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Grain market in Ukraine: Financial and economic aspects

Abstract. The study focused on analysing the financial and economic performance indicators of agricultural enterprises in Kharkiv Region, with an emphasis on calculating production costs per unit and identifying the specific features of the grain sector. The methodology included data analysis from three enterprises with different organisational and legal forms: the private enterprise “Agro”, the farming enterprise “Zerniatko”, and the limited liability company “Barvinok”. For each of these, unit production costs were calculated for three main crops: wheat, maize, and barley. The findings revealed that the private enterprise “Agro” incurred losses in wheat cultivation due to high production

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costs exceeding the market price, highlighting the need to optimise agro-technological practices. Meanwhile, the farming enterprise “Zerniatko” demonstrated stable financial results thanks to a diversified income structure that mitigated market fluctuation risks. The limited liability company “Barvinok” achieved the highest profit per unit of output by specialising in barley cultivation and benefiting from favourable soil conditions. However, its narrow specialisation increased risks amid changing market conditions. For maize, the most profitable enterprise achieved a profitability rate of 1,000 UAH per tonne, while for barley it was 850 UAH per tonne. An analysis of income structures showed that diversified enterprises were more resilient to market volatility, whereas a high concentration on a single crop, as in the case of the barley-focused enterprise, posed additional risks. The analysis found that the level of financial efficiency depended on specialisation, land bank size, and the level of technological development. Enterprises with a more balanced production structure were better able to adapt to market changes, while focusing on a single crop could both increase profitability and introduce additional risks. The data obtained allowed for an assessment of the economic efficiency of each enterprise. The study's findings support effective management decisions aimed at minimising risks in Ukraine's grain sector

Keywords: land use; grain crops; agricultural market; financing; financial results; agribusiness; risks

INTRODUCTION

The grain market constitutes one of the fundamental pillars of Ukraine's agricultural sector. Grain crops occupy a central position in agricultural production and exports, ensuring a stable inflow of foreign currency and forming the basis of the country's food security. However, the development dynamics of this market are closely linked to financial and economic factors, such as changes in land use, the availability of financial resources, the effectiveness of state regulation, and the adaptability of agricultural enterprises amid global economic fluctuations.

Analysing the financial and economic aspects of the grain market is important for assessing the efficiency of land use and investments in the agricultural sphere. The threat of declining land fertility, changes in land policy, and the imperfect structure of agricultural markets all call for in-depth research. Existing studies highlight essential issues related to the efficient use of agricultural land, the grain market's ability to overcome economic challenges, and ensuring the sustainable development of agricultural production.

In the article by Ya.O. Krylov (2018), an economic assessment of the current state of Ukraine's grain industry was conducted, including an analysis of grain market supply formation. The author emphasised the importance of forecasting gross grain and legume yields until 2025, along with domestic consumption

volumes. Particular attention was paid to the factors most affecting wheat production efficiency and the application of multiple linear regression to analyse them. Krylov also proposed ways to improve the grain market regulation mechanism in Ukraine, taking into account current economic conditions and development prerequisites for the sector. The conclusions drawn were useful for further development of the grain market and for improving financial and economic strategies in the agricultural sector. This study highlighted the importance of a high-quality mechanism for state regulation and forecasting of production and consumption volumes, which is a vital component of Ukraine's agricultural market functioning.

Researchers R. Miroshnyk & I. Bahlai (2022) examined key problems of the grain market in Ukraine and developed paths for its future development. The authors described the current state of sown areas before and during the military aggression, analysing grain market indicators for the years 2015-2021, in particular sown areas, gross harvests, and yields. They also explored export trends for Ukrainian grain and grain procurement volumes by importing countries in 2020-2021. Miroshnyk & Bahlai identified the development prospects of the grain market, stressing the need for stabilisation of the military-political situation in the country and the material and technical support of

farmers. Special attention was given to negative factors affecting the Ukrainian grain market, along with proposed specific solutions that could promote further market development.

The study by O. Albeshchenko (2022) explored the European experience in ensuring the sustainable development of the agricultural sector in rural areas. The author focused on regulation mechanisms and practices that enable effective management of rural development in the European Union and on ways to implement these practices in Ukraine. The article compared approaches to sustainable rural development across various European countries, particularly in terms of economic support for the agricultural sector, effective use of land resources, and rural infrastructure modernisation. Albeshchenko underscored the significance of a comprehensive approach to agricultural sector development, including political stability, investment in agricultural technologies, and increased agricultural productivity. The article also addressed environmental sustainability tools such as biodiversity conservation and the application of “green” development principles in rural areas. The main conclusions highlighted the importance of adapting European experience to national conditions and challenges faced by Ukrainian agriculture.

In his 2019 study, O. Petrenko (2019) conducted a financial and economic analysis of the grain market in Ukraine, which is a prerequisite for ensuring national food security. The author examined in detail the factors affecting production volumes and the structure of grain production, emphasising the importance of this sector for the national economy. The article also analysed grain export opportunities and the potential for innovative production development. O. Petrenko identified key aspects crucial to formulating a development strategy for grain and legume crops.

The topic of the financial and economic aspects of the grain market is attracting considerable attention from researchers worldwide due to its relevance in ensuring global food security, stabilising economies, and supporting the sustainable development of the agricultural sector. Scholars analyse grain market dynamics, examining factors such as production efficiency, export potential, price volatility, and political

aspects. These studies highlight the universal importance of the grain market in addressing economic challenges and fostering development at both national and global levels. The study by J. Lawson *et al.* (2021) focused on analysing the impact of speculation on grain prices. The author examines the issue of volatility in the food grain market resulting from speculative activity, with particular emphasis on the financial mechanisms that drive such processes. The article presents theoretical models and empirical data that demonstrate the effect of speculative investments on price dynamics in the sector.

In his work, S. von Cramon-Taubadel (2022) focused on the impact of Russian aggression on grain markets and food security. The study considers the significant geopolitical and economic consequences associated with the crisis that began in February 2022. The author analyses how the disruption of Ukrainian grain exports due to the war has contributed to increasing global food insecurity. X. Xu & Y. Zhang (2021) investigated price fluctuations in the maize market across more than 182 local markets in seven major maize-producing states in the USA. The study employed correlation analysis, hierarchical clustering, and price synchronisation analysis. The authors identified interdependencies, heterogeneity in price synchronisation, and temporal changes in these processes. The findings reveal that the degree of price alignment increased after November 2006, although the trend was not consistently upward.

Thus, the analysis of the financial and economic aspects of the grain market remains a relevant area of research not only in Ukraine but also globally. The strategic role of the grain market in food security and its influence on economic development underscore the need to examine key trends, interdependencies, and regulatory mechanisms. The aim of this study was to assess the financial and economic factors influencing the functioning of Ukraine's grain market, taking into account its structure, main risks, and potential directions for development.

MATERIALS AND METHODS

The research methodology was focused on the analysis of financial and economic indicators of three agricultural enterprises in Kharkiv Re-

gion as of 2024: the private enterprise Agro, the farm Zerniatko, and the limited liability company Barvinok (Opendatabot, n.d.). These enterprises were selected to represent a variety of organisational and legal forms and to allow for an in-depth examination of the grain sector based on three key aspects: area of agricultural land, financial efficiency, and the structure of income and expenditures. The farms operate on land areas ranging from 300 to 5,000 hectares and serve as representative examples of stable business models in the grain market of Kharkiv Region. They demonstrate long-term activity, consistent financial performance, and a high level of engagement in the regional agribusiness sector. One of the important indicators for analysing efficiency was grain crop yield, which made it possible to evaluate the productivity of land use for each enterprise. The standard methodology was applied for yield calculation, based on the ratio of harvested crop mass to the sown area. This ensured comparability of results even among enterprises with differing scales and agronomic practices (State Statistics Service of Ukraine, 2022).

The analysis covered three main crops – wheat, maize, and barley. Wheat was chosen due to its importance as a staple crop for many farms and its sensitivity to climatic conditions, which allowed for an assessment of how enterprises adapt to changing environmental factors (Law of Ukraine No. 1469-VIII, 2016). Maize, being highly productive and profitable, enabled the study of how businesses ensure both yield and economic efficiency under different levels of mechanisation and technological advancement. Barley, being less demanding in terms of growing conditions, offered insight into the specifics of cultivation technologies and facilitated comparative analysis of resource efficiency on simpler crops.

These crops are important not only from an agronomic standpoint but also financially, as they constitute a significant share of agricultural enterprise revenues and serve as the main source of profit. Crop yield is a key indicator in assessing land use efficiency. Within this study, yield was calculated using the following standard formula:

$$Y = \frac{Q}{A}, \quad (1)$$

where: Y – yield (tonnes/ha); Q – harvested crop mass (tonnes); A – sown area from which the crop was obtained (ha).

This formula provided a universal approach for evaluating the efficiency of each enterprise, regardless of production scale or landholding characteristics. The primary data for these calculations were obtained from enterprise production reports, which include information on total crop harvest and the areas used for cultivation. This method allowed for accurate comparisons among farms of various sizes.

Revenues from agricultural product sales were calculated as follows:

$$D = Q * P, \quad (2)$$

where: D – revenues from product sales (thousand UAH); Q – volume of products sold (tonnes); P – average price per tonne of product (thousand UAH).

This formula made it possible to determine enterprise revenues from grain sales, taking into account both sales volume and market price per unit.

The calculation of production cost per unit was also a key indicator of economic efficiency in agricultural production. This measure allowed for the assessment of the costs required to produce one tonne of agricultural product and facilitated comparisons across enterprises with different scales of operation and technological capacities.

The formula used was:

$$Wu = \frac{Z - P}{V}, \quad (3)$$

where: Wu – unit loss (UAH/tonne); Z – total production costs (UAH); P – income from product sales (UAH); V – volume of products sold (tonnes).

The value of this indicator is multifaceted, as it provided insight into enterprise productivity, the efficiency of resource use (both material and financial), and the competitiveness of products in the market. Furthermore, the analysis of unit costs considered the impact of technological factors such as mechanisation level, soil cultivation methods, and seed quality.

Data of land use were obtained from open data services of the State Land Cadastre (Opendatabot, n.d.; Open Data of the Land Cadastre

of Ukraine, n.d.). The analysis included extracts from the public cadastral map (Open Data of the Land Cadastre of Ukraine, n.d.) containing information on land types (arable land, pastures, hayfields), plot sizes, lessees, and designated land use. This information enabled the assessment of land use scale and the role of each enterprise in the local agricultural market. Particular emphasis was placed on land use structure, which is a critical factor in forming economic efficiency.

Financial and economic indicators were analysed based on financial statements and open data on the income and expenditure of each enterprise (State Statistics Service of Ukraine, n.d.). Key indicators considered included profitability, total profit, and production expenses, including costs for sowing campaigns, equipment maintenance, fertilisers, and transportation services. Additionally, the structure of financing – comprising loans, investments, and internal resources allocated for production – was studied.

The study took into account changes in grain prices and their impact on the financial performance of the enterprises (State Statistics Service of Ukraine, n.d.). A correlation analysis was conducted to establish the relationship between profitability and market grain prices. The research also evaluated the financial stability of the enterprises, reflecting their ability to adapt promptly to market fluctuations. The analysis was conducted using modern statistical methods. To compare key indicators, Student's t-test

was employed, which allowed for the identification of statistically significant differences between the enterprises under study. Correlation analysis was used to identify relationships between land area, expenditures, and profits.

Microsoft Excel and Statistica were used as tools for data processing and visualisation. These programmes enabled the construction of graphical models illustrating the comparison of enterprise results and facilitated multifactorial analysis. In particular, tables and charts were created to reflect the dynamics of financial indicators, their correlation with land use area, and the role of enterprises in the regional grain market.

RESULTS

One of the key factors determining the economic efficiency of agricultural enterprises is the area of land they own or lease. Land is the primary resource in agriculture, and its size largely determines the potential for the use of modern cultivation technologies and for increasing productivity. Enterprises with larger land areas are able to implement intensive farming methods, adopt advanced agrotechnologies, and focus on mass production. For a more accurate assessment, the land area of each enterprise was examined based on data from the State Land Cadastre (Open data of the land cadastre of Ukraine, n.d.) and the Opendatabot service (n.d.). Table 1 presents the land resources owned or leased by three agricultural enterprises in Kharkiv region.

Table 1. Land resources of the surveyed enterprises as of 2024 (ha)

Enterprise	Owned land (ha)	Leased land (ha)	Total area (ha)
PE "Agro"	115	1,192	1,307
FE "Zerniatko"	95	608	703
LLC "Barvinok"	342	4,678	5,020

Source: developed by the authors based on Opendatabot (n.d.) and Open data of the land cadastre of Ukraine (n.d.)

Based on the data in Table 1, it is evident that the total land area of each enterprise differs significantly. LLC "Barvinok" holds the largest land bank – 5,020 ha, the majority of which (4,678 ha) is leased, allowing for large-scale production. PE "Agro", with 1,307 ha, relies mainly on leased plots, although it owns 115 ha of land. FE "Zerniatko" operates on the smallest land area (703 ha), where leased land also constitutes the majority, with 95 ha in ownership.

PE "Agro" utilises 1,307 ha of land, of which 92% is leased. This structure enables the enterprise to adapt its operations to leaseholder conditions but results in a high level of dependency on partners. The limited proportion of owned land may constrain long-term investment decisions, yet it offers greater flexibility in addressing short-term financial and economic challenges. The small-scale enterprise FE "Zerniatko" possesses a land bank of 703 ha, of which

608 ha is leased. A high proportion of leased plots allows for greater flexibility but restricts strategic capacity. Through effective resource management, FE “Zerniatko” is able to focus on high-efficiency land use and the implementation of local innovations, enabling it to maintain competitiveness even on a smaller scale. LLC “Barvinok” holds a dominant position in terms of land area – 5,020 ha, of which 4,678 ha are leased. The enterprise enjoys considerable advantages owing to its scale, which facilitates the application of modern agrotechnologies. However, dependency on leaseholders remains a key long-term risk factor. Successful optimisation of production processes allows for high financial returns, even with such a ratio of ownership to lease. The analysis of land resources demonstrates that land area significantly affects the economic sustainability of enterprises. LLC “Barvinok”, with the largest land bank, effectively utilises large areas for the introduction of intensive technologies. Smaller enterprises, such as FE “Zerniatko”, have the opportunity to focus on the most rational use of limited resources.

The data show that land leasing plays a dominant role in the land structure of the enterprises, creating both opportunities and risks for their development. A balanced combination

of leased and owned land enables enterprises to align short-term adaptability with long-term investment strategies. This is a key factor in enhancing financial stability and operational efficiency in the current economic climate. The following is an example of yield calculations for various crops cultivated by the surveyed enterprises. The wheat yield for PE “Agro” was calculated as follows: the farm harvested 5273 tonnes of wheat from an area of 879 ha. The yield was calculated using formula (1):

$$Y_{\text{wheat}} = \frac{5273}{879} \approx 5.99 \text{ tonnes/ha.}$$

The maize yield for FE “Zerniatko” was based on a total harvested volume of 3124 tonnes from an area of 504 ha. The calculation is as follows:

$$Y_{\text{maize}} = \frac{3124}{504} \approx 6.20 \text{ tonnes/ha.}$$

The barley yield for LLC “Barvinok” was calculated based on 4286 tonnes harvested from 1198 ha. The calculation is as follows:

$$Y_{\text{barley}} = \frac{4286}{1198} \approx 3.58 \text{ tonnes/ha.}$$

The calculated yield results are summarised in Table 2.

Table 2. Grain crop yield across the surveyed enterprises

Enterprise	Crop	Sown area (ha)	Harvest (tonnes)	Yield (tonnes/ha)
PE “Agro”	Wheat	879	5,273	5.99
FE “Zerniatko”	Maize	504	3,124	6.20
LLC “Barvinok”	Barley	1,198	4,286	3.58

Source: developed by the authors based on Opendatabot (n.d.) and Open data of the land cadastre of Ukraine (n.d.)

The calculated yield indicators show notable variation depending on the crop and enterprise. FE “Zerniatko” demonstrated the highest maize yield (6.20 tonnes/ha), indicating efficient cultivation and likely intensive use of agrotechnical methods. PE “Agro” showed a fairly high wheat yield (5.99 tonnes/ha), which may reflect soil quality and crop care practices. LLC “Barvinok” had the lowest barley yield (3.58 tonnes/ha), possibly due to specific climatic conditions, less fertile soils, or reduced investment in modern technology.

Yield calculations enable the assessment of the effectiveness of individual enterprises and

their prospects for productivity improvement. Enterprises with lower yield indicators are advised to review their agrotechnical practices and explore opportunities to adopt modern innovations to improve future outcomes. The data obtained suggest that yield levels are significantly influenced by the application of innovative technologies and by land resource management strategies. Large enterprises such as LLC “Barvinok” demonstrate higher efficiency due to economies of scale and production modernisation. At the same time, smaller enterprises like FE “Zerniatko” maintain competitiveness by ensuring stable yields on smaller plots. Further

research could focus on identifying technologies that enhance yields in medium- and small-scale farms (APK-Inform, n.d.).

In calculating the key financial aspects of agricultural enterprises, particular importance is attached to the analysis of the volume of

products sold and the average price per tonne. These indicators allow for the assessment of enterprise efficiency within market conditions, as well as their competitiveness depending on the crop. The data on product sales by the studied enterprises are presented in Table 3.

Table 3. Volume of products sold and average price per tonne

Enterprise	Crop	Volume sold (tonnes)	Average price per tonne (thousand UAH)
PE "Agro"	Wheat	5,200	9.00
	Maize	1,500	10.40
	Barley	900	7.00
FE "Zerniatko"	Wheat	3,000	9.10
	Maize	3,100	10.50
	Barley	1,400	7.00
LLC "Barvinok"	Wheat	2,800	9.00
	Maize	2,000	10.10
	Barley	4,200	7.00

Source: compiled by the authors based on Opendatabot (n.d.) and Open Data of the Land Cadastre of Ukraine (n.d.)

The total revenue from sales for each enterprise and crop is illustrated in Figure 1. This indicator, calculated using formula (2), is significant as it demonstrates the ability of enterprises to efficiently use resources, generate added

value, and adapt to market conditions. Revenue values provide insight into the financial stability of agricultural enterprises and determine future opportunities for investment in technologies or production expansion.

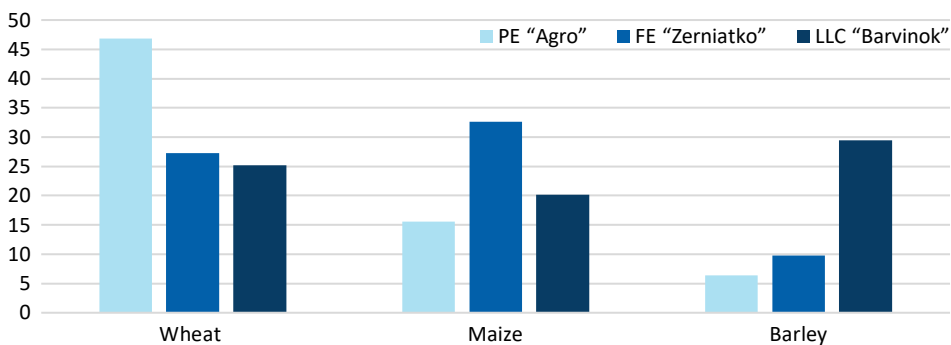


Figure 1. Revenue from product sales by the studied agricultural enterprises in 2024 (million UAH)

Source: compiled by the authors based on Open Data of the Land Cadastre of Ukraine (n.d.) and R. Miroshnyk & I. Bahlai (2022)

Wheat accounts for the majority of PE "Agro"'s revenue, providing more than 65% of total income. However, despite the significant volume of wheat sales, PE "Agro" incurred losses from wheat cultivation due to high production costs per unit compared to the market price. This indicates potential issues in the efficiency of agrotechnical practices and the need to

optimise costs to ensure profitability in the future. Thanks to a more balanced income structure, FE "Zerniatko" is not dependent on a single crop and is better equipped to cope with market fluctuations. Revenues from maize and wheat are at roughly the same level, which helps mitigate financial risks in a volatile market. This proves that diversification is an effective

agricultural strategy, as it reduces the impact of negative factors on a single crop.

LLC "Barvinok" achieves the highest profit per unit through barley cultivation. Favourable soil conditions and larger production scales contribute to this result. However, a focus on a single crop may pose risks in the event of market changes or adverse weather, so in the long term, diversification should be considered. The differing approaches of the enterprises to income structuring are determined by the specifics of the crops grown. PE "Agro" is vulnerable due to high wheat production costs, while FE "Zerniatko" avoids financial issues through diversification, and LLC "Barvinok" ensures profitability through barley but faces greater risks due to limited specialisation.

It is impossible to fully assess the financial and economic aspects of agricultural enterprises without considering losses per unit of production. This indicator allows for a comparison of resource use efficiency regardless of production scale. In particular, the analysis of losses per unit is critical for identifying weaknesses in production and economic processes, assessing enterprise competitiveness, and developing cost-optimisation measures. This approach makes it possible to compare the indicators of different enterprises regardless of differences in gross output or income, as it focuses on cost efficiency per tonne of production. An example

of the calculations for the three enterprises is provided below. Calculation of unit loss for PE "Agro" (wheat cultivation):

$$W_u = \frac{48500 - 46800}{5200} = 0.33 \text{ thousand UAH/tonne.}$$

This figure indicates a loss of 330 UAH per tonne of wheat, showing that costs exceeded revenue.

Calculation of unit loss for "Zerniatko" (maize cultivation):

$$W_u = \frac{29500 - 32600}{3100} = -1.00 \text{ thousand UAH/tonne.}$$

A profit of 1,000 UAH/tonne was achieved, indicating production efficiency.

Calculation of unit loss for LLC "Barvinok" (barley cultivation):

$$W_u = \frac{27300 - 29400}{4200} = -0.50 \text{ thousand UAH/tonne.}$$

The profit amounts to 500 UAH/tonne, also demonstrating a positive financial outcome.

For a deeper analysis of unit losses, calculations using formula (3) were carried out for the three agricultural enterprises in Kharkiv Region, using indicators of costs, revenue, and sales volumes of wheat. All values are presented in Table 4, which shows the variation in unit loss indicators between enterprises, taking into account their scale of activity and production efficiency.

Table 4. Unit losses, thousand UAH/tonne

Enterprise	Crop	Volume sold, t	Sales revenue, mln UAH	Costs, mln UAH	Unit loss, thousand UAH/tonne
PE "Agro"	Wheat	5,200	46.8	48.5	0.33
	Maize	1,500	15.6	14.8	-0.53
	Barley	900	6.3	6.5	0.22
FE "Zerniatko"	Wheat	3,000	27.3	26.2	-0.37
	Maize	3,100	32.6	29.5	-1.00
	Barley	1,400	9.8	10.0	0.14
LLC "Barvinok"	Wheat	2,800	25.2	25.0	-0.07
	Maize	2,000	20.2	18.5	-0.85
	Barley	4,200	29.4	27.3	-0.50

Source: compiled by the authors based on Opendatabot (n.d.) and Open Data of the Land Cadastre of Ukraine (n.d.)

PE "Agro" incurred a loss in wheat cultivation amounting to 330 UAH/tonne, which can be at-

tributed to high production costs exceeding the revenue from sales. A significant factor is the

unfavourable ratio between production costs and market prices. The issue may lie in an insufficient level of mechanisation and technological processes, resulting in high labour costs and expenditures on creating suitable growing conditions. Compared to wheat, maize and barley cultivation proved to be more profitable, as their production costs were significantly lower, while market prices remained consistently high. For instance, maize generated a profit of 530 UAH/tonne, indicating that farmers managed to organise agrotechnical operations effectively and find optimal cost-reduction solutions. Barley also delivered a positive financial result (220 UAH/tonne). However, the loss on wheat suggests the need to revise the enterprise's technical policy, as the high profitability of other crops demonstrates the enterprise's potential to achieve profitability when growing conditions are improved.

For the farming enterprise "Zerniatko", by contrast, all cultivated crops proved to be profitable. Maize emerged as the most profitable crop, which can be explained not only by market prices for this crop but also by effective cost management. A profit margin of 1,000 UAH/tonne allows the conclusion that the enterprise succeeded in establishing highly productive use of agricultural technologies, as well as making sound decisions regarding the organisation of the work process and the application of fertilisers, which influenced yields. Maize, being one of the most popular and economically advantageous crops in Ukraine, generates significant income if favourable conditions for its successful cultivation are ensured. The cultivation of wheat and barley also yielded positive financial results, although their profitability was lower compared to maize. This may indicate that the enterprise selected an appropriate strategic plan and invested in technologies that positively influenced the growth and development of cereal crops.

The company "Barvinok" LLC also demonstrated stable financial results, with the highest profit per unit of production recorded for maize – 850 UAH/tonne. This enterprise succeeded in significantly reducing production costs, likely due to improved technological processes and a higher level of mechanisation. Moreover, it is worth noting that the successful implementation of advanced agrotechnologies

(e.g. crop rotation or specialised fertilisers) may also have enhanced production efficiency. Similarly to "Zerniatko", "Barvinok" LLC managed to achieve profitability across all cultivated crops. Therefore, it is likely that the enterprise employs a comprehensive approach to development and strategic management, which ensures high performance even in the cultivation of less popular crops such as barley.

The data obtained highlight the importance of optimising costs and increasing yields as key factors in the financial sustainability of enterprises. From a financial and economic perspective, the enterprises demonstrate the capacity to adapt to changing market conditions by leveraging their comparative advantages in the cultivation of specific crops. Such analysis is essential for strategic planning by agricultural producers, as it enables the identification of weak points in the product realisation system and provides a foundation for further financial decision-making.

Having analysed the key performance indicators of the selected enterprises, a number of conclusions can be drawn regarding their efficiency and operational characteristics. The research findings suggest that the scale of the land bank has a significant impact on the ability of enterprises to implement modern technologies and use resources effectively. The highest yields are demonstrated by enterprises that apply intensive farming methods. At the same time, the structure of product sales and the average price per tonne underscore the economic differences between crops and enterprises, which considerably affect the overall financial outcome.

The significant volumes of maize sales by "Zerniatko" indicate a strategy focused on high-profitability crops, whereas the emphasis of "Barvinok" LLC on barley demonstrates regional specificities and the effectiveness of crop selection. The overall revenues of the enterprises confirm that wheat remains the main source of financial inflows, but diversification in agricultural production helps to minimise risks. The results obtained not only describe the current situation but also create a basis for a deeper analysis of the reasons behind enterprise successes or failures. This allows a focus on structural factors, market risks, and development prospects of the grain sector.

DISCUSSION

The results of the conducted study confirm the key role of financial and economic aspects in the functioning of the grain market. The analysis of the dynamics of yields, sown areas, export volumes, and financial indicators allows the conclusion that these elements are decisive for the stability and competitiveness of the sector (Ministry of Agrarian Policy and Food of Ukraine, n.d.; Resolution of the Cabinet of Ministers of Ukraine No. 1020, 2023).

The study emphasised that grain production largely depends on regional natural and climatic conditions, the effectiveness of agro-technical measures, and the application of modern biometric and economic approaches to performance assessment. The conducted analysis confirms the necessity of using adaptive cultivation technologies to ensure high yield indicators, especially in the context of changing agro-climatic characteristics. Attention to sown areas and biometric parameters made it possible to identify the most productive solutions under real agricultural conditions, considering regional-level resources.

The results identified in the study point both to confirmation of conclusions made by other authors and to certain differences. Summarising the obtained data, it may be asserted that they partly correlate with previous works by foreign scholars who focused on the role of financial and economic factors in the functioning of the global grain market. However, the present study places greater emphasis on the regional context and the natural and climatic characteristics of Ukrainian conditions. These aspects require detailed analysis, which will be considered below, starting with a review of foreign studies.

The study by A.M. Martins (2024) examined the short-term market response to the war in Ukraine and its impact on agricultural markets. The author shows that supply restrictions led to a significant rise in grain prices. Furthermore, negative abnormal returns on the market were identified following the signing of the grain initiative agreement and other key events. Comparing this with the current study, one can note some parallels concerning the importance of external factors' impact on the agricultural sector, particularly economic and geopolitical

shifts. However, unlike the work of A.M. Martins, which focused on short-term market reactions, the current research provides a deeper focus on long-term economic processes and the adaptation of taxation mechanisms to the specific challenges posed by war.

The study by G. Abuselidze (2021) focused on the use of hedging to minimise risks in agricultural markets, particularly using the example of Georgia's grain market. The author stressed the importance of introducing advanced regulatory instruments to reduce risks caused by seasonality, fluctuations in production volumes, and natural and climatic conditions. It was noted that hedging may serve as a key tool for protection against price fluctuations, which is especially important in the agricultural sector, where product prices often depend on these factors. In the current study, this aspect of hedging could be applied to analyse Ukraine's grain market, as the country faces similar challenges, particularly seasonality and yield unpredictability. Overall, G. Abuselidze's work highlighted the need to adapt financial instruments to reduce economic risks in the agricultural sector. A comparison of such instruments for the grain markets of Ukraine and Georgia helps to understand how crucial their role is in developing market stability and ensuring reliable supplies to both national and international markets.

In the study by S. Kohlhase & J.L. Wielhouwer (2023), the role of the head office and business units in tax and customs planning processes through transfer pricing was analysed. The authors examine mechanisms for optimising taxes and customs duties through the establishment of transfer prices between company divisions. This allows companies to minimise tax expenses and enhance the efficiency of international trade. For Ukrainian agricultural enterprises, particularly in the grain market, such planning can be an important element for optimising financial flows and managing tax risks, especially under changing external economic conditions. Transfer pricing can serve as a tool for reducing the tax burden when entering international grain markets, thereby increasing the competitiveness of Ukrainian products. This study highlights the significant role that transfer pricing management plays in the globalised economic

space in the context of international trade relations, underscoring the need for the prudent application of such approaches to improve the financial and economic stability of national markets, especially the grain market.

Researchers B. Kalinowska & P. Bórawski (2024) analysed the factors influencing grain prices in Poland from 2005 to 2023. The authors applied multiple regression analysis to identify the key factors shaping wheat and rye prices. Among these factors were the areas of land used for grain cultivation, yield, grain production volumes, grain imports and exports, as well as domestic grain consumption. The study showed that wheat prices in Poland are significantly influenced by global trends in grain markets, which is also confirmed by the impact of global yield fluctuations and wheat cultivation areas on domestic price levels. In contrast, rye prices are influenced by the area under cultivation and domestic bread consumption. The decline in livestock production in Poland has led to a reduced demand for rye as animal feed. The study also emphasises the importance of external economic factors in shaping grain prices, which is relevant for analysing the financial and economic aspects of the grain market in Ukraine. As in Poland, global grain prices, changes in yields, and production volumes significantly impact price levels, which underscores the importance of effective risk management for Ukrainian farmers in the international grain market.

In the study by F.C. Ljungqvist *et al.* (2022), the impact of climatic variations on grain prices in early modern Europe was analysed. The authors stress the significance of climatic factors for the price dynamics of cereals, particularly the relationship between extreme weather events and yield fluctuations. It was found that weather phenomena such as droughts and excessive rainfall significantly affected grain price changes in Europe. This study uses long-term historical data to assess how weather conditions influenced market grain prices, introducing instability into production cycles. Unlike the current study's broader European context, which focuses on the financial and economic aspects of Ukraine's grain market, the main emphasis of Ljungqvist *et al.* is on the historical and climatic analysis of grain price volatility in European

markets. Thus, the Ukrainian study centres on economic pricing mechanisms related to local production conditions and international trade aspects, whereas the authors of this work examine price changes due to climatic factors. Moreover, although both studies highlight the importance of global market conditions, the Ukrainian context places greater emphasis on a broader spectrum of financial and economic factors.

Researchers M.J. Iqbal *et al.* (2022) studied the factors influencing the nutritional value of wheat, particularly agronomic conditions and cultivation methods that ensure high product quality. The authors emphasised the need to improve cultivation technologies and agricultural policies to enhance the nutritional properties of wheat. Compared to the present study, which focuses on the financial and economic aspects of the grain market in Ukraine, this research is more oriented toward agronomy and practical methods for improving grain quality. At the same time, the importance of ensuring grain quality, increasing yields, and adapting technologies to the conditions of specific Ukrainian regions is also reflected in the study focused on the agronomic aspect of grain production.

O.M. Smith *et al.* (2019) conducted a global meta-analysis confirming that organic agriculture offers significant environmental benefits but is accompanied by greater yield fluctuations compared to conventional farming. They found that organic methods can increase resilience to certain environmental factors but also significantly reduce productivity in some regions. This study is important for the current analysis of the grain market, as it highlights the challenge of ensuring stable supply and pricing in the industry amid unstable yields. The key difference lies in the fact that this study focuses on the advantages and disadvantages of organic agriculture as a whole, whereas the current study is centred on the financial and economic aspects of grain production and trade in Ukraine under changing market conditions and techno-economic approaches within the country.

Studies by Ukrainian authors focus on the internal aspects of regulating the agricultural market and economic mechanisms, while international sources emphasise global trends and factors influencing the grain market,

comparing them across different countries. This reflects a difference in approaches: in Ukraine, more attention is paid to national specificities and policy. In the study by S. Moshenskyi *et al.* (2024), agricultural and resource economics in Ukraine were examined in light of economic growth challenges. These aspects correspond to the new study focused on the grain market within the context of the economy, although the research emphasis differs – in the Ukrainian case, the general issue of economic growth in the agricultural sector is of greater significance.

Researchers A. Kucher *et al.* (2021) provided a detailed analysis of the economic impact of soil erosion on agriculture in Ukraine, particularly on declining land fertility and the production capacities of agricultural enterprises. They emphasised the importance of natural factors in ensuring the sustainable development of agricultural production but did not consider the impact of these processes on financial aspects, such as soil restoration costs or the adaptation of production to changing environmental conditions. In contrast, the presented study focuses on analysing the economic mechanisms of the grain market, specifically the effectiveness of financial strategies of agricultural enterprises managing these lands and the impact of external economic factors on their operations.

In the work by I. Makarenko *et al.* (2022), attention was drawn to the transparency of agricultural companies as a key factor for ensuring sustainable development and attracting investment. The study highlighted the importance of effective management, corporate social responsibility, and transparency in reporting for capital attraction, particularly in agribusiness. In comparison with the present study, which focuses on the financial and economic aspects of the grain market, Makarenko's work is more focused on institutional and corporate foundations that contribute to the effective functioning of enterprises but does not include an analysis of specific economic aspects of the grain market, such as costs, profitability, and financial risks faced by agricultural enterprises at various stages of the production process.

The research by M.V. Dykha *et al.* (2023) and I. Kyryliuk & A. Trokhymenko (2021) focused on grain pricing in Ukraine, particularly on the role

of state regulation and contractual relations that determine grain prices in the domestic market. By analysing the impact of government policy, the authors identified key trends in pricing that may help enterprises adapt to market changes. However, this research does not cover the broader aspects of grain market functioning, particularly financial risks and economic strategies of enterprises, which constitute the main theme of the present study. The current work has examined in greater depth not only pricing but also the relationship between pricing, unit production costs, and profitability in agricultural enterprises in Ukraine.

Researchers A. Ceglar *et al.* (2021) analysed the loss of land suitable for growing durum wheat in the future due to climate change, emphasising the significant impact of rising temperatures and changes in precipitation patterns on global agricultural markets. Similarly, the study by Y. Chai *et al.* (2022) considered risks associated with multiple pathogens affecting global wheat production and assessed likely economic losses and the need for investment in crop protection. In turn, M. Yanagi (2024) focused on the general challenges of wheat cultivation due to climate change and proposed adaptive strategies, including the improvement of agricultural technologies and the development of resistant varieties. All these studies confirm that grain production is highly dependent on climate change and associated risks, whereas the present study additionally considers the financial and economic aspects of Ukraine's grain market, in particular mechanisms for stabilisation under growing risks. This approach makes it possible not only to assess the threat of reduced cultivated areas and the impact of diseases but also to propose economic tools to minimise losses in this sector.

The study by A.C. Sánchez *et al.* (2022) is devoted to assessing the financial profitability of diversified agricultural systems at the global level. Using meta-analysis, the authors showed that such systems generally exhibit greater financial stability compared to monoculture farming, reduce crop loss risks, and improve resource use efficiency. At the same time, it was noted that profitability largely depends on regional characteristics, political conditions, and market

access. The current study also examines economic aspects of agriculture. Comparing approaches to assessing economic efficiency in various agrosystems enables a better understanding of the functioning of the grain market and the potential of diversification as a risk mitigation mechanism.

The study by G.B. de D. Ribeiro *et al.* (2024) focused on the use of financial instruments to assess the socio-economic sustainability of small-scale irrigated farming in Brazil. The authors analyse the financial profitability of agrosystems, viewing it as a key factor in the stability of agricultural enterprises. It is emphasised that effective financial planning and investment in technological solutions can enhance farm resilience to changes in the economic environment. The current study also examines financial aspects of agribusiness, particularly in the context of the grain market.

The work by S. Li *et al.* (2021) is dedicated to the life-cycle assessment and economic efficiency of maize cultivation practices in the western Corn Belt of the United States. The article analyses the impact of various farming methods on economic indicators and environmental sustainability, which correlates with the study of the financial and economic aspects of the grain market in Ukraine. Both studies highlight the need to optimise agricultural production through the implementation of effective financial and environmental approaches. The main difference lies in the fact that S. Li's study focuses on the evaluation of specific farming practices within one country, whereas the current study considers a broader financial and economic context of the grain market, including risks and regulatory mechanisms under current challenges.

The research by S.K. Kuchimov (2021) was focused on economic issues of ensuring the efficiency of agricultural production through the use of innovative technologies. The author emphasises the importance of technological development for increasing productivity and reducing costs in agriculture. In turn, the work by N. Davydenko *et al.* (2024) explores the modelling of innovation and investment development of agricultural enterprises in the context of ensuring their financial security. All three studies correlate with the present analysis of the

financial and economic aspects of the grain market, as they emphasise sustainability, efficiency, and innovation in the agricultural sector. The difference in the present study lies in its focus on macroeconomic risks and financial mechanisms for stabilising the grain market under current challenges.

In conclusion, the comparison of the financial and economic aspects of the grain market in Ukraine with current international and Ukrainian studies shows that the factors affecting pricing and the grain market have both commonalities and significant differences. In particular, the relevance of changes in the global grain market, price fluctuations, and the main factors determining supply and demand are noted both in foreign and Ukrainian studies. However, Ukraine has its own specific features in the form of the influence of national economic and political conditions.

The studies demonstrate that among the main factors determining grain pricing are seasonality, production volume fluctuations, natural factors, as well as the role of state policy, which is crucial for addressing economic problems. Additionally, international factors, particularly global grain market trends, play an important role for Ukraine. However, a number of issues still require more detailed analysis, especially regarding the interaction of financial and economic measures at local and international levels. In summary, it should be noted that despite the general similarity of the issues studied in the grain market, there are significant differences in economic aspects for Ukraine that require further study and adaptation to local realities.

CONCLUSIONS

As a result of the conducted research, the financial and economic indicators of three agricultural enterprises in Kharkiv Region with different forms of ownership were evaluated: PE "Agro", FE "Zerniatko", and LLC "Barvinok". The enterprises own or lease land plots with a total area of 1,307 ha, 703 ha, and 5,020 ha respectively, demonstrating the differences in the scale of their operations. According to the research data, the grain crop yields on the enterprises were as follows: wheat – 5.99 t/ha (PE "Agro"), maize – 6.20 t/ha (FE "Zerniatko"), barley –

3.58 t/ha (LLC “Barvinok”). These results indicate the competitive productivity of the cultivated crops in the region.

The analysis of financial indicators revealed varying levels of profitability depending on the crop and the enterprise. Thus, wheat cultivation at PE “Agro” resulted in a loss of 330 UAH/t, which is explained by high production costs. At the same time, maize and barley cultivation proved to be profitable, with results of 530 UAH/t and 220 UAH/t respectively. This highlights the need to optimise production processes to reduce wheat-related expenses. At FE “Zerniatko”, all crops were profitable, with maize generating the highest profit – 1,000 UAH/t. This was due to effective resource management, the use of modern technologies, and high yields. LLC “Barvinok” also demonstrated stable profitability. The best financial results were achieved in maize cultivation, with a profit of 850 UAH/t. The enterprise’s efficiency was driven by improvements in technological processes and increased mechanisation, which enabled the optimisation of production costs and ensured profitability across all cultivated crops.

Thus, the conducted research allows drawing several important conclusions regarding the financial and economic activity of agribusiness enterprises in Kharkiv Region. Data analysis confirmed that production efficiency and profitability directly depend on the level of enterprise specialisation, cost and technological optimisation, as well as the chosen management strategy. The findings confirm that cost optimisation, the selection of economically efficient crops, the proper use of land resources, and the development of modern technologies are key factors in the stable functioning of agricultural business under current economic challenges. Future research should focus on a more in-depth analysis of the financial structure of expenses, the impact of climatic factors, and market fluctuations in order to improve the efficiency of the sector’s enterprises.

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CONFLICT OF INTEREST

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Ринок зернових в Україні: фінансово-економічні аспекти

Анотація. Дослідження було спрямоване на аналіз фінансово-економічних показників діяльності аграрних підприємств Харківської області з акцентом на розрахунок витрат

на одиницю продукції та виявлення особливостей функціонування зернового сектору. Методологія включала аналіз даних трьох підприємств різних організаційно-правових форм: приватного підприємства «Агро», фермерського господарства «Зернятко» та товариства з обмеженою відповідальністю «Барвінок». Для кожного з них було розраховано витрати на одиницю продукції за трьома основними культурами: пшениця, кукурудза та ячмінь. У результаті дослідження встановлено, що приватне підприємство «Агро» зазнало збитків у вирощуванні пшениці через високі витрати, які перевищували ринкову ціну, що свідчить про необхідність оптимізації агротехнологій. Водночас фермерське господарство «Зернятко» продемонструвало стабільні фінансові результати завдяки диверсифікованій структурі доходів, що зменшило ризики ринкових коливань. Товариство з обмеженою відповідальністю «Барвінок» отримало найбільший прибуток на одиницю продукції за рахунок спеціалізації на вирощуванні ячменю та сприятливих ґрунтових умов, однак вузька спеціалізація підвищує ризики в умовах зміни ринкової кон'юнктури. Для кукурудзи на найбільш прибутковому підприємстві рентабельність становила 1000 гривень за тонну, тоді як для ячменю – 850 гривень за тонну. Аналіз структури доходів показав, що диверсифіковані підприємства більш стійкі до коливань ринку, тоді як висока концентрація на одній культурі, як у разі з підприємством, що зосереджується на ячмені, створює додаткові ризики. На основі аналізу встановлено, що рівень фінансової ефективності підприємств залежить від їхньої спеціалізації, розміру земельного банку та рівня технологічного розвитку. Виявлено, що підприємства з більш збалансованою структурою виробництва краще адаптуються до ринкових змін, тоді як орієнтація на одну культуру може як підвищувати прибутковість, так і створювати додаткові ризики. Отримані дані дозволили оцінити економічну ефективність діяльності кожного підприємства. Результати дослідження сприяють ухваленню ефективних управлінських рішень для мінімізації ризиків у зерновому секторі України

Ключові слова: землекористування; зернові культури; аграрний ринок; фінансування; фінансові результати; агробізнес; ризики