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Monitoring of the aggregate level of economic efficiency of agricultural enterprises in Ukraine: Factors of influence and growth prospects

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▸ **Abstract.** The efficiency of agricultural enterprises is determined by the synergistic influence of an entire set of various factors. Improvement and testing of methodological support for factor-complementary diagnostics of the level of economic efficiency of business entities in modern conditions is still an urgent issue. The purpose of this study was to comprehensively monitor the level of economic efficiency of agricultural enterprises in Ukraine and measure the degree of influence of priority factors on the aggregate efficiency indicator. The study involved several methods: abstract-logical, comparative analysis, tabular, statistical, matrix-coordinate method, calculation-constructive, monographic, factor analysis. It was established that during 2015 and 2021, this aggregate indicator increased by 47% – from 15.07 to 22.13 points. Among the factors that had a positive effect on the established growth of the overall indicator of economic efficiency, the largest rating coefficients have: an increase in labour productivity (1.5852), a more than two-fold increase in the amount of net profit of agricultural enterprises (1.0931), a 2.2-fold increase in the coefficient financing (0.905), a 1.9-fold increase in the loan capital turnover ratio (0.8754) and an almost 3-fold increase in its profitability (0.8587), an increase in the receivables turnover index (0.7899) and a two-fold increase in the absolute liquidity index (0.7500). The following influencing factors had the most negative effect on the level of the overall efficiency indicator: a 23% decrease in the fund return indicator (-0.6005), a 17% decrease in the quick liquidity ratio (-0.4944), a 26% deterioration in the profitability of fixed assets (-0. 4642), a decrease in turnover and profitability of the equity capital of agricultural enterprises (-0.4653 and -0.4426, respectively). The practical significance of this study is determined by the improvement of methodological tools for measuring and diagnosing the aggregate level of economic efficiency of business entities, which can be useful in the management practice of organizing monitoring and developing areas for improving the economic efficiency of agricultural enterprises

▸ **Keywords:** economic efficiency; dynamics; additive model; profitability; financial stability

▸ Introduction

The economic mechanism of efficiency of agricultural enterprises is formed, on the one hand, based on the versatility and variety of forms of its manifestation, and on the other hand – through variable combinations of various priority factors of influence. Efficiency assessment should factor in the various manifestations of practice and results of economic activity of agricultural enterprises as comprehensively as possible. The variety and specificity of measurement forms when comparing the effect

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with the resources spent on obtaining it require improvement of methodological tools for comprehensive assessment and dynamic diagnostics of the level of economic efficiency of agricultural enterprises.

The essence and versatility of the manifestation of efficiency is conditioned upon the existence of many types of effect and the variety of costs (resources) that cause their occurrence. Its measurement requires having a quantitatively expressed effect (result) and resources (costs). When proving economic problems that are solved in conditions of possible sufficient provision of economic activity with appropriate resources, the maximum effect is achieved with a focus on the marginal cost of the resource and the cost of the marginal product. According to their comparison, a decision should be made on the appropriate limit of resource consumption, at which such an economic effect is achieved.

Each enterprise operates under an entire system of factors. Assessment and consideration of this impact during business planning, development strategy formation and substantiation of the national policy in the field of agriculture is a necessary condition for achieving success in business activities.

Among foreign scientists, E. Gunes, & H. Guldal (2019) made a significant contribution to the study of the problems of increasing the economic efficiency of agricultural enterprises, who carried out a thorough investigation aimed at determining the efficiency of agricultural enterprises in Turkey due to the variable use of capital and credit resources. The authors measured and established a close relationship between the indicators of credit resource use and the level of overall economic efficiency of farmers.

N. Bachev (2022) conducted a quantitative assessment of the effectiveness of farm management, identified the main factors that reduce the efficiency of farms in Bulgaria. Among the most influential authors, the author highlights the lack of material, technical and innovative support for agricultural labour, the imperfection of the policy of minimizing transaction costs, and the need to increase the level of national support for small-scale farming.

A. Gaviglio *et al.* (2021) evaluated the technical efficiency and productivity of suburban farms specializing in crop and livestock production. Differentiation of the levels of economic efficiency of farms is determined precisely by their industry specifics. The results of the study show that crop farms are more efficient than livestock farms, but have less productive technology. Attention is focused on the need to develop a policy to improve the level of education of farmers and national support for farm efficiency.

H. Alem *et al.* (2018) investigated the economic efficiency of Norwegian crop farms using stochastic frontier analysis. The results of the analysis indicate that the average efficiency was approximately 78-81%. The authors proved that the level of farm efficiency is determined by the practice of crop rotation and land use management, national support, and the level of non-agricultural activities. All this has a positive impact on the dynamics of production costs on crop farms.

Analysis of economic results and evaluation of production efficiency in farms specializing in field crops and classified by economic size is presented in the study by A. Skarzhinskaya (2019).

The functioning of agricultural enterprises is characterized by instability, a considerable degree of risk, as well as the adverse impact of a changing external environment. This has become especially acute with the outbreak of a full-scale war and adversely affects the performance indicators of economic activity.

In the conditions of constant changes in the external environment, the problems of formalized assessment of factors affecting the overall level of economic efficiency of agricultural enterprises and forming the microenvironment of their development become relevant.

At the same time, the study of methodological aspects of determining the economic efficiency of agricultural enterprises in the context of highlighting the impact of priority factors is represented by individual studies, where attention is focused mainly on individual factors without consideration of their complex impact. Factoring this in, the available developments require additional substantiation, clarification, and adaptation to modern business conditions.

The purpose of this study was a comprehensive assessment of the level of economic efficiency of agricultural enterprises in Ukraine, and a retrospective measurement of the priority impact of factors. To achieve the purpose set, the tasks of the study were defined as follows:

– to estimate the dynamics of the level of economic efficiency of agricultural enterprises using the methodology for calculating the aggregate indicator;

– to substantiate the model and calculate the degree of influence of factors on the aggregate performance indicator using deterministic factor analysis techniques.

The scientific originality of the obtained results lies in the fact that a methodological approach to complementary assessment of efficiency as a phenomenon and process of economic activity and various forms and levels of economic efficiency has been further developed, which is based on the determination of an integral indicator using the matrix-coordinate method and modelling the factor influence on the dynamics of its level.

▸ Literature Review

L. Rohatina (2018), R. Sodoma & T. Shmatkovska (2021) and many other researchers investigated the influence of factors of the internal and external environment on the functioning of agricultural enterprises in the context of their economic efficiency.

V. Nesterenko & A. Moroz (2022) investigated the indirect effect of innovative factors on the functioning and pace of economic development of agricultural enterprises. M. Humeniuk & D. Nemish (2022) analysed the dynamics of the level of economic efficiency of small agricultural enterprises.

The authors found that the set of indicators used to assess the efficiency of small agricultural enterprises should be graded by types of efficiency and defined groups of indicators that should be used to assess economic, technological, social, and environmental efficiency.

L. Vdovenko (2018), V. Otenko *et al.* (2023) analysed and evaluated the factors of the national support influence on the results of agricultural enterprises.

O. Anisenko & K. Vakar (2018), V. Holian & A. Hordiichuk (2019) investigated the modern problems of the development of the agrarian sector of the economy of Ukraine in the conditions of institutional changes, the determination of prospects for the development of the agrarian economy, considering the existing risks and possible options for the influence of national policy.

Comprehensive research on the problems of improving the economic efficiency of farms in Bulgaria was conducted by N. Koteva (2019). M. Asfaw et al. (2019) solved the problems of technical, distributional, and economic efficiency of farms in Ethiopia.

Z. Naglova *et al.* (2017) investigated the presence of considerable differences in economic indicators between enterprises of the Czech dairy industry, which are differentiated by size, form of ownership, and receipt of subsidies. The authors proved that large companies with foreign ownership can be considered as a potential threat and affect the level of competitiveness of other enterprises.

V. Masuku & A. Belete (2015) investigated and analysed the economic efficiency of small dairy farmers in Swaziland. The authors described socio-economic characteristics, evaluated the economic efficiency of small dairy farms, identified, and analysed factors affecting its level. Monitoring of the dynamics of profitability of small dairy enterprises revealed a trend of its stability and gradual growth.

E. Rosochatecká (2018) singles out the quality of the database and the substantiation of the methodological assessment tools as priority components of the measurement and analysis of the performance of agricultural enterprises. The author suggests using the method of financial analysis indices, the economic rate of profit and tools for forecasting indicators of the financial condition of the enterprise for a comprehensive assessment of the level of economic efficiency of agricultural enterprises.

Bulgarian scientists M. Georgiev & A. Roycheva (2017) focused on investigating the institutional impact of individual factors operating in agricultural enterprises and proposed a comprehensive methodological approach to measuring this impact.

M. Guth & K. Smedzik-Ambrozy (2020) studied the impact of factor security on the level of economic efficiency of agricultural production in EU countries. The authors showed that there is a variety of availability of factors of production in agriculture between groups of EU regions, which leads to differences in the technical efficiency of agricultural holdings of different types of production.

▸ Research Methodology

During the study, several methods were used: abstract-logical – to formulate conclusions; comparative analysis – to compare indicators of agricultural production, assess the profitability and return of enterprises and identify trends in their changes; tabular – to visually represent the results of the study. The statistical method was used to determine the variation in indicators of liquidity and solvency, financial stability, business activity and efficiency of agricultural enterprises. Using the matrix-coordinate method, the aggregate indicator of the efficiency of the functioning of agricultural enterprises was calculated. The calculation-constructive method was used to analyse and determine the type of financial stability of agricultural enterprises of Ukraine in dynamics; monographic method was used to detail the current level of efficiency of agricultural enterprises of Ukraine; deterministic factor analysis - to determine the factors influencing the aggregate efficiency indicator.

The methodology of the conducted study is presented in the form of the following sequence of stages:

– assessment of the dynamics of natural indicators of agricultural production in Ukraine during 2000-2021;

– assessment of the dynamics of agricultural production in Ukraine at constant prices in 2016 for 2000-2021;

– measurement, monitoring, and evaluation of the dynamics of indicators of profitability and return of agricultural enterprises in 2015-2021;

– assessment of liquidity, solvency, diagnostics of the level and type of financial stability of agricultural enterprises for 2015-2021;

– assessment and monitoring of the dynamics of business activity indicators of agricultural enterprises for 2015-2021;

– construction of matrices of priority indicators, calculation, and evaluation of the dynamics of an integral indicator of the efficiency of agricultural enterprises in Ukraine;

– building a model and calculating the influence of factors on the aggregate performance indicator using deterministic factor analysis techniques;

– assessment of the rating of factors that positively and negatively affected the change in the overall performance indicator of agricultural enterprises in Ukraine.

To form and calculate the overall indicator of the efficiency of the functioning of agricultural enterprises, the coordinate matrix method was employed, which is used to reduce the set of indicators to a single generalized indicator, considering their importance.

The sequence of implementation of this method was as follows:

1. Substantiated choice of a set of indicators that characterize the results of economic activity of agricultural enterprises;

2. For each indicator, the maximum value is selected, and the first matrix is formed by dividing all indicators by the selected maximum values in rows (the matrix has the following form):

X_1	$X_{1\,2015}/X_{1max}$	$X_{1\,2016}/X_{1max}$	$X_{1\,2017}/X_{1max}$	$X_{1\,2018}/X_{1max}$	$X_{1\,2019}/X_{1max}$	$X_{1\,2020}/X_{1max}$	$X_{1\,2021}/X_{1max}$
X_2	$X_{2\,2015}/X_{2max}$	$X_{2\,2016}/X_{2max}$	$X_{2\,2017}/X_{2max}$	$X_{2\,2018}/X_{2max}$	$X_{2\,2019}/X_{2max}$	$X_{2\,2020}/X_{2max}$	$X_{2\,2021}/X_{2max}$
X_3	$X_{3\,2015}/X_{3max}$	$X_{3\,2016}/X_{3max}$	$X_{3\,2017}/X_{3max}$	$X_{3\,2018}/X_{3max}$	$X_{3\,2019}/X_{3max}$	$X_{3\,2020}/X_{3max}$	$X_{3\,2021}/X_{3max}$
X_4	$X_{4\,2015}/X_{4max}$	$X_{4\,2016}/X_{4max}$	$X_{4\,2017}/X_{4max}$	$X_{4\,2018}/X_{4max}$	$X_{4\,2019}/X_{4max}$	$X_{4\,2020}/X_{4max}$	$X_{4\,2021}/X_{4max}$
X_5	$X_{5\,2015}/X_{5max}$	$X_{5\,2016}/X_{5max}$	X_{152017}/X_{5max}	$X_{5\,2018}/X_{5max}$	$X_{5\,2019}/X_{5max}$	$X_{5\,2020}/X_{5max}$	$X_{5\,2021}/X_{5max}$
X_6	$X_{6\,2015}/X_{6max}$	$X_{6\,2016}/X_{6max}$	$X_{6\,2017}/X_{6max}$	$X_{6\,2018}/X_{6max}$	$X_{6\,2019}/X_{6max}$	$X_{6\,2020}/X_{6max}$	$X_{6\,2021}/X_{6max}$
X_7	$X_{7\,2015}/X_{7max}$	$X_{7\,2016}/X_{7max}$	$X_{7\,2017}/X_{7max}$	$X_{7\,2018}/X_{7max}$	$X_{7\,2019}/X_{7max}$	$X_{7\,2020}/X_{7max}$	$X_{7\,2021}/X_{7max}$
X_8	$X_{8\,2015}/X_{8max}$	$X_{8\,2016}/X_{8max}$	$X_{8\,2017}/X_{8max}$	$X_{8\,2018}/X_{8max}$	$X_{8\,2019}/X_{8max}$	$X_{8\,2020}/X_{8max}$	$X_{8\,2021}/X_{8max}$
X_9	$X_{9\,2015}/X_{9max}$	$X_{9\,2016}/X_{9max}$	$X_{9\,2017}/X_{9max}$	$X_{9\,2018}/X_{9max}$	$X_{9\,2019}/X_{9max}$	$X_{9\,2020}/X_{9max}$	$X_{9\,2021}/X_{9max}$
X_{10}	$X_{10\,2015}/X_{10max}$	$X_{10\,2016}/X_{10max}$	$X_{10\,2017}/X_{10max}$	$X_{10\,2018}/X_{10max}$	$X_{10\,2019}/X_{10max}$	$X_{10\,2020}/X_{10max}$	$X_{10\,2021}/X_{10max}$
X_{11}	$X_{11\,2015}/X_{11max}$	$X_{11\,2016}/X_{11max}$	$X_{11\,2017}/X_{11max}$	$X_{11\,2018}/X_{11max}$	$X_{11\,2019}/X_{11max}$	$X_{11\,2020}/X_{11max}$	$X_{11\,2021}/X_{11max}$
X_{12}	$X_{12\,2015}/X_{12max}$	$X_{12\,2016}/X_{12max}$	$X_{12\,2017}/X_{12max}$	$X_{12\,2018}/X_{12max}$	$X_{12\,2019}/X_{12max}$	$X_{12\,2020}/X_{12max}$	$X_{12\,2021}/X_{12max}$
X_{13}	$X_{13\,2015}/X_{13max}$	$X_{13\,2016}/X_{13max}$	X_{132017}/X_{13max}	$X_{13\,2018}/X_{13max}$	$X_{13\,2019}/X_{13max}$	$X_{13\,2020}/X_{13max}$	$X_{13\,2021}/X_{13max}$
X_{14}	$X_{14\,2015}/X_{14max}$	$X_{14\,2016}/X_{14max}$	$X_{14\,2017}/X_{14max}$	$X_{14\,2018}/X_{14max}$	$X_{14\,2019}/X_{14max}$	$X_{14\,2020}/X_{14max}$	$X_{14\,2021}/X_{14max}$
X_{15}	$X_{15\,2015}/X_{15max}$	$X_{15\,2016}/X_{15max}$	$X_{15\,2017}/X_{15max}$	$X_{15\,2018}/X_{15max}$	$X_{15\,2019}/X_{15max}$	$X_{15\,2020}/X_{15max}$	$X_{15\,2021}/X_{15max}$
X_{16}	$X_{16\,2015}/X_{16max}$	$X_{16\,2016}/X_{16max}$	$X_{16\,2017}/X_{16max}$	$X_{16\,2018}/X_{16max}$	$X_{16\,2019}/X_{16max}$	$X_{16\,2020}/X_{16max}$	$X_{16\,2021}/X_{16max}$
X_{17}	$X_{17\,2015}/X_{17max}$	$X_{17\,2016}/X_{17max}$	$X_{17\,2017}/X_{17max}$	$X_{17\,2018}/X_{17max}$	$X_{17\,2019}/X_{17max}$	$X_{17\,2020}/X_{17max}$	$X_{17\,2021}/X_{17max}$
X_{18}	$X_{18\,2015}/X_{18max}$	$X_{18\,2016}/X_{18max}$	$X_{18\,2017}/X_{18max}$	$X_{18\,2018}/X_{18max}$	$X_{18\,2019}/X_{18max}$	$X_{18\,2020}/X_{18max}$	$X_{18\,2021}/X_{18max}$
X_{19}	$X_{19\,2015}/X_{19max}$	$X_{19\,2016}/X_{19max}$	$X_{19\,2017}/X_{19max}$	$X_{19\,2018}/X_{19max}$	$X_{19\,2019}/X_{19max}$	$X_{19\,2020}/X_{19max}$	$X_{19\,2021}/X_{19max}$
X_{20}	$X_{20\,2015}/X_{20max}$	$X_{20\,2016}/X_{20max}$	$X_{20\,2017}/X_{20max}$	$X_{20\,2018}/X_{20max}$	$X_{20\,2019}/X_{20max}$	$X_{20\,2020}/X_{20max}$	$X_{20\,2021}/X_{20max}$
X_{21}	$X_{21\,2015}/X_{21max}$	$X_{21\,2016}/X_{20max}$	$X_{21\,2017}/X_{20max}$	$X_{21\,2018}/X_{20max}$	$X_{21\,2019}/X_{20max}$	$X_{21\,2020}/X_{20max}$	$X_{21\,2021}/X_{20max}$
X_{22}	$X_{22\,2015}/X_{22max}$	$X_{22\,2016}/X_{22max}$	$X_{22\,2017}/X_{22max}$	$X_{22\,2018}/X_{22max}$	$X_{22\,2019}/X_{22max}$	$X_{22\,2020}/X_{22max}$	$X_{22\,2021}/X_{22max}$
X_{23}	$X_{23\,2015}/X_{23max}$	$X_{23\,2016}/X_{23max}$	$X_{23\,2017}/X_{23max}$	$X_{23\,2018}/X_{23max}$	$X_{23\,2019}/X_{23max}$	$X_{23\,2020}/X_{23max}$	$X_{23\,2021}/X_{23max}$
X_{24}	$X_{24\,2015}/X_{24max}$	$X_{24\,2016}/X_{24max}$	$X_{24\,2017}/X_{24max}$	$X_{24\,2018}/X_{24max}$	$X_{24\,2019}/X_{24max}$	$X_{24\,2020}/X_{24max}$	$X_{24\,2021}/X_{24max}$
X_{25}	$X_{25\,2015}/X_{25max}$	$X_{25\,2016}/X_{25max}$	$X_{25\,2017}/X_{25max}$	$X_{25\,2018}/X_{25max}$	$X_{25\,2019}/X_{25max}$	$X_{25\,2020}/X_{25max}$	$X_{25\,2021}/X_{25max}$

(1)

where X_1 is net profit, UAH billion; X_2 – labour productivity, thous. UAH; X_3 is the return on fiXed assets, %; X_4 is the return on working capital, %; X_5 is the return on capital, %; X_6 is the return on equity, %; X_7 is the return on loan capital, %; X_8 is the return on products (gross), %; X_9 is the return on sales, %; X_{10} is the return on activities, %; X_{11} is the fund return, billion UAH; X_{12} is the asset turnover ratio; X_{13} is the accounts receivable turnover ratio; X_{14} is the accounts payable turnover ratio; X_{15} is the equity turnover ratio; X_{16} is the coverage ratio; X_{17} is the quick liquidity ratio; X_{18} is the absolute liquidity ratio; X_{19} is the loan capital turnover ratio; X_{20} is the coefficient of autonomy (independence); X_{21} is the funding ratio; X_{22} is the financial stability coefficient; X_{23} is the equity manoeuvrability ratio; X_{24} is the ratio of provision of own working capital; X_{25} is the ratio of provision of stocks with own working capital.

3. The results of calculations of the first matrix are squared, and the second matrix is formed;

4. The sum of the results obtained by year for the analysed period is a cumulative indicator of the efficiency of the functioning of agricultural enterprises of Ukraine, which is calculated using the following formula:

$$Y_{(j)} = \sum_1^n \left(\frac{x_{ij}}{x_{imax}}\right)^2, \quad (2)$$

where $Y(j)$ is a cumulative indicator of the efficiency of the functioning of agricultural enterprises of Ukraine in the j^{th} year; x_{ij} is the value of the i^{th} indicator (factor) that forms the aggregate efficiency indicator in the j^{th} period; x_{imax} is the maximum value of the i^{th} indicator (factor) for the analysed research period; n is the number of indicators (factors).

The model of factor influence on the aggregate performance indicator is recognized as additive, and the formulas for calculating the influence of factors in retrospect by year of study have the following form:

$$\Delta y_{(i+1)j} = (x_{1j} + x_{2j} + x_{3j} + x_{(i+1)j} + \ldots x_{nj}) - (x_{1j} + x_{2j} + x_{3j\text{-}1} + x_{(i+1)j\text{-}1} + \ldots + x_{nj\text{-}1}), \quad (3)$$

where Δy_{ij} is the impact of the i^{th} indicator (factor) on the total performance indicator in the jth year.

The rating of factors that positively and negatively affected the change in the overall efficiency indicator of the functioning of agricultural enterprises of Ukraine was formed and assessed by calculating the ratio of the influence of each factor on the change in the overall efficiency indicator.

Research Results

Over the past two decades, Ukraine has substantially increased the volume of agricultural production, especially export-oriented types. Thus, from 2000 to 2021, wheat production increased 3.2 times (from 10.2 to 32.2 million tonnes), barley – 1.4 times (from 6.9 to 9.4 million tonnes). The continued growth of global demand for Ukrainian corn contributed to an 11-fold increase in its production (from 3.8 million tonnes in 2000 to 42.1 million tonnes in 2021). If in 2000 Ukraine grew 24.4 million tonnes of grain crops, then 20 years later this figure exceeded the mark of 86 million.

The production of soybeans, rapeseed, sunflower, and poultry meat also increased considerably – by 54, 22, 4.7, and 6.9 times, respectively. During the analysed period, the volume of agricultural production in monetary terms increased by 52.4% – from UAH 467.5 billion in 2010 to UAH 712.6 billion in 2021 (Table 1).

Table 1. Dynamics of agricultural production in Ukraine, mln UAH (in constant prices of 2016)

Product type	2010	2015	2018	2019	2020	2021	2021 to 2000, %
agricultural products	467.5	596.8	671.3	681.0	612.1	712.6	152.4
crop production	329.6	453.0	529.3	538.7	473.4	580.3	176.1
grain and leguminous crops	126.8	193.4	225.6	239.7	207.8	274.3	216.3
technical cultures	98.2	149.3	190.6	194.8	162.4	199.8	203.5
potatoes, vegetable, and melon food crops	67.7	77.3	80.9	77.8	78.9	80.7	119.2
fruit and berry crops, grapes	12.8	14.8	17.1	14.6	13.4	14.4	112.5
products animal husbandry	137.8	143.8	141.9	142.3	138.7	132.3	96.0
farm animals (rearing)	64.7	70.2	72.6	74.2	73.4	71.7	110.8
milk	50.1	47.3	44.8	43.0	41.2	38.8	77.4
eggs	19.8	19.5	18.7	19.4	18.8	16.3	82.3
other livestock products	3.1	6.8	5.8	5.7	5.3	5.5	177.4

Source: calculated according to the data of the State Statistics Service of Ukraine (2022)

Crop production experienced the highest growth rates during the analysed period. Thus, during 2010-2021, the production of crop products in Ukraine increased by 76.1% (from UAH 329.6 billion to UAH 580.3 billion). For groups of agricultural products, the dynamics of production is uneven. Thus, the production of export-oriented types of grain crops at constant prices in 2016 for the analysed period increased 2.2 times, industrial crops – 2 times, vegetables – by 19.2%. At the same time, the total production of livestock products decreased by 4% compared to 2010.

The net income from the sale of products in agricultural enterprises of Ukraine for 2015-2021 increased by 2.5 times (from 372 to 918.7 billion UAH); however, the total costs of production and sale of products also increased by 2.5 times – from 270 billion UAH in 2015 to 680.2 billion UAH in 2021 (Table 2).

Table 2. Dynamics of profitability of agricultural enterprises of Ukraine, billion UAH

Indicators	2015	2016	2017	2018	2019	2020	2021	2021 to 2015
Net income from sales of products	372	414.8	467.6	540.5	572.7	624.1	918.7	247.0
Production and sales costs	270	324.7	399	469.7	481.9	542.5	680.2	251.9
Financial result before taxation, billion UAH	102.0	90.1	68.6	70.8	90.8	81.6	238.5	233.8
Enterprises that made a profit before taxation								
as a percentage of the total number	89.0	88.4	86.8	86.8	83.5	83.2	88.7	99.7
financial result	127.6	102.8	89.0	93.5	115.3	108.1	246.6	193.3
Enterprises that received a pre-tax loss								
as a percentage of the total number	11.0	11.6	13.2	13.2	16.5	16.8	11.3	102.7
financial result, mln UAH	25.6	12.7	20.4	22.8	24.5	26.5	8.2	32.0
Net profit, billion UAH	101.9	89.9	68.3	70.5	90.2	81.0	237.6	233.2
Enterprises that made a net profit								
as a percentage of the total number	88.9	88.4	86.7	86.7	83.4	83.1	88.7	99.8
financial result, mln UAH	127.5	102.5	88.7	93.2	114.7	107.5	245.8	192.8
Enterprises that received a net loss								
as a percentage of the total number	11.1	11.6	13.3	13.3	16.6	16.9	11.3	101.8
financial result, mln UAH	25.6	12.7	20.4	22.8	24.5	26.5	8.2	32.0
Number of employees, thous. people	500.9	513.2	489.2	479.8	461.5	443.7	460.0	91.8

Source: calculated according to the data of the State Statistics Service of Ukraine (2022)

The aggregate net profit after taxation for the analysed period increased by 2.3 times (from UAH 101.9 to UAH 237.6 billion). Therewith, the percentage of profitable enterprises in the country's agriculture stayed almost unchanged – 88.7%. The calculation of the factor influence on the positive dynamics of the net profit revealed the most priority influence of the growth of the sales revenue indicator, which amounted to UAH 546.7 billion for the analysed period. In turn, the corresponding increase in the cost of production reduced net profit by UAH 410.2 billion.

Comprehensive monitoring of the dynamics of consolidated indicators of agricultural enterprises' balance sheets for 2015-2021 revealed the following trends:

– total capital growth of 94.2% (or UAH 646.2 billion);
– increase in the value of non-current assets by almost 3 times (or by UAH 290 billion);
– growth in working capital volumes by 69.2% (or UAH 356.2 billion);
– positive transformation of the structure of assets of enterprises (the ratio between non-current and current assets increased from 0.33 to 0.53.

A retrospective analysis of sources of financing for agricultural enterprises found a positive trend of almost 3-fold increase in the cost of their equity, from UAH 275.3 billion in 2015 to UAH 791.1 billion in 2021) (Table 3). In comparison, loan capital in the form of long- and short-term bank loans increased by merely 31.7% (from UAH 410.5 billion to UAH 540.8 billion). Accordingly, the share of equity for the analysed period increased by 19.3 percentage points – from 40.1% to 59.4%.

Table 3. Analysis of sources of financing for agricultural enterprises of Ukraine, billion UAH

Indicators	2015	2016	2017	2018	2019	2020	2021	2021 in % to 2015.
Equity	275.3	369.4	436.3	483	522.8	612.3	791.1	287.4
Loan capital	410.5	1,167.9	475.2	500.6	507.6	518	540.8	131.7
Specific weight of equity, %	40.1	24.0	47.9	49.1	50.7	54.2	59.4	19.3
Specific weight of loan capital, %	59.9	76.0	52.1	50.9	49.3	45.8	40.6	-19.3
Total capital	685.8	1,537.3	911.5	983.6	1,030.4	1,130.3	1,331.9	194.2

Source: calculated according to the data of the State Statistics Service of Ukraine (2022)

Agricultural production in Ukraine is still consistently profitable, and a considerable increase in net profit in 2021 could not but affect the dynamics of profitability indicators of agricultural enterprises. The return on loan capital experienced the greatest growth (from 16.5% to 43.9%), the return on current assets increased by 7.5% and reached 27.3% in 2021. Profitability of operations reached 34.9%, return on equity – 30.0%, return on sales – 25.9%. The greatest drop was experienced by the return on fixed assets of enterprises (from 95.9% in 2015 to 70.2% in 2021) (Table 4).

Table 4. Dynamics of performance indicators of agricultural enterprises of Ukraine, %

Indicator	2015	2016	2017	2018	2019	2020	2021	2021 to 2015, %
Return on fixed assets	95.9	61.4	37.1	30.3	31.2	26.1	70.2	-25.7
Return on working capital	19.8	6.8	10.7	10.8	14.1	11.4	27.3	7.5
Return on capital	14.9	5.8	7.5	7.2	8.8	7.2	17.8	2.9
Return on equity	37.0	24.3	15.7	14.6	17.3	13.2	30.0	-7.0
Return on loan capital	16.5	6.1	8.0	7.8	9.6	7.7	43.9	27.4
Product profitability (gross)	38.1	28.2	18.1	16.3	19.8	15.8	36.2	-1.9
Return on sales	27.4	21.7	14.6	13.0	15.7	13.0	25.9	-1.5
Return on activity	37.7	27.7	17.1	15.0	18.7	14.9	34.9	-2.8
Capital return, billion UAH	3.50	2.83	2.54	2.33	1.98	2.01	2.71	77.4
Capital capacity, billion UAH	0.29	0.35	0.39	0.43	0.51	0.50	0.37	127.6
Labour productivity, thous. UAH per employee	624.0	765.0	755.4	867.7	928.6	857.2	968.9	155.3
including crop production	660.0	804.0	777.4	900.1	954.4	853.7	1016.0	153.9
animal husbandry	503.9	614.0	664.8	730.4	815.2	872.8	808.3	160.4

Source: calculated according to the data of the State Statistics Service of Ukraine (2022)

Labour productivity indicators for the analysed period increased in crop production by 53.9%, and in animal husbandry – by 60.4%

It was established that the dynamics of indicators of profitability and return of agricultural enterprises affects their liquidity and solvency. During 2015-2021, the coverage ratio had fairly stable values within the regulatory limits and increased by 27.5% (from 1.5 to 1.92). The absolute liquidity ratio has low values, but there is a steady trend of its growth. Net working capital increased 2.4 times over the analysed period (from UAH 172.2 billion to UAH 416.2 billion) (Table 5). A set of indicators of financial stability characterize the stability of the financial condition of enterprises in retrospect and allow predicting possible crisis phenomena in the future, assessing dependence on creditors and investors. The analysis of the financial stability of agricultural enterprises in Ukraine helped identify it during 2015-2017 as sufficient, but in the following 2018-2020 period, the

type of financial stability was recognized as insufficient. A profitable and productive 2021 contributed to improving the financial stability of agricultural enterprises. There is a tendency to improve almost all indicators of financial stability: the coefficient of autonomy (independence) increased by 0.19 points, financial dependence decreased from 0.60 to 0.41, which is within the optimal values.

Table 5. Indicators of liquidity and solvency of agricultural enterprises in Ukraine

Indicators	2015	2016	2017	2018	2019	2020	2021	2021 in % to 2015
Coverage ratio	1.50	1.19	1.54	1.56	1.55	1.61	1.92	127.5
Coefficient quick liquidity	1.00	0.99	0.88	0.78	0.72	0.75	0.84	83.4
Absolute liquidity ratio	0.05	0.02	0.05	0.05	0.06	0.09	0.10	205.7
Net working capital, UAH billion	172.2	212.7	223	236	226.6	269.9	416.2	241.7

Source: calculated according to the data of the State Statistics Service of Ukraine (2022)

An increase in the financial stability coefficient from 0.50 to 0.66 indicates a decrease in the level of dependence of agricultural enterprises on borrowed funds and a relative increase in their solvency on their obligations at the expense of equity. Nevertheless, the indicators of equity working capital availability, despite the relative growth trend, are still low (Table 6).

Table 6. Analysis of the financial stability of agricultural enterprises of Ukraine in dynamics, billion UAH

Indicator	2015	2016	2017	2018	2019	2020	2021	2021 in % to 2015
Current assets	514.6	1318.7	639.1	654.3	641.2	711.1	870.8	169.2
Current liabilities	342.4	1106	416.1	418.3	414.6	441.2	454.6	132.8
Availability of own working capital	104.1	150.8	163.8	153.7	133.6	193.1	330.2	317.2
Long-term loan sources	68.1	61.9	59.1	82.3	93	76.8	86.2	126.6
Availability of own and long-term sources of working capital formation	172.2	212.7	222.9	236	226.6	269.9	416.4	241.8
Short-term loan sources	27.85	29.06	46.85	54.85	52.43	56.34	55.2	198.2
Total value of the main sources of working capital formation	200.05	241.76	269.75	290.85	279.03	326.24	471.6	235.7
Reserves and expenses	114.9	160.3	203.4	256	270.7	289.1	388.8	338.4
Surplus or lack of own working capital	-10.8	-9.5	-39.6	-102.3	-137.1	-96	-58.6	-542.6
Surplus or shortage of own and long-term sources of working capital formation	57.3	52.4	19.5	-20	-44.1	-19.2	27.6	48.2
Surplus or shortage of the main sources of formation of reserves and expenses	85.15	81.46	66.35	34.85	8.33	37.14	82.8	97.2
Type of financial stability	S	S	S	L*	L*	L*	S	
Indicators of financial stability of enterprises								
Coefficient of autonomy (independence)	0.40	0.24	0.48	0.49	0.51	0.54	0.59	148.0
Financial dependency ratio	0.60	0.76	0.52	0.51	0.49	0.46	0.41	67.8
Funding ratio	0.45	0.25	0.51	0.54	0.56	0.58	1.46	218.1
Financial stability ratio	0.50	0.28	0.54	0.57	0.60	0.61	0.66	131.5
Equity manoeuvrability coefficient	0.38	0.41	0.38	0.32	0.26	0.32	0.42	110.4
Ratio of provision with own working capital	0.20	0.11	0.26	0.23	0.21	0.27	0.38	187.4
Ratio of provision of stocks with own working capital	0.91	0.94	0.81	0.60	0.49	0.67	0.85	93.7

Note: A – absolute; S – sufficient; L – low

Source: calculated according to the data of the State Statistics Service of Ukraine (2022)

Notably, the dynamics of the level and ultimately the type of financial stability of enterprises is largely determined by the set of indicators of their business activity. Research has established a considerable improvement in the turnover of assets of agricultural enterprises – the total turnover ratio for the analysed period increased by 45.9% (from 0.7 to 1.1), and the turnover period decreased by 159 days (Table 7).

Table 7. Analysis of business activity of agricultural enterprises of Ukraine in dynamics

Indicator	2015	2016	2017	2018	2019	2020	2021	2021 to 2015, %
Asset turnover ratio	0.7	0.3	0.7	0.8	0.9	0.9	1.1	145.9
Turnover period, days	504.9	1,160.4	498.9	441.8	408.7	415.9	346.0	68.5
Accounts receivable turnover ratio	1.1	0.4	1.3	1.7	1.9	1.9	2.4	223.0
Accounts payable turnover ratio	1.1	0.4	1.1	1.3	1.4	1.4	2.0	186.0
Repayment period of receivables, days	336.3	961.0	285.5	220.1	189.7	192.8	150.8	44.8
Payable debt repayment period, days	336.0	973.2	324.8	282.5	264.2	258.0	180.6	53.8
Inventory turnover ratio	3.2	2.6	2.3	2.1	2.1	2.2	2.4	73.0
Turnover period, days	112.7	141.1	158.8	172.9	172.5	169.1	154.5	137.0
Turnover ratio of fixed assets	3.5	2.8	2.5	2.3	2.0	2.0	2.7	77.5
Turnover period, days	104.3	128.8	143.7	156.9	184.5	181.6	134.6	129.0
Equity turnover ratio	1.4	1.1	1.1	1.1	1.1	1.0	1.2	85.9
Turnover period, days	270.1	325.1	340.6	326.2	333.2	358.1	314.3	116.4
Loan capital turnover ratio	0.6	0.3	0.5	0.6	0.6	0.6	1.7	187.5
Turnover period, days	606.1	1298.3	665.4	608.6	597.4	616.1	214.9	53.3
Operating cycle, days	449.1	1102.0	444.2	393.0	362.3	361.8	305.3	68.0
Financial cycle, days	113.1	128.8	119.4	110.5	98.0	103.8	124.7	110.2

Source: calculated according to the data of the State Statistics Service of Ukraine (2022)

A positive trend in the management practice of agricultural enterprises is a significant increase in the ratio of receivables from 1.1 to 2.4 and a corresponding reduction in the term of its repayment by almost half - from 336 to 151 days. Despite the established increase in the amount of resources borrowed by the enterprise and a considerable increase in the amount of short-term bank loans, this did not affect the deterioration of the turnover of the company's accounts payable – the turnover ratio increased from 1.1 to 2.0 points, and the repayment period decreased from 336 to 181 days. The indicators of turnover of material stocks and fixed assets of enterprises decreased by 27.0% and 22.5%, respectively. Equity turnover declined by almost 14%. In the presence of a positive trend of increasing the efficiency of receivables management, the operational cycle of agricultural enterprises between the purchase of stocks and the receipt of funds from the sale of products during the analysed period decreased by almost 144 days. The relatively insignificant increase in the duration of the financial cycle indicates that, due to the seasonality of agricultural production, enterprises receive money from customers 3.8 months later on average than they make payments to their creditors.

The aggregate integral (generalizing) performance indicator of agricultural enterprises of Ukraine was retrospectively monitored using the matrix-coordinate method based on the structuring of a set of priority indicators of economic efficiency, liquidity, and solvency, financial stability and business activity (Table 8).

Table 8. Calculation of the total efficiency indicator of agricultural enterprises in Ukraine

Indicators	2015	2016	2017	2018	2019	2020	2021	2015	2016	2017	2018	2019	2020	2021
	Coordinate matrix one							Coordinate matrix two						
Net profit	0.43	0.38	0.29	0.30	0.38	0.34	1.00	0.18	0.14	0.08	0.09	0.14	0.12	1.00
Labour productivity	0.64	0.78	0.90	0.96	0.88	0.64	1.00	0.41	0.61	0.80	0.92	0.78	0.41	1.00
Return on fixed assets	1.00	0.64	0.39	0.32	0.33	0.27	0.73	1.00	0.41	0.15	0.10	0.11	0.07	0.54
Return on working capital	0.73	0.25	0.39	0.40	0.52	0.42	1.00	0.53	0.06	0.15	0.16	0.27	0.17	1.00
Return on capital	0.84	0.33	0.42	0.40	0.49	0.40	1.00	0.70	0.11	0.18	0.16	0.24	0.16	1.00
Return on equity	1.00	0.66	0.42	0.39	0.47	0.36	0.81	1.00	0.43	0.18	0.16	0.22	0.13	0.66
Return on loan capital	0.38	0.14	0.18	0.18	0.22	0.18	1.00	0.14	0.02	0.03	0.03	0.05	0.03	1.00

Table 8, Continued

Indicators	2015	2016	2017	2018	2019	2020	2021	2015	2016	2017	2018	2019	2020	2021
Product profitability (gross)	1.00	0.74	0.48	0.43	0.52	0.41	0.95	1.00	0.55	0.23	0.18	0.27	0.17	0.90
Return on sales	1.00	0.79	0.53	0.47	0.57	0.47	0.95	1.00	0.63	0.28	0.23	0.33	0.23	0.89
Return on activity	1.00	0.73	0.45	0.40	0.50	0.40	0.93	1.00	0.54	0.21	0.16	0.25	0.16	0.86
Fund return	1.00	0.81	0.73	0.67	0.57	0.57	0.77	1.00	0.65	0.53	0.44	0.32	0.33	0.60
Asset turnover ratio	0.64	0.27	0.64	0.73	0.82	0.82	1.00	0.40	0.07	0.40	0.53	0.67	0.67	1.00
Accounts receivable turnover ratio	0.46	0.17	0.54	0.71	0.79	0.79	1.00	0.21	0.03	0.29	0.50	0.63	0.63	1.00
Accounts payable turnover ratio	0.55	0.20	0.55	0.65	0.70	0.70	1.00	0.30	0.04	0.30	0.42	0.49	0.49	1.00
Equity turnover ratio	1.00	0.79	0.79	0.79	0.79	0.71	0.86	1.00	0.62	0.62	0.62	0.62	0.51	0.73
Coverage ratio	0.78	0.62	0.80	0.81	0.81	0.84	1.00	0.61	0.38	0.64	0.66	0.65	0.70	1.00
Coefficient quick liquidity	1.00	0.99	0.88	0.78	0.72	0.75	0.84	1.00	0.98	0.77	0.61	0.52	0.56	0.71
Absolute liquidity ratio	0.50	0.20	0.50	0.50	0.60	0.90	1.00	0.25	0.04	0.25	0.25	0.36	0.81	1.00
Loan capital turnover ratio	0.35	0.18	0.29	0.35	0.35	0.35	1.00	0.12	0.03	0.09	0.12	0.12	0.12	1.00
Coefficient of autonomy (independence)	0.68	0.41	0.81	0.83	0.86	0.92	1.00	0.46	0.17	0.66	0.69	0.75	0.84	1.00
Funding ratio	0.31	0.17	0.35	0.37	0.38	0.40	1.00	0.09	0.03	0.12	0.14	0.15	0.16	1.00
Financial stability ratio	0.74	0.44	0.89	0.91	0.94	1.00	0.61	0.55	0.20	0.79	0.82	0.87	1.00	0.37
Equity manoeuvrability coefficient	0.90	0.98	0.90	0.76	0.62	0.76	1.00	0.82	0.95	0.82	0.58	0.38	0.58	1.00
Ratio of provision with own working capital	0.53	0.29	0.68	0.61	0.55	0.71	1.00	0.28	0.08	0.47	0.37	0.31	0.50	1.00
Ratio of provision of stocks with own working capital	1.00	1.03	0.89	0.66	0.54	0.74	0.93	1.00	1.07	0.79	0.43	0.29	0.54	0.87
Aggregate indicator of the efficiency of the functioning of agricultural enterprises	-	-	-	-	-	-	-	**15.07**	**8.84**	**9.85**	**9.37**	**9.78**	**10.10**	**22.13**

Source: the result of the authors' research

The highest efficiency of agricultural enterprises of Ukraine was achieved in pre-war 2021, the lowest in 2016. During the analysed period, this aggregate indicator increased by 47% – from 15.07 to 22.13 points.

The matrix-indicative toolkit of the final stage of determining the aggregate indicator of the efficiency of the functioning of agricultural enterprises is recognized as an additive model.

The algorithm for calculating the influence of factors on the performance indicator is based on the use of the chain substitution technique. This mathematical tool helps determine the influence of individual factors on the change in the value of the performance indicator by gradually replacing the base value of each factor indicator with the factual value in the next period.

The practical implementation of this methodological technique allowed establishing the following dynamics and rating assessment of the factor impact (Table 9).

Thus, in 2021, compared to 2015, the overall efficiency indicator increased by 7.06 points. The following factors had the greatest positive impact on the established growth: an increase in labour productivity (the impact was estimated at 22.5%), a considerable increase in the amount of net profit of agricultural enterprises (15.5%), an increase in the financing ratio (12.8%), an increase in the turnover

ratio loan capital (12.4%) and an increase in its profitability (12.2%), an increase in the turnover ratio of receivables (11.2%) and a substantial increase in the absolute liquidity ratio (10.6%).

Table 9. The result of deterministic factor analysis of the impact on the aggregate performance indicator of agricultural enterprises

Indicators	2016 compared to 2015	2017 compared to 2016	2018 compared to 2017	2019 compared to 2018	2020 compared to 2019	2021 compared to 2020	2021 compared to 2015
Net profit, billion UAH	0.2362	0.0232	0.4235	0.3224	0.2775	1.3886	1.0931
Labour productivity, thous. UAH	1.1931	1.2412	0.8088	0.1989	-0.078	1.1273	1.5852
Return on fixed assets	-0.5901	-0.2602	-0.1499	0.006	-0.1317	0.4617	-0.4642
Return on working capital	-0.864	0.0916	0.0029	0.1103	-0.1924	0.7256	0.474
Return on capital	-0.6945	0.0713	-0.0139	0.0608	-0.0808	0.7364	0.2993
Return on equity	-0.5687	-0.4512	-0.1244	0.0429	-0.0913	0.5301	-0.4426
Return on loan capital	-0.122	0.0139	-0.0916	0.0162	-0.017	0.8692	0.8587
Product profitability (gross)	-0.4522	-0.5221	-0.0427	0.0871	-0.0981	0.7307	-0.0973
Return on sales	-0.4728	-0.5433	-0.1588	0.1032	-0.1032	0.5684	-0.2065
Return on activity	-0.4601	-0.3342	-0.1474	0.0877	-0.0898	0.6008	-0.243
Capital return, billion UAH	-0.3462	-0.1271	-0.0835	-0.1632	0.0098	0.2697	-0.6005
Asset turnover ratio	-0.3306	0.2306	0.1239	0.1405	-0.1405	0.3306	0.595
Accounts receivable turnover ratio	-0.1823	0.2656	0.2083	0.125	-0.1402	0.3733	0.7899
Accounts payable turnover ratio	-0.2625	0.2625	0.12	0.0675	-0.0729	0.51	0.6975
Equity turnover ratio	-0.5827	0.0004	-0.165	0.0031	-0.1071	0.2245	-0.4653
Coverage ratio	-0.4262	0.2592	0.0169	-0.0685	0.0515	0.2468	0.3896
Coefficient quick liquidity	-0.0899	-0.4057	-0.166	-0.09	0.0441	0.1431	-0.4944
Absolute liquidity ratio	-0.21	0.21	-0.125	0.11	0.45	0.19	0.75
Loan capital turnover ratio	-0.0934	0.0554	0.0381	0.0032	-0.0281	0.7754	0.8754
Coefficient of autonomy (independence)	-0.2942	0.4364	0.0278	0.0575	0.0905	0.1623	0.5404
Funding ratio	-0.2657	0.0727	0.0148	0.0103	0.0107	0.8422	0.905
Financial stability ratio	-0.3612	0.5426	0.0333	0.0512	0.1254	-0.6265	-0.3752
Equity manoeuvrability coefficient	0.2344	-0.2343	-0.2381	-0.3973	0.1973	0.3195	0.1814
Ratio of provision with own working capital	-0.3932	0.3843	-0.3018	-0.1709	0.1994	0.4952	0.723
Ratio of provision of stocks with own working capital	0.167	-0.2747	-0.4576	-0.2848	0.2522	0.3304	-0.3275
Changes in the overall indicator of financial stability and efficiency of agricultural enterprises	-6.23	1.01	-0.48	0.41	0.32	12.03	7.06

Source: the result of the authors' research

At the same time, a decrease in the return on capital, profitability of fixed assets, quick liquidity ratio, indicators of turnover and profitability of equity capital of agricultural enterprises had a negative impact on the level of the overall efficiency indicator.

Conducting deterministic factor analysis in retrospective dynamics revealed the following trends. The largest decrease in the total efficiency of agricultural enterprises occurred in 2016 (compared to the previous 2015, the indicator almost halved – from 15.0 to 8.84). The greatest negative impact was caused by the following factors: a decrease in the profitability of working capital of enterprises (13.9%), the profitability of the entire capital of enterprises (11.1%), the profitability of fixed assets (9.5%), the turnover ratio of own capital (9.4%). Since 2017, there has been a gradual increase in this indicator. Thus, the growth of the aggregate efficiency indicator by 1.01 points in 2017 was facilitated by the increase in labour productivity, improvement of financial stability coefficients, provision of own working capital, turnover of receivables and turnover of payables.

In the following year, 2018, the level of economic efficiency of agricultural enterprises decreased by 0.48 points, mainly due to the deterioration of indicators of availability of their own working capital.

In 2019, the increase in the aggregate efficiency index by 0.41 points was contributed by the growth of the net profit of enterprises, the further growth of labour productivity, the improvement of indicators of business activity, and the increase in the level of absolute liquidity of assets. The growth of the efficiency indicator in 2020 was also most affected by the positive dynamics of net profit and a substantial improvement in the financial stability of agricultural enterprises.

In 2021, the cumulative performance indicator more than doubled from 2020 (from 10.1 to 22.13) and experienced the largest absolute value for 2015-2021. This rapid growth was facilitated by the improvement of almost all indicators of factor impact on the total performance of agricultural enterprises.

Thus, the indicators of profitability of assets and return on invested capital, which are indirectly related to the amount of net profit, as well as indicators of turnover of receivables and indicators of financial stability, of which the provision ratio is recognized as the priority, have the greatest indicative influence on the dynamics of the aggregate indicator of the efficiency of agricultural enterprises own working capital.

Comparing the obtained results with the results of other researchers, we note that the factor studies of L. Rogatina (2018) focus on the analysis of economic factors of the macro-environment and determining their impact on the development of the agricultural sector of Ukraine. Direct foreign and capital investments, the level of population income, the income tax rate and the dynamics of the exchange rate were selected as relevant factors, while the set of internal effective factors of agricultural enterprises were not included in the analysis. V. Nesterenko and A. Moroz (2022) investigated the impact of a set of innovative factors, and the level of competitiveness of agricultural enterprises was chosen as an effective indicator of efficiency.

M. Humeniuk & D. Nemish (2022) consider profitability as a general indicator of the development of small agrarian entrepreneurship and the economic efficiency of its production and focus their research only on small forms of agricultural entrepreneurship. H. Pruntseva (2020) revealed the dependence of the performance of agricultural enterprises on the expenditures of the state budget of Ukraine on the agricultural sector. In contrast to the present study, which was aimed at determining the overall integral indicator of economic efficiency, the dynamics of the net profit indicator were chosen as the results of the activities of agricultural enterprises.

L. Vdovenko's research (2018) is also aimed at determining the impact of state support on the efficiency of agricultural enterprises, but the author also tried to provide a comparative description with other European countries. In turn, O. Anysenko & K. Vakar (2018) generally determined the prospects for the development of agriculture in Ukraine, considering the existing risks and possible options for the national agrarian policy.

V. Holian *et al.* (2019) investigated the factorial influence of the institutional environment on the efficiency of the agricultural sector of the economy and the real possibilities of its further development. The authors found a positive influence of institutional factors on the results of functioning of large agricultural enterprises and a braking effect on the work of medium and small agricultural businesses. The need to ensure comprehensive development of the agrarian sector of the economy focuses on overcoming the raw material orientation of export supplies of agricultural and food products and increasing the specific weight in the structure of production of products with high added value.

The methodology for assessing the economic efficiency of Norwegian researchers H. Alem *et al.* (2018) is based on the methodological tools of stochastic marginal analysis, the implementation of which helped determine the level of average efficiency and prove that management methods and a set of socio-economic factors considerably affect economic indicators of farms in the crop industry.

M. Asfaw *et al.* (2019) emphasized the influencing factors in the production of wheat, and the authors proposed to evaluate the overall efficiency differently from the standpoint of the levels of technical, distributional, and economic efficiency using the example of small wheat producers.

The methodological toolkit of the statistical analysis of factors affecting the results and efficiency of activities carried out by Czech researchers (Naglova *et al.*, 2017) is more focused on the specifics of dairy enterprises. In turn, the use of the cluster analysis methodology allowed assessing the factor impact of foreign capital on the efficiency and competitiveness of medium and small producers of dairy products.

We agree with the conclusions of the research results of V. Masuku and A. Belete (2015), who used a universal approach to analyse and evaluate the economic efficiency of small, medium, and large dairy farms. The integrated use of three methods of data analysis, namely descriptive statistics, econometric analysis (stochastic marginal function of profit) and

gross profit analysis allowed the authors to measure the average level of their economic efficiency.

Authors fully agree with the conclusions that the quality of the database and the evaluation method used affect the objectivity of the evaluation of the results of the management of agricultural enterprises. In contrast to the applied toolkit, E. Rosochatecká (2018) used the index method, the method of calculating the economic rate of profit, and indicators of forecasting the financial state of enterprises to determine the overall indicator of the efficiency of agricultural enterprises.

N. Koteva (2019) found a significant relationship between the size and economic efficiency of farms. The author identifies aggregate economic efficiency with such indicators as productivity and profitability of farms, and the applied methodological tools combine methods of comparative analysis, statistical groupings, and expert evaluation.

One cannot help but agree with the results of research by M. Guth & K. Smedzik-Ambrozy (2020), which revealed the priority influence of the available resource potential of the country on the level of economic efficiency of its agricultural enterprises. The level of provision of land resources, capital, and labour is recognized as the main factors that create the economic efficiency of the agrarian sector of the country's economy.

Thus, in contrast to other researchers, a complex algorithmized methodical approach to assessing the level of economic efficiency of agricultural enterprises of Ukraine based on the definition and analysis of the aggregate indicator and the construction of a model of factor influence on its dynamics has been substantiated and tested.

▸ Conclusions

A substantiated and tested methodical approach to the complementary evaluation of efficiency as a phenomenon and process of economic activity, which is based on a step-by-step algorithm for calculating integral indicators and subsequent modelling of factor influence, allows for a comprehensive assessment of the dynamics of the level of economic efficiency of agricultural enterprises of Ukraine and to carry out retrospective monitoring based on rating coefficients.

Notably, the analysis is based on statistical data before the full-scale russian invasion of Ukraine. The performance indicators of agricultural enterprises in the past 2022 will be incomparably worse.

Since 2015, there has been a steady trend of a gradual increase in the volume of production of the vast majority of agricultural products, an increase and strengthening of the export potential of Ukrainian agricultural enterprises; however, the beginning of russia's full-scale armed aggression has had a devastating effect on the functioning and prospects of their further development.

Prospective ways from the topic for the following scientific works focus on observing the stabilization and gradual recovery of agricultural enterprises of Ukraine, namely the following endogenous factors:

– further development of military events on the territory of Ukraine;

– the pace of liberation of the occupied territories;

– state of damage and destruction of agricultural enterprises and agricultural infrastructure;

– the degree of mining of a considerable part of the territories, including farmland;

– real opportunities for setting up logistics;

– aggravation of the shortage of working capital at agricultural enterprises;

– limited number of resources;

– terms and scope of solving the problem of unblocking Ukrainian ports and operation of export corridors for further export of Ukrainian agricultural products;

– the current state and level of realization of the capacity potential of processing enterprises according to the current military situation;

– providing state support to agricultural enterprises.

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None.

▸ Conflict of Interest

None.

▸ References

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Моніторинг сукупного рівня економічної ефективності сільськогосподарських підприємств України: фактори впливу та перспективи зростання

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► **Анотація.** Ефективність діяльності сільськогосподарських підприємств визначається синергетичним впливом цілої сукупності різноманітних факторів. Удосконалення та апробація методичного забезпечення факторно-компліментарної діагностики рівня економічної ефективності суб'єктів господарювання у сучасних умовах залишається актуальною проблемою. Метою дослідження був комплексний моніторинг рівня економічної ефективності сільськогосподарських підприємств України та вимірювання ступеня впливу пріоритетних факторів на сукупний показник ефективності. У процесі дослідження використано ряд методів: абстрактно-логічний, порівняльного аналізу, табличний, статистичний, метод матриці-координат, розрахунково-конструктивний, монографічний, факторного аналізу. Встановлено, що протягом 2015 та 2021 рр. даний сукупний показник збільшився на 47% – від 15,07 до 22,13 пункти. Серед факторів, які позитивно вплинули на встановлене зростання сукупного показника економічної ефективності, найбільші рейтингові коефіцієнти мають: збільшення продуктивності праці (1,5852), більш, ніж дворазове зростання обсягу чистого прибутку сільськогосподарських підприємств (1,0931), збільшення у 2,2 рази коефіцієнта фінансування (0,905), зростання у 1,9 разів коефіцієнта оборотності позикового капіталу (0,8754) та збільшення майже у 3 рази його рентабельності (0,8587), зростання показника оборотності дебіторської заборгованості (0,7899) та дворазове збільшення показника абсолютної ліквідності (0,7500). Найбільш негативно на рівні сукупного показника ефективності позначилися наступні фактори впливу: зниження на 23% показника фондовіддачі (-0,6005), зменшення на 17% коефіцієнта швидкої ліквідності (-0,4944), погіршення на 26% рентабельності основних засобів (-0,4642), зниження оборотності та рентабельності власного капіталу сільськогосподарських підприємств (-0,4653 та -0,4426 відповідно). Практична значущість проведеного дослідження визначається удосконаленням методичного інструментарію вимірювання та діагностики сукупного рівня економічної ефективності суб'єктів господарювання, що може бути корисним в управлінській практиці організації моніторингу та розробки напрямів підвищення економічної ефективності сільськогосподарських підприємств

► **Ключові слова:** економічна ефективність; динаміка; адитивна модель; рентабельність; фінансова стійкість