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TRANSFORMATION OF MOLDOVA'S AGRICULTURAL SECTOR: NEW CHALLENGES AND INVESTMENT OPPORTUNITIES

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Abstract. Agriculture plays a key role in the national economy of the Republic of Moldova, ensuring food security and being an important source of employment for the population. Over the last period, the activity of agricultural enterprises has been undergoing remarkable transformations related to global climate changes on the planet, integration of the country into the world markets, technological progress and new challenges. Maintaining the investment attractiveness of agricultural enterprises will allow developing promising areas in agriculture, which will contribute to sustainable growth of the country's economy. The article analyses the dynamics and structure of agricultural enterprises in the Republic of Moldova for the period 2017-2022, based on data from the Bureau of National Statistics. The study reveals a significant increase in the number of agricultural enterprises, where small and micro enterprises predominate. Key performance indicators, including revenues, profits, assets and investments in long-term assets, are analyzed, and a factor analysis of investment attractiveness is conducted by applying a seven-factor return on assets model. The authors emphasize the need for strategic investment and sustainable management for the further development of this type of activity.

Key words: *agriculture, dynamics of enterprises, production volume, investment attractiveness, return on assets.*

JEL code: *E22, F60, O13.*

INTRODUCTION

Agriculture plays a key role in Moldova's national economy, ensuring food security and employment [1]. In recent years, this type of activity of the national economy has undergone significant changes under the influence of climatic factors, integration into international markets and technological progress.

These transformations pose new challenges by actively attracting investment for modernization and sustainable agricultural growth [2].

The increase in the volume of investment resources directly depends on measures aimed at improving business efficiency, since the most attractive for investors are enterprises that provide a quick return of capital and high profits [3].

In practice, the assessment of investment attractiveness can be based on indicators such as return on assets, availability of infrastructure and workforce.

The purpose of this study is to analyze the current state and prospects of agricultural development of the Republic of Moldova in the conditions of ongoing transformations.

In particular, the authors pay attention to the investment attractiveness of this type of activity of the national economy, considering it as a result of analysis by potential investors of economic, social conditions and public administration (creating a favorable business environment) [4].

Thus, the importance of this topic is emphasized not only by economic but also social aspects, which makes it extremely relevant for research and practical application.

1. METHODOLOGY OF THE STUDY

A variety of analysis methods were used, including time series analysis to study the dynamics of key indicators, comparative analysis to assess the trends in the agricultural development of the

Republic of Moldova in the context of trends of the European Union countries, as well as factor analysis to determine the impact of the main factors on the profitability of agricultural enterprises.

Special attention was paid to correlation analysis, which allowed to identify an additional set of factors that affect the performance of enterprises that go beyond solely financial indicators. The use of this method contributed to a better understanding of the interrelationships between the various aspects of the agricultural sector and provided an opportunity to take into account not only economic but also social parameters.

The integrated approach allowed to identify the main trends in the development of the agricultural sector of Moldova, as well as to assess its investment attractiveness.

2. ANALYSIS OF THE CURRENT STATE OF AGRICULTURE IN MOLDOVA

To assess the current state of agriculture, it is advisable to start with an analysis of the dynamics of enterprises and the degree of fragmentation of this sector of the economy (Figure 1).

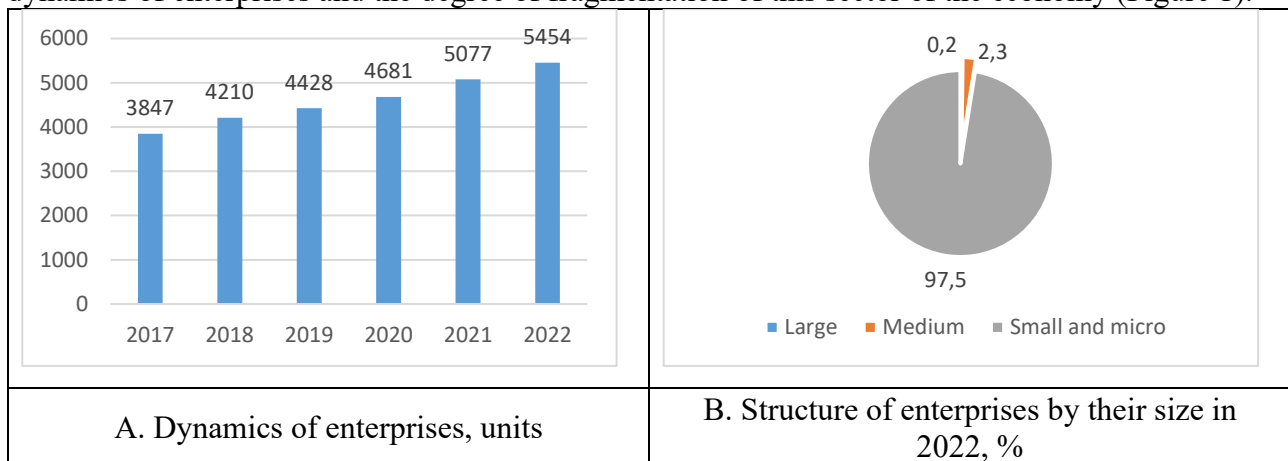


Figure 1. Dynamics and Structure of Agricultural Enterprises

Source: compiled by the authors on the basis of [5].

The analysis of the number of agricultural enterprises for the period 2017-2022 shows a steady growth of this type of activity. During the period under review, the number of enterprises increased from 3847 to 5454, indicating a significant expansion of the sector. This dynamic growth in the number of enterprises may indicate the attractiveness of agriculture to new entrants.

Analysis of the structure of agricultural enterprises by their size in 2022 shows that this type of activity consists mainly of small and micro-enterprises, which make up 97.5 % of the total number of enterprises. Such a structure indicates a high degree of fragmentation of the industry and indicates that there are restrictions on access to large investments and large-scale innovation.

The dynamics of agricultural production are presented in table 1.

Analysis of the dynamics of agricultural production for the period 2017-2022 shows significant fluctuations in production volumes and growth rates. In 2021, there was a sharp jump in production to 48434 million lei, which is 158 % higher than the previous year. However, in 2022, production fell to 41024.6 million lei, which is only 70.8 % of the 2021 level. These fluctuations point to instability in agricultural production, highlighting the importance of sustainable development and the need for policy measures to mitigate such fluctuations.

Table 1. Dynamics of agricultural production

Indicators	2017	2018	2019	2020	2021	2022
Global Agricultural Production, million lei	34142.0	32637.0	34597.0	30061.0	48434.0	41024.6
Growth rate chain, %	109.0	103.0	98.0	73.0	158.0	70.8

Source: compiled by the authors on the basis of [6].

To ensure sustainable and sustainable agricultural growth, investments are needed to improve infrastructure, introduce innovative technologies and adapt to climate change, thereby making financial investments a key factor in long-term agricultural development.

In order to better understand the dynamics of agricultural development and assess the challenges facing the sector, it is interesting to compare the growth rates of agricultural production in Moldova and some EU countries according to 2022 data (Figure 2).

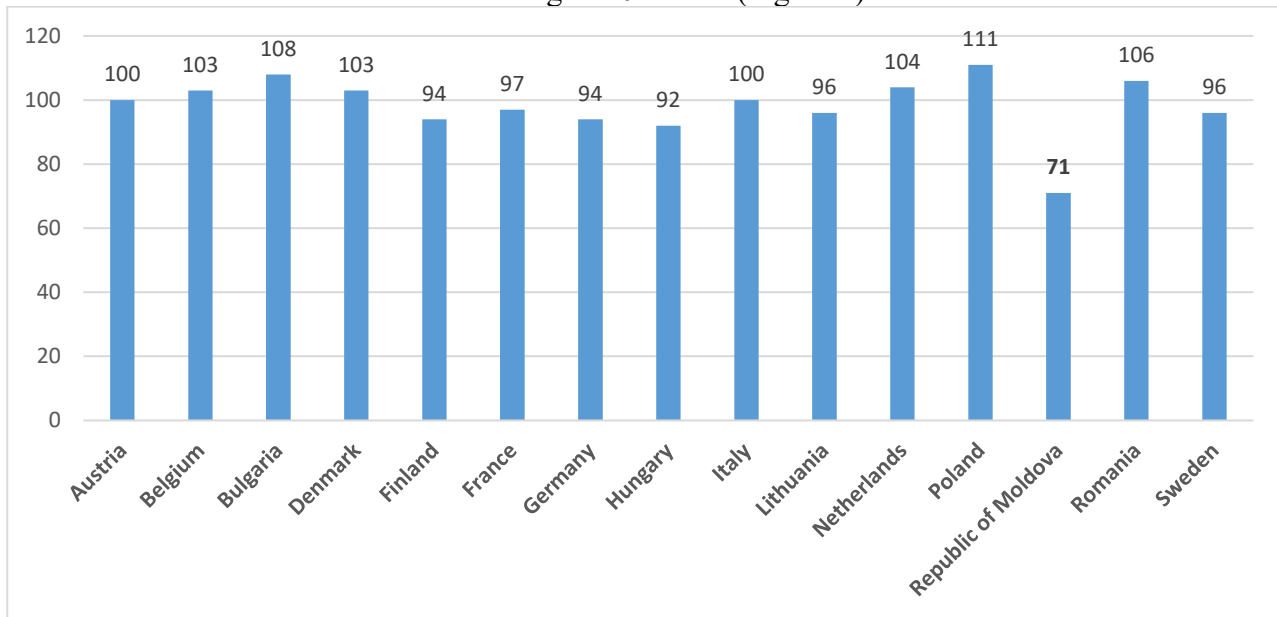


Figure 2. Growth rate of agricultural production in Moldova and some EU countries 2022 (percentage to the previous year), %

Source: compiled by the authors on the basis of [7].

Based on the data presented in figure 2, it can be concluded that in 2022, most countries of the European Union have seen a steady increase in agricultural production. The largest growth was observed in Poland (111 %), Bulgaria (108 %) and Romania (106 %). These countries are showing a positive trend, exceeding the figures of the previous year. A number of EU countries, such as Finland (94 %), Germany (94 %), Lithuania (96 %) and Sweden (96 %), saw a decline in agricultural production compared to the previous year. As for the Republic of Moldova, it can be noted that the growth rate of agricultural production in the Republic of Moldova is 70.8 % of the level of the previous year (2021). This indicator is significantly lower than in other countries reviewed, highlighting the contrast and regional differences in agricultural practices and policies. Given the successful performance of some EU countries, Moldova can benefit from international cooperation by adopting experience and best practices in the field of agriculture to overcome current challenges and achieve sustainable growth in the future.

Thus, the analysis of the data emphasizes the need for a comprehensive approach to solving problems in the agricultural sector of Moldova, aimed at the restoration and further development of this important sector of the economy.

The role of investment in long-term assets is an important aspect that needs to be taken into account in order to better understand the changes in output.

The dynamics of investments in long-term assets of agricultural enterprises are presented in table 2.

Table 2. Dynamics of investments in long-term assets of agricultural enterprises

Indicators	2017	2018	2019	2020	2021	2022
Investments in Long-term Assets, million lei	2306.2	2737.0	2635.5	2313.7	3288.3	4655.1
Growth rate chain, %	119.3	114.7	92.4	87.3	132.9	119.1

Source: compiled by the authors on the basis of [8].

The data presented in table 2 show significant volatility in the dynamics of investments in long-term assets of agricultural enterprises between 2017 and 2022. Investments ranged from 2306.2 million lei in 2017 to 4 655.1 million lei in 2022, including a decline in 2019 and 2020 due to the impact of economic crises, including the COVID-19 pandemic. At the same time, the significant

growth in investments in 2021 and 2022 indicates the recovery of investment activity and positive expectations for the future development of agriculture.

3. ASSESSMENT OF INVESTMENT ATTRACTIVENESS

Further research should focus on the analysis of factors affecting the stability and growth of agriculture, including through an integrated approach to assessing the investment attractiveness of agriculture.

The dynamics of key indicators of agricultural enterprises are presented in table 3.

Table 3. Dynamics of key indicators of agricultural enterprises

Indicators	2017	2018	2019	2020	2021	2022
Sales revenue, million lei	15983.76	17215.64	17501.72	15974.01	24713.46	27900.14
Net profit, million lei	2264.11	1461.66	1445.70	-264.19	5787.60	3780.27
Total assets, million lei	27233.02	31532.34	34715.19	34532.42	43504.87	51071.54
Current liquidity ratio, coefficient	1.366	1.298	1.328	1.283	1.515	1.473
Working capital turnover ratio, coefficient	1.685	1.548	1.415	1.394	1.802	1.750
Coefficient of financial autonomy, coefficient	0.445	0.400	0.403	0.387	0.432	0.431
Profitability of equity, %	18.7	11.6	10.3	-2.0	30.8	17.2

Source: compiled by the authors on the basis of [5].

Analysis of the dynamics of key indicators of agricultural enterprises for the period 2017-2022 shows multidirectional trends.

Sales revenues showed steady growth, rising from 15983.76 million lei in 2017 to 27900.14 million lei in 2022. The dynamics of net profit for the period under review was volatile, registering a negative value (net loss) in 2020 in the amount of 264.19 million lei.

According to the total assets of the enterprise, there was a trend of growth, reaching 51071.54 million lei in 2022, which indicates an increase in the scale of activity. However, current liquidity and working capital ratios, although showing some improvement in 2021, declined in 2022, indicating a decline in the efficiency of working assets management.

The coefficient of financial autonomy varied in a narrow range (from 0.387 to 0.445), and its value indicates a constant dependence on borrowed funds. The profitability of equity showed significant fluctuations: after a negative value in 2020 (-2.0 %), it reached 30.8 % in 2021, but fell again to 17.2 % in 2022, reflecting volatility in capital return.

Thus, despite rising incomes and assets, the profitability and efficiency of management of agricultural enterprises demonstrate volatility, which requires attention to the management of financial and operational aspects of activities.

In this regard, in order to ensure the sustainable development of agricultural enterprises, it is necessary to clearly understand the risks and factors of influence on this phenomenon.

When investment attractiveness is viewed from the perspective of return on invested capital, this economic category can be understood as the most comprehensive indicator of an enterprise's performance - return on assets. Accordingly, based on the dynamics of the profitability of assets and its level, it is possible to conclude about deterioration or improvement of conditions for increased investment activity.

It is interesting to assess the level of investment attractiveness of this type of activity on the basis of the application of a seven-factor model of profitability of assets. This model allows to conclude about the dynamics of sectoral development within the economy and its attractiveness for investors, relying mainly on the financial results achieved by enterprises.

The general formula for calculating the profitability of assets as a result of the transformation of the multiple model is transformed by the method of expansion into a multiplicative model with a new set of factors. This method involves extending the original model by multiplying the numerator and fraction denominator by one or more new indicators.

The return on assets can be calculated using the following equation Eq.(1) [9]:

$RA = NP/TA = NP/IS * IS/CA * CA/CL * CL/AR * AR/AP * AP/BC * BC/TA$, where: (1)

- Net Profit (NP) / Total Assets (TA) – Return on Assets;
- Net Profit (NP) / Income from Sales (IS) – Profitability of sales;
- Income from Sales (IS) / Current Assets (CA) – Turnover of current assets;
- Current Assets (CA) / Current Liabilities (CL) – Current liquidity ratio;
- Current liabilities (CL) / Accounts Receivable (AR) – Ratio of short-term liabilities to accounts receivable;
- Accounts Receivable (AR) / Accounts Payable (AP) – Ratio of accounts receivable to accounts payable;
- Accounts payable (AP) / Borrowed Capital (BC) – Ratio of accounts payable to borrowed capital;
- Borrowed capital (BC) / Total Assets (TA) – Ratio of borrowed capital to total assets of the enterprise.

The strength of this model is the simplicity and structure of the assessment, which makes it extremely popular among specialists.

Factor analysis is carried out using the method of chain substitution using absolute differences (Table 4).

Table 4. Assessment of investment attractiveness of agricultural enterprises, 2021-2022.

Indicators	2021	2022	The change	Impact on return on assets, %
Profitability of sales, %	23.4	13.5	-9.9	-5.62
Turnover of current assets, coefficient	1.190	1.188	-0.001	-0.01
Current liquidity ratio, coefficient	1.515	1.473	-0.042	-0.21
Ratio of short-term liabilities to accounts receivable, coefficient	1.843	1.876	+ 0.033	0.13
Ratio of accounts receivable to accounts payable, coefficient*	1	1	0.0	0.00
Share of accounts payable in borrowed capital, %	30.1	29.2	-0.9	0.23
Ratio of borrowed capital to total assets of the enterprise, coefficient	0.568	0.569	+ 0.001	0.01
Return on assets, %	13.3	7.4	-5.9	x

Source: compiled by the authors on the basis of [5].

* Accounts payable under this study were planned at the level of receivables due to the lack of detailed data on the size of the elements of short-term liabilities, based on the economic assumption of the need for balanced management of assets and liabilities of the enterprise.

A key factor that has had a negative impact on the investment attractiveness of agricultural enterprises is the negative dynamics of profitability of sales, which decreased by 9.9 percentage points, which led to a decrease in return on assets by 5.62 %. This indicates a deterioration in the profitability of the main activities of enterprises, which reduces their attractiveness to investors.

The current liquidity ratio declined slightly from 1.515 to 1.473, resulting in a decrease in return on assets of 0.21 %. Even in the current conditions, agricultural enterprises consistently ensure the repayment of short-term liabilities at the expense of current assets.

The share of accounts payable in borrowed capital has remained virtually unchanged, indicating the stability of the management of financial liabilities. The ratio of borrowed capital to total assets remained at the level of the previous year (an increase of 0.001 points), indicating the absence of significant changes in the structure of borrowed financing and the minimal impact on the return on assets (0.01 %).

In general, the decline in profitability of sales became the main factor in the decrease in investment attractiveness of agricultural enterprises, despite the continued financial stability and

stable management of short-term liabilities, which is also confirmed by the value of the integral index of investment attractiveness, which amounted to 0.556 points for the study period (Table 5).

Using this index, potential investors can assess the current state of the business and the potential benefits of investments.

At the same time, it is important to note that this indicator describes only the financial aspects of the activities of agricultural enterprises without taking into account a number of factors (business climate, social factors, etc.), which indicates a one-sided approach in assessing the economic potential of enterprises in the long term [10].

An important addition to the considered seven-factor model can be a correlation analysis, with an additional set of key factors. Such analysis will add depth to the assessment of investment attractiveness and provide a more accurate picture for potential investors.

Table 5. Calculation of the index of investment attractiveness of the enterprise

Indicators	Index of change of indicator, 2022-2021
Profitability of sales	0.579
Turnover of current assets	0.999
Current liquidity ratio	0.972
Ratio of short-term liabilities to receivables	1.018
Ratio of receivables to accounts payable	1.000
Share of accounts payable in borrowed capital	0.971
Ratio of borrowed capital to total assets of the enterprise	1.001
Integral index of investment attractiveness	0.556

Source: compiled by the authors on the basis of Table 4.

The baseline data for correlation analysis are presented in table 6.

Table 6. Baseline data for correlation analysis

Years	Return on Assets, % (Y)	Global production per 1 hectare of cultivated agricultural land in agricultural enterprises, thousand lei/hectare (x1)	Labor productivity, thousand lei/person (x2)	Share of large enterprises in the total number of agricultural enterprises, % (x3)	Time, years (T)
2015	0.2	35.9	255.3	0.8	1
2016	4.7	39.2	309.5	1.0	2
2017	8.3	43.0	351.7	1.0	3
2018	4.6	40.6	380.8	0.9	4
2019	4.2	41.9	402.1	0.7	5
2021	13.3	57.2	615.4	0.3	7
2022	7.4	47.5	702.8	0.2	8

Source: compiled by the authors on the basis of [5], [6], [11].

To analyze the factors influencing the return on assets of agricultural enterprises (Y), the following variables were included in the model: gross output per hectare of cultivated agricultural land in agricultural enterprises (x1), efficiency of labor resource utilization (x2), enterprise size structure (x3), and time trend (t).

It is expected that the increase in gross output per hectare, labor productivity [12] and concentration of production (increase in the share of large enterprises) will have a positive impact on profitability.

Gross output per hectare of planted area is one of the key factors affecting the investment attractiveness of agricultural enterprises. This indicator reflects the efficiency of land use. The higher the gross output per hectare, the more opportunities the enterprise has to generate revenue from sales and operating profit. This situation increases the profitability of assets and indicates the attractiveness of the enterprise for investments by accelerating the return on investment.

The high level of productivity makes enterprises more flexible and resilient to external fluctuations, which increases their investment attractiveness.

The growth of the share of large enterprises in the overall structure of agricultural enterprises has a positive impact on the profitability of assets, as large enterprises have significant sown areas, which allows optimizing production costs. In addition, such enterprises have the resources to introduce innovations in the organization and management of production. They can invest in advanced technologies, including automated control systems, modernized soil treatment methods and improved irrigation systems.

The analysis period is 2015-2022, with the exception of 2020, when enterprises recorded net losses. Experts point to several factors, such as the drought, COVID 19, the lack of development of government programs in the field of agriculture and the uncompetitive exchange rate, which in 2020 caused the deepest crisis in agriculture in 30 years [13].

The multiple correlation equation is as follows:

$$Y = -36.2942 + 0.6637 * x_1 + 0.0208 * x_2 + 9.8732 * x_3 - 0.5692*t.$$

The test of regression coefficients by Student’s test showed that their value is significant, since the calculated reliability of the correlation coefficient is higher than the tabulated value (table 7).

Table 7. Regression coefficients according to Student’s test

Parameter	Coefficient	Critical Value of Student’s T-test	Calculated Student’s T-test
Intercept	-36.2942	3.9343	-9.2250
b 1	0.6637	0.0667	9.9506
b 2	0.0208	0.0084	2.4738
b 3	9.8732	2.0748	4.7585
t	-0.5692	0.4267	-1.3341

Source: compiled by the authors.

The economic sense of the resulting regression coefficients means:

b1 – an increase in gross output per 1 hectare of cultivated agricultural land in agricultural enterprises by 1 mii lei/hectar will increase the return on assets by 0.6637 %;

b2 – an increase in labor productivity by 10 thousand lei will lead to an increase in the profitability of assets by 0.208 %;

b3 – an increase in the share of large enterprises in the structure of agricultural enterprises by 0.1 % will lead to an increase in the profitability of assets by 0.9873 %;

t – each year the return on assets decreases by an average of 0.5692 % (for this set of factors).

The coefficient of determination obtained (0.9920) suggests a strong relationship within the equation. The factors integrated into the mathematical model have an impact on around 99.20 % of the fluctuations observed in the net profit of agricultural enterprises. Moreover, the correlation coefficient stands at 0.9960. The assessment of these findings using Fisher’s criterion indicates the significance of the multiple correlation coefficient, as the calculated F-value (61.817) exceeds the tabulated F-value (9.35) [14]. This is supported by the degrees of freedom (f1=7, f2=2, with a significance level of q=0.10).

CONCLUSIONS

In the Republic of Moldova there is a steady growth in the number of agricultural enterprises, which indicates the attractiveness of this sector for new market participants. However, the high degree of fragmentation and predominance of small and micro-enterprises create barriers to attracting significant investment and innovation.

A comparative analysis of the dynamics of agricultural production in the EU countries showed that Moldova is significantly behind in terms of growth. As recommendations, it should be proposed to adopt the experience of EU countries, where positive trends in growth and sustainable development of the sector are noted.

The dynamics of investments in long-term assets of Moldovan agricultural enterprises demonstrates significant volatility, especially under the influence of economic crises. However, the increase in investment in recent years indicates a recovery in activity. To sustain sustainable growth, it is necessary to continue to attract investment in this activity.

The main indicator of investment attractiveness, profitability of assets, shows unstable results, despite the growth of income and assets of enterprises.

Correlation analysis revealed the dependence of the profitability of assets on the value of gross output per 1 hectare of cultivated agricultural land, labor productivity and the share of large enterprises in the overall structure of agricultural enterprises, which emphasizes the need to take into account both economic and social factors in assessing the attractiveness of agricultural enterprises.

One-sided assessment of investment attractiveness based on financial indicators alone is insufficient. It is recommended to take into account social and macroeconomic factors, as well as create conditions for the growth of large enterprises, which contributes to the increase of investment activity in the sector, as well as narrowing the development gap compared to the more competitive economies of the EU.

The following studies should focus on the analysis of factors affecting the sustainability of agricultural enterprises, with an emphasis on the development of multi-factor models that take into account not only financial but also social parameters.

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