war period

Mykola Ilchuk
Doctor of Economic Sciences, Professor
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0001-5129-6110

Serhii Nikitchenko*
PhD in Economic Sciences, Associate Professor
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0003-1940-4788

Oleksandr Sytnyk
Postgraduate Student
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0009-0000-5903-8466

Vitaliy Pavlenko
Postgraduate Student
National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0009-0008-5937-9584

▸ **Abstract.** In the context of modern development of agricultural producers, assessing the level of their activity efficiency and searching for an appropriate strategy for further development is essential. The aim of the article was to formulate a concept of sustainable development for agricultural producers based on identifying the most viable development strategy. The article's methodological framework included the following methods of scientific inquiry: descriptive method, measurement and comparison methods, economic-mathematical modelling, induction, deduction, analysis and synthesis, system-structural analysis. The essence of diversification of activities in the agricultural sector was examined and revealed, defining their role in forming sustainable development. To achieve this, theoretical concepts of Ukrainian and foreign scholars, as well as the categories of "diversification" and "sustainable development," were synthesized. Subsequently, an analysis and forecast of land use by agricultural enterprises were conducted. The dynamics of changes in the structure of cultivated areas from 1991 to 2021 were determined, as this period marked the implementation of agricultural reform aimed at finding effective agricultural product producers. Changes in the magnitude of costs for primary resources in farm enterprises of the Kyiv region on the eve of the war were defined, and the economic efficiency of cultivating major agricultural crops was analysed. Based on established data, a development strategy was modelled for an average farm in the Forest-Steppe zone of Ukraine, considering the concept of diversification through the implementation and development of animal husbandry. Furthermore, directions for further development of agricultural entities were substantiated by deepening the diversification of activities through optimizing cultivated areas. The research outcomes could be considered in shaping the development strategy of entrepreneurial structures and evaluating their impact on sustainable development in the post-war period

▸ **Keywords:** strategy production; sustainable development; forecast; economic efficiency

▸ **Suggested Citation**: Ilchuk, M., Nikitchenko, S., Sytnyk, O., & Pavlenko, V. (2023). Diversification of entrepreneurial activities in the agricultural sector of Ukraine's economy in the post-war period. *Ekonomika APK*, 30(4), 25-35. doi: 10.32317/2221-1055.202304025.

*Corresponding author

▸ Introduction

Diversification, in the context of increased competition, plays a crucial role in forming an effective entrepreneurial strategy. In general terms, diversification of activities is seen as a strategy where a company expands its business operations by adding new directions or products to its core activities. This can be achieved through internal development, acquiring other companies, or creating joint ventures with partners. Diversification of activities allows companies to reduce risks associated with market changes, competition, and technological shifts. It also enables companies to enter new markets and enhance their competitiveness. In the agricultural sector of the economy, diversification, based on optimizing production structure, helps mitigate the impact of price fluctuations.

These fundamental principles have been substantiated and further developed in the works of both past and contemporary scholars. For instance, S. Balyuk & A. Kucher (2018), P.De Andrés *et al.* (2017) have highlighted the role of diversification strategies in utilizing financial resources. They explored how the choice of strategy influences a company's value. A.N. Kariuki *et al.* (2018) consider diversification as a tool to expand the range of value-added dairy products. Their findings show that access to markets for diversified products positively impacted the performance of dairy industry enterprises in the studied region. Research by O. Varchenko *et al.* (2019), D. Beillouin *et al.* (2019) assess the production and ecological benefits of diversifying activities in farms specialized in plant-based production. Meanwhile, N.K. Nigam & C.P. Gupta (2020) investigate the feasibility of diversification, studying its impact on various aspects of a firm's activities, including financial performance and time analysis. Ukrainian scholar O.M. Zgurska (2018) extended research in the context of crisis situations, emphasizing diversification as a tool to address inefficiencies and uncertainties in the external environment.

Economic activities are often categorized into production and financial sectors. In the financial sector, diversification involves allocating investments across different assets to reduce the risk of losses. The more diverse the assets in a portfolio, the less impact a decrease in the price of one asset has on the overall income. Diversification can encompass different asset classes such as stocks, bonds, real estate, gold, and other resources. It helps decrease risks and increase stability in an investment portfolio. On the other hand, production diversification is a strategy in which a company expands its production range by adding new categories of goods or services to its core products. This can be achieved through internal development, acquiring other companies, or creating joint ventures with partners.

Production diversification enables companies to expand their market presence, enter new market segments, and enhance competitiveness. It also allows companies to reduce risks associated with market changes and competition. However, the war in Ukraine has posed numerous challenges to the country's economy, affecting business operations and industry development. Agricultural production is one of the sectors heavily affected by the conflict. A crucial precondition for post-war entrepreneurial development in the agricultural sector is the establishment of market conditions that ensure the growth of value-added and profitability for producers through diversification of their activities. The aim of the article was to scientifically generalize theoretical concepts of diversification of agricultural producers' activities and, based on this, further develop practical recommendations for identifying promising development directions in accordance with the concept of sustainable development in the post-war period.

▸ Materials and Methods

The basis of the conducted research was an informational foundation, which encompassed not only statistical data characterizing the economic activities of agricultural enterprises in Ukraine, but also aggregated statistical reports provided by the State Statistics Committee of Ukraine. This comprehensive information served as the foundation for studying and analysing various aspects of rural development, enabling a deeper and more objective understanding of the industry's state and its development trends (Agriculture of Ukraine…, 2022; Global and domestic…, 2022).

The research process went through several stages. In the first stage, using descriptive and systemic-structural methods, the generalization, and analysis of theoretical principles of diversification of activities by agricultural producers were carried out. Based on these principles, priority directions of diversification in the post-war period were identified. To substantiate these theoretical positions, in the second stage, using measurement and comparison methods at the empirical level, the land use structure from 1991 to 2021 was analysed, as well as changes in the structure of cultivated areas in Ukraine. This period was chosen due to Ukraine's independence and the initiation of agrarian reform aimed at finding efficient producers of agricultural products. Data for the year 2022 cannot fully reflect the state of economic development, as it is hindered by the full-scale war on Ukrainian territory. Also, not all the data for 2022 and 2023 has been published yet.

In the third stage of the research, for the purpose of forecasting the development of agricultural producers, relevant data for the year 2022 were used. Taking into account the analysis of changes in land ownership, a predictive model was constructed that allows calculating the average size of farm households by 2030. The equation of the model is as follows:

$$y = 64{,}409\ln(x) + 15{,}055. \quad (1)$$

The mentioned model allows for a maximum consideration of trends in land ownership changes among the studied economic entities. The obtained data were used in the construction of an economic-mathematical model. The next important step in the research was the comparison of the economic efficiency of production activities of farm households in the pre-war and subsequent marketing years. This comparison enabled the determination of key resources and their impact on the increase of production costs. This stage of the work was conducted using methods of induction, deduction, analysis, and synthesis.

The obtained analytical data served as the basis for forecasting the development of agrarian producers through the diversification of their activities, specifically through the involvement and development of the livestock sector.

To formulate this forecast, an economic-mathematical model was developed using an economic-mathematical modelling method. This model projects the production structure based on scientifically grounded approaches to crop rotation and considering livestock development (Ilchuk *et al.,* 2019).

The objective function for optimizing production systems is as follows:

$$F_{\max} = \sum_{k=1}^{n} v_k s_k + \sum_{t=1}^{m} v_t p_t, \quad (2)$$

where $F_{\max}$ – is income; k – the type of crop (g = 1,2…, n); t – the type of animal (a = 1,2…, m); s_k – the cultivated area of the g-th crop; p_t – is the livestock population of the a-th animal type; v_k – is the income per unit of area for the j-th crop; v_t – the income per head for the k-th type of animal.

▸ Results and Discussion

Continuing the scientific and practical work of colleagues, it is necessary to consider and further develop the following key principles of agricultural product diversification, taking into account the balance between cultivating high-margin crops without disrupting crop rotation patterns, revitalizing the livestock sector, and promoting the development of farm households as the foundation for sustainable post-war development (Fig. 1).

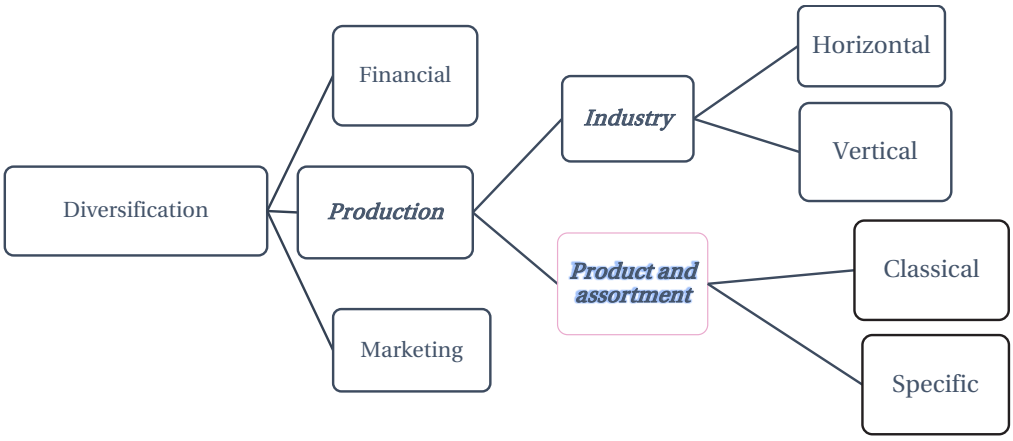

Figure 1. Types of diversification of agricultural producers
Source: summarized and supplemented by the authors on the basis of developed theoretical sources M.M. Ilchuk *et al.* (2016); I.V. Svinous *et al.* (2018)

The diversification of activities among agricultural producers is driven by objective factors within a market economy. It allows for the reduction of the impact of price fluctuations on production, thereby stabilizing the income generated. Diversification also activates potential sources of internal growth and enhances production efficiency. Depending on market conditions, the goals of diversification can vary (Fig. 1). This multifunctionality underscores the practicality of using diversification as a foundation for shaping the development strategy of agricultural producers. In stable market conditions, the theory of production diversification has focused on investigating industry-specific forms of implementation. However, the development of the economy amidst military activities and the post-war period increases the significance of considering and developing the theoretical aspects of production diversification based on product-assortment forms of implementation. The choice of this strategy is justified by its lower investment requirements compared to other strategic forms-horizontal and vertical.

Diversification is regarded as a process that occurs throughout the entire lifecycle of agricultural enterprises, encompassing all its aspects. The economic context of this process involves initiating any activity that generates income, but does not encompass all aspects of the economy (Ilchuk *et al.,* 2016). Therefore, diversification for agricultural producers serves as a tool that maximizes the utilization of internal enterprise potential to achieve profitability. Diversification is believed to preserve the competitiveness of the enterprise, foster the development of strong market resilience, and eventually channel capital toward more profitable entrepreneurial ventures (Marshalok *et al.,* 2021).

The foundation of diversification must be based on the concept of sustainable development, which aims to move away from the idea of stimulating consumption growth. This concept was initially introduced at the United Nations conferences in Stockholm (1972) and Rio de Janeiro (1992). According to its basic principles, the concept of sustainable development envisions societal growth where economic and social benefits are determined by the ecosystems' capacity for self-renewal. Solving this issue lies in the rational balance between socio-economic development and the rational use of natural resources. This balance should ensure environmental safety while effectively using available resources, all while promoting improved quality of life and well-being for the population. In Ukraine, the implementation of the concept of sustainable development is significantly complicated due to ongoing military actions. Undoubtedly, this situation has a significant impact on the understanding of the state and prospects of sustainable development, underscoring the importance of comprehending diversification in shaping the development strategy of agricultural producers in the post-war period. Agriculture has been one of the sectors most affected. When looking at this issue through the lens of ecological, social, and economic societal development, attention should be drawn to the following problematic aspects.

Firstly, ecology: it has been identified that a considerable area requires demining and proper reclamation. Among land resources, black soils have suffered the most. According to experts from the National Scientific Center "Institute of Soil Science and Agrochemistry named after O.N. Sokolovsky", as of May 2022, the most significant areas affected by combat actions are characterized by the following primary soil types: ordinary chernozems (50.1 thousand square kilometres), soddy and soddy-podzolic soils (29.4 thousand square kilometres), southern chernozems (16.2 thousand square kilometres), and dark chestnut soils (9.6 thousand square kilometres) (Balyuk & Kucher, 2018). Over a short period, significant land areas in the south and east of Ukraine have been taken out of circulation, and the material and technical base has been damaged or destroyed, resulting in reduced livestock populations.

Secondly, social development: the structure, quantity, and employment of the population have significantly changed due to the military actions. The involvement of able-bodied male population, internal migration, and the departure of women and children abroad exacerbate the issues of sustainable development in the post-war period. The incapacity of enterprises in the occupied territories or in regions close to conflict zones, the loss, or damage to business assets, disruptions in logistics including port closures, have led to a sharp increase in unemployment. According to preliminary data, in July, unemployment reached 35%, nearly four times higher than the end of 2021 (9.8%). This is due to the complete or partial closure of enterprises and the loss or wear of production facilities. Considering inflation at 26% and the devaluation of the hryvnia, real wages have decreased by over 40% (The unemployment rate…, 2022).

Thirdly, the economic sphere: military actions have impacted the volume of commodity production. The production of agricultural products, especially crops, has significantly decreased, and the country's export opportunities have deteriorated. The situation further complicated after the start of the maritime blockade of the ports of Odesa and Mykolaiv. The logistical capacities of the Ukrainian Danube Shipping Company, railways, and road transport are insufficient to facilitate proper agricultural product circulation. As a result, demand has plummeted, and prices for agricultural products, especially grains, have dropped. The conclusion of a grain agreement improved the overall situation, but numerous farmers in the south incurred significant losses. According to unofficial data, up to 30% of micro-agricultural enterprises did not even plant winter grains, as the absence of early spring technological measures and low market prices, ranging from 1600 to 2500 hryvnias per ton, did not allow for profitable margins (Splodytel *et al.,* 2023).

When considering the factors leading to economic decline and the opportunities for managing this process, it's worth noting that the situation with grain crops was anticipated. An export-oriented grain industry had been producing three times more than domestic consumption in recent years (Grain market…, 2022). While excess production was directed towards exports, the sector became a crucial source of currency inflow to the budget. However, the pursuit of profit and the lack of an effective national security policy jeopardize not only income volumes to the budget, such as taxes and contributions, but also the possibility of sustainable development of rural territories and the well-being of tens of thousands of farm enterprises and hundreds of thousands of citizens associated with this sphere.

It can be argued that this situation is the consequence of the absence of a unified, comprehensive concept for the development of the agricultural sector. The lack of control over the formation of market relations resulted in significant sectoral imbalances when forming new principles of management after Ukraine's independence. Therefore, it's important to understand the historical development of Ukraine's agricultural sector, its current level of development, and its place in global agriculture. This analysis is crucial for shaping the development strategy of the agricultural sector both in the post-war period and overall, in the formulation of a sustainable development concept. Based on these considerations, a rapid analysis of the conditions of operations in the agricultural sector of the economy was conducted (Fig. 2).

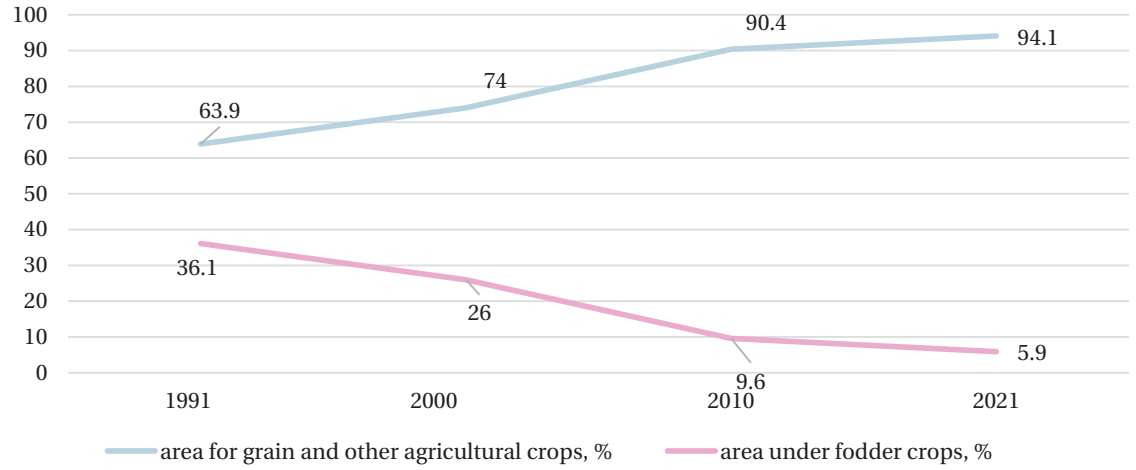

Figure 2. Dynamics of the structure of land use by agricultural producers
Source: summarized on the basis of statistical reporting data Agriculture of Ukraine for 2021 (2022)

In Figure 2, the dynamics of the distribution of agricultural land between grain and forage crops are depicted. Grains are the primary group of crops, while forage crops serve as the main raw material base for the livestock industry. The analysis revealed that during the initial stages of market relations, low agricultural productivity, disruptions in established economic connections, lack of credit and material support negatively affected the economic efficiency of agricultural producers' activities and compelled them to seek ways to navigate the complex situation.

As a result, there was a reduction in livestock farming. This is because managing the livestock industry is more labor-intensive and requires larger investments in fixed assets compared to the crop sector. Bringing livestock to a more productive level demanded disproportionate investments and efforts. These mentioned factors, along with low product prices, became the main influencers behind the reduction in livestock and poultry populations. Consequently, this led to a decrease in the area under forage crops and became one of the factors influencing changes in crop rotation structures (Fig. 3).

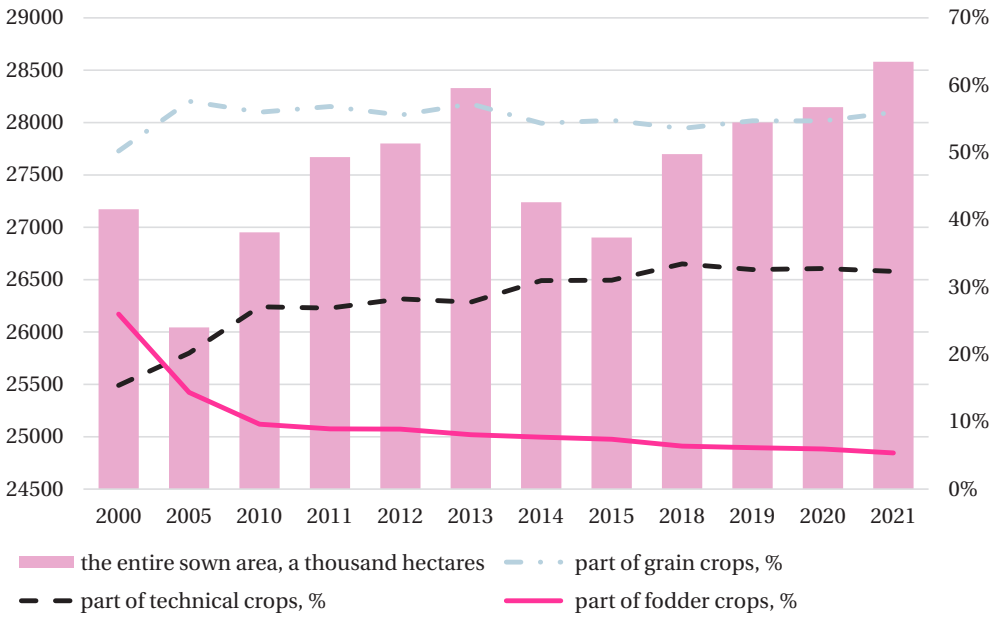

Figure 3. Dynamics of the structure of cultivated areas and its change
Source: summarized on the basis of statistical reporting data Agriculture of Ukraine for 2021 (2022)

Analysing thedynamics of sown areas during the researched period, it's worth noting that the total sown area increased. The significant reduction in 2014 and 2015 is directly linked to the withdrawal of agricultural land from cultivation in the Donetsk and Luhansk regions due to military actions and the annexation of the Crimean Peninsula. However, during the subsequent period, a clear trend of increasing the area under cultivation of agricultural crops was restored. This was primarily achieved through the reduction in areas under forage crops. By the beginning of 2022, Ukraine was able to compensate for the loss of sown areas and partially restore the export opportunities of the agricultural sector. Agricultural producers, including farmers, regained the ability to sell their products at global market prices, and the country was able to fill its budget through external economic activity and currency inflows.

The analysis of agricultural production in Ukraine's agricultural sector indicates that from 2000 to 2020, the production of cereals and legumes consistently increased. Technological improvements in production and the expansion of cultivated areas for crops resulted in a more than twofold increase in grain production over the course of a decade. The production of some oilseed crops, especially sunflower, rapeseed, and soybeans, also increased (Soybeans in crop…, 2020; Global and domestic…, 2022). However, the low demand for livestock products, combined with a generally low technological level of production processes, influenced the sector's development. Livestock populations, productivity, and consequently, the volume of product output, decreased. Consequently, the overall decrease in livestock affected the reduction of areas under forage crops (Kravchuk *et al.*, 2021).

Structural changes in the industry occurred concurrently with land privatization. These measures allowed peasants to obtain land shares. New types of entrepreneurial structures formed: large-scale and small-scale agricultural producers. Among these, numerous family farms emerged, with 48 860 farms registered as of January 1, 2022 (More than…, 2022). Analysing the development of these economic entities, it's important to highlight the following characteristics: Firstly, family farms comprise around 80% of the total number of agricultural businesses. Secondly, these farms hold approximately 22% of arable land. Thirdly, 80% of family farms own less than 500 hectares of land, with an average farm size of 131 hectares. Therefore, given the quantity of family farms, the changing dynamics of their sizes, and their impact on rural development, it's prudent to emphasize an analysis of their status and prospects (Varchenko *et al.*, 2019).

In Ukraine's agricultural sector, the specialization of family farms is largely driven by the specialization of large-scale agricultural producers, namely agro-holdings. As a result, the situation that unfolded in 2022 had a negative impact on all market participants. Over a short period, prices for essential resources underwent changes (Fig. 4).

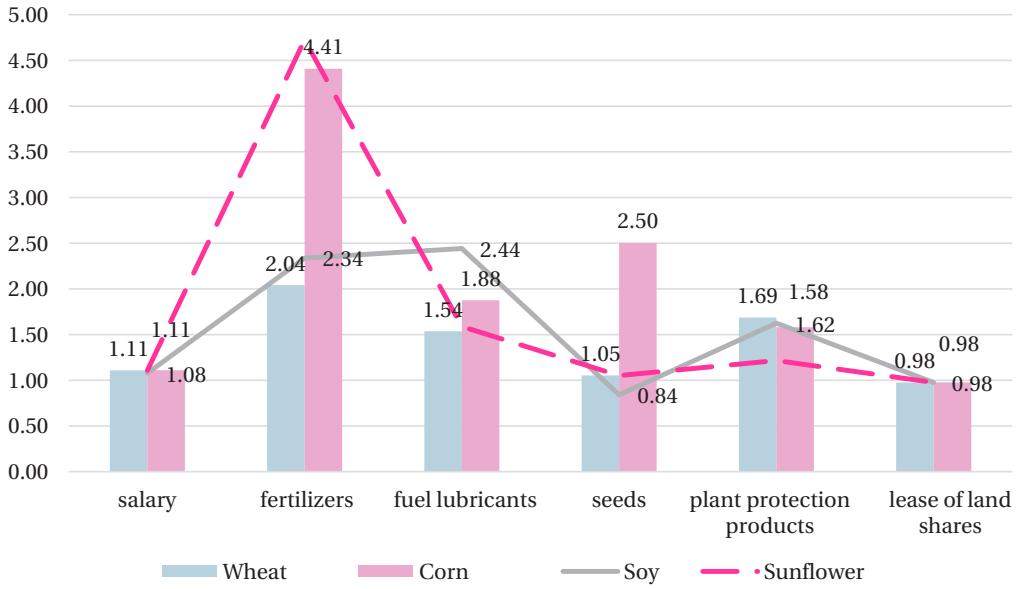

Figure 4. Changes in costs of basic resources in farms of the Kyiv region for the 2021/2022 marketing year
Source: summarized on the basis of statistical data on Agriculture of Ukraine for 2021 (2022)

The sowing campaign of 2022 took place against the backdrop of a sharp increase in prices for essential resources such as fuel, lubricants, fertilizers, seeds, and plant protection products. There was a significant reduction in the supply of these key resources in the market, coinciding with the breakdown of financial and trade credit relationships, a rapid devaluation of the hryvnia (the Ukrainian currency), and a decrease in demand for agricultural products. All of these factors had a negative impact on the economic efficiency of agricultural producers. For instance, when analysing the activities of farms in the Forest-Steppe zone of the Kyiv region, it was observed a considerable increase in the cost of production. The main contributing factors were expenses related to fertilizers, fuel and lubricants, seeds, and plant protection products. Meanwhile, the increase in labour costs and rental payments for land remained relatively unchanged.

Comparing with the previous year, Table 1 allows drawing the conclusion that the war has impacted the profitability of cultivating main crops. The profitability of cultivating main crops has significantly decreased, and growing cereals has become unprofitable altogether. For example, the loss in wheat cultivation amounted to -10.8%, and for corn, it was -44.5%. Moreover, the marginal profit per hectare of corn turned out to be negative at -10 521.1 hryvnias, indicating the impracticality of producing this type of grain in the short term (Potaeva, 2022).

Table 1. Efficiency of cultivation of the main agricultural crops

Indexes	Wheat		Corn		Soy		Sunflower	
	2021	2022	2021	2022	2021	2022	2021	2022
Productivity, t/ha	4.61	4.12	8.01	5.35	2.68	2.36	2.52	2.19
Fixed costs per 1 ha, hryvnias	4 909.1	6 011.6	4 898.3	6 010.7	4 901.9	6 016.4	4 893.4	6 004.1
Variable costs per 1 ha, UAH	12 637.5	12 472.6	18 609.9	31 118.6	11 935.2	17 691.3	10 633.1	12 108.1
Marginal income, UAH/ha	26 639.7	4 007.4	41 625.3	-10 521.1	32 284.8	9 507.3	36 541.3	12 529.4
Profitability (loss) of production, %	123.8	-10.8	156.2	-44.5	162.6	14.7	203.8	36.0

Source: summarized on the basis of statistical data on Agriculture of Ukraine for 2021 (2022)

The situation that has unfolded in the agricultural sector of the country requires new approaches to organizing the production activities of agricultural production. In this situation, the necessity of implementing a diversification strategy arises, which would ensure the sustainable development of the industry, both economically and ecologically. Diversification can be used to reduce operational risk, achieve increased financial synergy, stabilize income,

enhance credit opportunities, and promote growth or change in the company's profile. When considering diversification of agricultural production, it is worthwhile to explore the possibility of increasing the acreage under soybean cultivation. Soybeans are a valuable agricultural crop that serves as both a food and feed crop, enhancing its utilization possibilities. Notably, soybean products are considered an alternative source of nutrition and absorption for people who cannot tolerate conventional dairy proteins. This explains the growing demand for soy-based products among the population. Soybeans belong to one of the most widely cultivated agricultural crops globally, and the global trade market for soybeans has increased to nearly 50-55 million tons over the past two decades (Soybeans in crop…, 2020).

Soybeans are also valuable as a preceding crop in crop rotation planning. They have the ability to extract hard-to-reach nutrients from lower soil horizons. Subsequently, soybeans leave behind approximately 70-100 kg/ha of available nitrogen, 20-25 kg/ha of phosphorus, and 30-40 kg/ha of potassium in the soil, which contributes to a 15% increase in maize yield (Global and domestic…, 2022). The growing demand for soybeans, coupled with favourable climatic conditions in Ukraine, has led domestic agricultural producers to become leading exporters of soybeans. As a result, the expansion of soybean processing capacities enables national manufacturers to take leadership positions not only in raw material production but also in finished products. Ukraine ranks among the top ten soybean producers globally. According to preliminary data, in 2021/22 MY, Ukraine exported 1.39 million tons of soybeans, which is only 5% lower than the previous season's figure. Key regions for soybean production in Ukraine include the Khmelnytsky, Poltava, Zhytomyr, Kherson, and Kyiv regions. Soybean was almost the only oilseed crop that experienced a slight increase in monthly export rates during the war period compared to the previous period. For instance, from March to August 2022, soybean exports reached 507 thousand tons, exceeding the figure of the same period in 2020/21 MY by 65%. The main importers of soybeans are the EU and Turkey (Kazakova & Kondratyuk, 2015; Rozhko, 2022).

When planning the profitability of soybean cultivation, it is crucial to consider pricing dynamics. The internal market experiences low price fluctuations due to both internal and external high demand for this crop. However, the range of price fluctuations within $400-$650 per ton is quite noticeable for Ukrainian farmers and does not strategically solve the problem of decreasing soybean prices due to logistics issues. The analysis of operating entities revealed that as of 2020, the average farm size in the Forest-Steppe zone was around 181 hectares. It was also observed that the trend of farm size growth continued over the studied period. For instance, if the average farm size was 22.6 hectares in 1995, it increased to 56 hectares in 2000 and 103 hectares in 2010. Correspondingly, the specialization of agricultural producers also changed. Over the last period, farms specialized in producing spring cereals, maize for grain, sunflower seeds, and soybeans. Approximately 55% of the area was dedicated to grain crops, including maize for grain, while nearly 30% was allocated to sunflower, and slightly over 12% to soybeans. On average, 2 workers were engaged in the production activities (Development of regional…, 2020).

To determine the level of land utilization, an appropriate statistical model was used based on formula (1). As of 2023, farmers cultivate about 21% of arable land (Table 2). Their share in the total number of agricultural enterprises reaches 80%. Therefore, the development project for farms in the Forest-Steppe zone focuses primarily on state support to increase the utilization of arable land for farm use through internal redistribution.

Table 2. Project for the development of an average-sized farm in the Forest-Steppe Zone

Indexes	Medium farm household			
	2022 (fact)		2030 (project)	
	ha	%	ha	%
In total agricultural land, ha	180.5	100	211	100
Sowing area, hectares	180.5	100	116	55
Crops culture, in total	99.3	55	50	10
including: winter wheat	54.2	30	25	5
corn for grain	24.8	25	21	4.2
Sunflower	50.5	28	20	4
Soy	21.7	12	35	7
Other cultures	10.9	11	15	3
Annual herbs	—	—	50	10
Perennial herbs	—	—	20	4
Haymakers, ha	—	—	25	5
Population of animals, heads	—	x	58	x
Cows, heads	—	x	23	x
The young of the great horned livestock, heads	—	x	35	x

Table 2, Continued

Indexes	Medium farm household			
	2022 (fact)		2030 (project)	
	ha	%	ha	%
Pigs, heads	—	x	100	x

Source: summarized on the basis of statistical data on Agriculture of Ukraine for 2021 (2022)

The next step should involve the revival of the livestock industry. Livestock is crucial primarily in the socio-ecological aspect of sustainable development. It enables the creation of additional permanent job opportunities and serves as a foundation for deepening diversification efforts. Furthermore, this move can help structure cropland, improve crop rotation, and enhance the application of organic fertilizers. In combination, this will contribute to strengthening the country's food security, preserving natural soil fertility, and restoring the export potential of livestock products (The state plans…, 2020). For modelling the diversification project of farm operations, an economic-mathematical model was developed. It forecasts the production structure of the enterprise based on scientifically grounded approaches to forming crop rotations and developing livestock – expressed in formula (2).

According to the developed diversification project, by reducing the area under cereals and correspondingly increasing the area under soybeans and fodder crops, the structure of agricultural land use will change (Table 3). Additionally, it's important to maintain an unchanged proportion of livestock in agricultural production calculations. Such an approach is necessary to overcome the negative processes occurring in this industry, stabilize the situation, and eventually lead the sector to high profitability.

Table 3. Results of the implementation of the project of diversification of medium-sized farms in the Kyiv region for the long term

Indicator	A medium-sized farm		
	In fact, 2022	Forecast for 2030	Forecast to fact index
Area of agricultural land, ha	180.5	211.0	1.2
Number of industries	1	2	2.0
Number of types of products, pcs	4	6	1.5
Production of gross products, thousand hryvnias. total*	4 033.6	11 098.8	2.8
including plant products	4 033.6	5 348.7	1.3
livestock products	—	5 750.0	h
Employed in agriculture, persons of all	2	7	3.5
including plant products	2	2	1.0
livestock products	—	5	x
Need for investments, only thousand hryvnias	x	4 797.50	x
including: plant growing	x	657.5	x
animal husbandry	x	4140	x
Subsidy, thousand UAH	x	115.0	x
Total return on investment, years (RI)	x	1.7	x
Including animal husbandry	x	2.7	x

Source: summarized on the basis of statistical data on Agriculture of Ukraine for 2021 (2022)

The results of calculations indicate the possibility of achieving maximum crop yields, animal productivity, and product quality, which will contribute to increasing production volumes. Optimization of crop area structures and livestock feeding regimes, coupled with mechanisms of state support in the form of subsidies, should expedite investment returns. It should be noted that the combination of crop production and livestock farming should positively impact the ecological and social components of sustainable development. These measures are expected to promote the sustainable development of the agricultural sector and accelerate the country's economic recovery in the post-war period. The obtained results align and complement the conclusions reached by N.K. Nigam & C.P. Gupta (2020) regarding the overall feasibility of diversification. Similarities can also be drawn with findings from D. Beillouin *et al.* (2019), particularly in terms of the potential for additional benefits from diversification. Agreement can be found with the conclusions of A.N. Kariuki *et al.* (2018), who viewed diversification as a means to expand the product range, and with E. Jahanshiri *et al.* (2023) regarding the positive impact of diversification on the ecosystem, sustainable development, and food security. However, it's important to note that focusing solely on the financial component, as highlighted by P.De Andrés *et al.* (2017), doesn't fully encompass the category in terms of its influence on the social and environmental aspects of business development.

Additionally, considerable attention has been devoted to the study of diversification and sustainable development by foreign authors. Research conducted in the mid-20th century and relevant in 2023 includes the works of H.I. Ansoff (2007) and A.D. Chandler (1990), where the concept of "diversification" started to be viewed through the prism of corporate development strategy. Notably, these studies focused on large corporations, each with unique development characteristics. H.I. Ansoff (2007) regarded diversification as an extreme option for business development, as entering new markets with new products is a complex and costly approach. Subsequently, M.E. Porter (1987) further developed and refined the ideas laid out by previous authors. Porter defines "diversification" as one of three main universal strategies, involving the creation of a product or service with unique properties that essentially coincides with characteristics proposed earlier. These foundational understandings of "diversification" are important for its ongoing scientific exploration. J. Claire *et al.* (2021) advanced the concept of diversification in agriculture. They concluded that in terms of the potential to generate additional income, farms are not making sufficient use of diversification mechanisms. The activities considered by the authors include agro-tourism, professional services, and primary processing.

Similar conclusions were reached somewhat earlier by a group of domestic researchers, including M.M. Ilchuk *et al.* (2016). Their findings established that creating and activating existing service cooperatives and developing agritourism are important directions for expanding diversification. The theoretical portion of their work concluded that diversification in the agricultural sector is a positive process of expanding the assortment of products, goods, and services. It allows enterprises to utilize existing material resources, land, and labour more effectively, thereby reducing production seasonality, increasing employment, and generating additional income through timely and well-thought-out industry manoeuvring. Furthermore, Ukrainian researchers continued this line of study, including O.M. Zgurska (2018). Her research extended beyond the agricultural sector. She viewed diversification as a tool to overcome crises characterized by inefficient enterprise functioning and increasing uncertainty in the external environment. This conclusion is applicable to agricultural sector enterprises as well.

▸ Conclusions

Therefore, the development of the agricultural sector in the post-war period lies in the realm of diversification of production activities of agricultural enterprises. The increase in the cost of essential resources has led to higher production costs, while the decrease in product prices has affected both short-term and long-term periods. Additionally, the low level of diversification in the agricultural sector has impacted the financial results of agricultural producers in 2022 – the cultivation of certain grains became unprofitable. For instance, wheat production incurred a loss of 10%, and maize production suffered a loss of 44.5%.

It should be considered that the primary strategic directions for the development of the agricultural sector in the post-war period lie in diversification of entrepreneurial activities. Moving away from grain specialization, developing animal husbandry, and expanding cultivated areas for soybean cultivation are intended to stabilize the profitability of agricultural activities, ensure sustainable rural development, and consequently improve the living standards of rural residents during the post-war period. Trends of increasing land ownership and land use provide grounds to expect the average size of a farm to grow to 211 hectares by 2030. Considering these trends, it's advisable to implement appropriate state regulatory measures that facilitate the development of animal husbandry. The feasibility of such a project is projected within three years. This project will help mitigate risks from market fluctuations and, from an ecological and social perspective, reduce land degradation, optimize land use, and create additional jobs. In general, the projection is to allocate 45% of agricultural land to fodder crops and increase employment by 3.5 times.

It has been determined that diversification of activities can also have negative consequences, such as increased managerial complexity, costs associated with developing new directions, and the potential to lose focus on core activities. Therefore, prior to implementing a diversification strategy, companies should thoroughly analyse their capabilities and risks. The deepening of theoretical concepts regarding the diversification of activities for agricultural producers has been discussed. An optimization model for the development strategy of agricultural producers based on the development of animal husbandry has been proposed. Furthermore, it's advisable to consider further research into the category of "diversification of activities" in the context of household activities in Ukraine; determining the level of economic efficiency of agricultural activities in the post-war period; investigating strategic development directions for the agricultural sector in the context of supporting key economic entities; identifying strategic directions for the development of animal husbandry and several other aspects.

▸ Acknowledgements

None.

▸ Conflict of Interest

None.

▸ References

[1] Agriculture of Ukraine for 2021. (2022). Retrieved from https://ukrstat.gov.ua/druk/publicat/kat_u/publ7_u.htm.
[2] Ansoff, H.I. (2007). *Strategic management: Classic edition.* London: Palgrave Macmillan. doi: 10.1057/9780230590601.
[3] Balyuk, S., & Kucher, A. (2018). *National wealth of Ukraine – "chernozem" – under threat of destruction.* Retrieved from http://www.golos.com.ua/article/366511.
[4] Beillouin, D., Ben-Ari, T., & Makowski, D. (2019). A dataset of meta-analyses on crop diversification at the global scale. *Data in Brief,* 24, article number 103898. doi: 10.1016/j.dib.2019.103898.
[5] Chandler, A.D. (1990). *Scale and scope: The dynamics of industrial capitalism*. Cambridge: The Belknap Press.
[6] Claire, J., Austen, A., Adewale, H.A., & Conall, M. (2021). Farm diversification: Drivers, barriers and future growth potential. *Special Section on Climate Change and Agri-Food,* 20(2), 70-75. doi: 10.1111/1746-692X.12295.

[7] De Andrés, P., De la Fuente, G., & Velasco, P. (2017). Does it really matter how a firm diversifies? Assets-in-place diversification versus growth options diversification. *Journal of Corporate Finance*, 43, 316-339. doi: 10.1016/j.jcorpfin.2017.01.011.
[8] Development of regional agribusiness in figures and facts of 2020. (2020). Retrieved from https://agro-business.com.ua/agro/ekonomichnyi-hektar/item/19061-rozvytok-rehionalnoho-ahrobiznesu-v-tsyfrakh-i-faktakh-2020-roku.html.
[9] Global and domestic soybean markets. (2022). Retrieved from http://agro-business.com.ua/agro/ekonomichnyi-hektar/item/25235-hlobalnyi-i-vnutrishnii-rynky-soi.html.
[10] Grain market of Ukraine: Supply and demand in 2021/2022 marketing year. (2022). Retrieved from https://agropolit.com/spetsproekty/960-pinok-zernovih-ukrayini-popit-ta-propozitsiya-u-2021-2022-marketingovomu-rotsi.
[11] Ilchuk, M.M., Nikitchenko, S.O., & Pereguda, E.F. (2016). Diversification of the activity of entrepreneurial structures in the agrarian sphere. *Ekonomika APK*, 23(4), 13-21.
[12] Ilchuk, M.M., Reznik, N., & Us, S. (2019). Production activity of agricultural business structures and its efficiency in Ukraine. In *Proceedings of the 14th international conference on ICT in education, research and industrial applications. Integration, Harmonization and Knowledge Transfer* (pp. 17-29). Kyiv: Kyiv National University named after Taras Shevchenko.
[13] Jahanshiri, E., Azam-Ali, S., Gregory, P.J., & Wimalasiri, E.M. (2023). A shortlisting framework for crop diversification in the United Kingdom. *Agriculture*, 13(4), article number 787. doi: 10.3390/agriculture13040787.
[14] Kariuki, A.N., Kihoro, J.M., & Iravo, M.A. (2018). Technological innovation and performance of informal dairy enterprises in Kenya: A product diversification perspective. *Journal of Business and Management Sciences*, 6(4), 163-170. doi: 10.12691/jbms-6-4-4.
[15] Kazakova, I.V., & Kondratyuk, N.V. (2015). The efficiency of soybean production and the development of the soybean market in Ukraine and the world. *Efficient Economy*, 5, 1-5.
[16] Kravchuk, N., Kilnitska, O., Lavrynenko, S., & Yaremova, M. (2021). Infrastructural support of socio-economic development of rural territories of Ukraine. *Scientific Horizons*, 24(10), 58-71. doi: 10.48077/scihor.24(10).2021.58-71.
[17] Marshalok, M., Melnyk, A., Vasiuta, V., Yatsenko, V., & Saienko, V. (2021). Competitive advantages of small business. *Journal of Interdisciplinary Research*, 11(2), 60-65.
[18] More than 1,000 new farms were opened in Ukraine. (2022). Retrieved from http://surl.li/kjlrl.
[19] Nigam, K.N., & Gupta, C.P. (2020). Negative related diversification, positive related diversification and firm's performance: Measurement and application. *Global Business Review*, 24(1), 48-67. doi: 10.1177/0972150919886415.
[20] Porter, M.E. (1987). From competitive advantage to corporate strategy. *Harvard Business Review*, 65(3), 43-59.
[21] Potaeva, O. (2022). *Despite the war, Ukraine reduced soybean exports by only 5% in 2021/2022*. Retrieved from https://agrotimes.ua/agromarket/popry-vijnu-ukrayina-u-2021-22-mr-skorotyla-eksport-soyi-lyshe-na-5/.
[22] Rozhko, V. (2022). *Early cereals: Results of the 2021/22 season and the start of the 2022/23 MR in conditions of war*. Retrieved from https://www.apk-inform.com/uk/exclusive/topic/1528022.
[23] Shpykulyak, O.G., & Malik, M.Y. (2019). Formation of the organizational and economic model of family farming in Ukraine: Institutional foundations, problems and priorities. *Economy of Agriculture*, 26(9), 86-98. doi: 10.32317/2221-1055.201909086.
[24] Soybeans in crop rotation: Best options. (2021). Retrieved from https://www.agronom.com.ua/soya-u-sivozmini-najkrashhi-varianty/.
[25] Splodytel, A., Holubtsov, A., Chumachenko, S., & Sorokina, L. (2023). *Land pollution as a result of Russia's aggression against Ukraine*. Retrieved from https://ecoaction.org.ua/wp-content/uploads/2023/03/zabrudnennia-zemel-vid-rosii1.pdf.
[26] Svinous, I.V., Rudych, O.O., & Zubchenko, W. (2018). Diversification as a factor of leveling the risks of production and economic activity of agricultural enterprises. *Innovative Economy*, 3-4(74), 42-49.
[27] The state plans to allocate subsidies for cattle for family farms. (2020). Retrieved from https://www.me.gov.ua/News/Detail?id=82227aa6-526a-40c7-a7dc-2f9f70f98c7e.
[28] The unemployment rate in Ukraine has reached 35%, but will decrease by the end of 2022. (2022). Retrieved from http://surl.li/kjllk.
[29] Varchenko, O., Radko, V., Rudych, O., Svynous, I., & Tkachenko, K. (2019). Risks of dairy farming in Ukraine and ways of their minimization and neutralization. *Agricultural Science and Practice*, 6(1), 41-59. doi: 10.15407/agrisp6.01.041.
[30] Zgurska, O.M. (2018). Diversification as a method of increasing the economic efficiency of the enterprise. *Investments: Practice and Experience*, 13, 16-21.

Диверсифікація підприємницької діяльності в аграрному секторі економіки України у повоєнний період

Микола Максимович Ільчук

Доктор економічних наук, професор
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0000-0001-5129-6110

Сергій Олександрович Нікітченко

Кандидат економічних наук, доцент
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0000-0003-1940-4788

Олександр Олександрович Ситник

Аспірант
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0009-0000-5903-8466

Віталій Віталійович Павленко

Аспірант
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна
https://orcid.org/0009-0008-5937-9584

► **Анотація.** В контексті сучасного розвитку аграрних товаровиробників, актуальною є оцінка рівня їх ефективності діяльності та пошуку відповідної стратегії подальшого розвитку. Мета статті полягала у формуванні концепції сталого розвитку аграрних товаровиробників на основі пошуку найдоцільнішої стратегії розвитку. Методологічною базою статті стали наступні методи наукового пізнання: описовий метод, методи вимірювання та порівняння, метод економіко-математичного моделювання, індукції, дедукції, аналізу та синтезу, системно-структурний. Розглянуто та розкрито сутність диверсифікації діяльності підприємств аграрної сфери та визначено їх роль у формуванні сталого розвитку. З цією метою здійснено узагальнення теоретичних положень, українських та зарубіжних науковців, категорій «диверсифікація» та «сталий розвиток». В подальшому проведено аналіз та здійснено прогноз землекористування сільськогосподарських підприємств. Встановлено динаміку зміни структури посівних площ в період з 1991 по 2021 роки, оскільки в саме в цей період починається реалізовуватись аграрна реформа, яка спрямована на пошук ефективного товаровиробника сільськогосподарської продукції. Визначено, як змінювалася величина витрат на основні ресурси у фермерських господарствах Київської області на передодні початку війни та проаналізовано економічну ефективність вирощування основних сільськогосподарських культур. На основі встановлених даних, змодельована стратегія розвитку середньостатистичного фермерського господарства Лісостепової зони України, яка враховує концепцію диверсифікації діяльності на основі впровадження та розвитку галузі тваринництва. Також, обґрунтовано напрями подальшого розвитку аграрних формувань через поглиблення диверсифікації діяльності на основі оптимізації посівних площ. Результати дослідження можуть бути враховані при формуванні стратегії розвитку підприємницьких структур та оцінці їх впливу на сталий розвиток у повоєнний період

► **Ключові слова:** стратегія; виробництво; сталий розвиток; прогноз; економічна ефективність