AN INTEGRATED APPROACH TO EVALUATING THE FINANCIAL PERFORMANCE OF AGRICULTURAL ENTITIES: A COMPOSITE SCORING MODEL

Mihaela – Cătălina FROICU[1], Ștefana – Beatrice PĂDURARU[1], Gabriela IGNAT[1], Carmen Luiza COSTULEANU[1]

e-mail: catalina.froicu@iuls.ro

Abstract

The economic performance of agricultural entities has recently been analyzed in the context of increasing pressures caused by economic instability, climate change, and sustainability requirements promoted by the European Union, international organizations, and financial institutions. Financial assessment can no longer be limited to traditional indicators, requiring an approach that combines financial soundness with resource-use efficiency.
This paper proposes an analytical model based on the construction of a composite financial performance index. The main objective is to provide a simple yet useful tool for understanding the overall performance of agricultural enterprises.
Although numerous financial indicators are commonly used to assess agricultural performance, they are typically analyzed individually, and aggregation into a unified score is rarely applied in Romania's agricultural sector.
Indicators such as return on assets, return on equity, current ratio, debt ratio, and asset turnover were included. A sub-index of economic sustainability was calculated based on profit per hectare and income per employee. All values were normalized and combined into a general score, scaled from 0 to 100.
The model was applied to a sample of five agricultural farms, using data for the year 2024. The results were graphically represented, allowing for an intuitive interpretation of the scores. The findings confirm the relevance of a synthetic evaluation method that is easy to apply and adaptable to various agricultural contexts.

Keywords: Agribusiness, Financial performance, Composite indicators, Financial scoring

In recent years, agriculture has been increasingly exposed to pressures driven by economic instability, climate change, and sustainability requirements imposed at both European and international levels. In this context, the financial performance of farms can no longer be assessed through traditional analysis based solely on isolated indicators. A more comprehensive approach is needed—one that captures the complexity of modern agricultural activity and reflects both financial soundness and the efficiency of resource utilization (Gómez-Limón & Riesgo, 2009).

The literature offers a wide range of financial indicators for performance analysis; however, they are often considered independently, without an integrated aggregation method (Hedman Jansson & Lagerqvist, 2013). In Romania, synthetic evaluations—such as scoring models—are rarely applied in the agricultural sector, despite their potential to provide a clearer and more interpretable overview (Herman & Zsidó, 2023).

This paper proposes a composite scoring model designed to integrate key financial indicators—profitability, liquidity, indebtedness, and efficiency—alongside a sub-index reflecting economic sustainability. The latter is calculated based on the ratio of profit to farmed area and total income per employee, in line with recent recommendations on sustainable and efficient performance (Sinisterra-Solís *et al.,* 2024).

The main objective is to develop and apply a user-friendly assessment tool that enables comparative analysis between agricultural entities and facilitates performance monitoring over time. The model is tested on a sample of Romanian farms using real data for the year 2024. The results provide a starting point for discussions on economic efficiency in agriculture and potential directions for optimization.

[1] Ion Ionescu de la Brad Iasi University of Life Sciences, Iasi, Romania

MATERIAL AND METHOD

The study was conducted using a sample of five crop-focused agricultural entities selected from the North-East Region of Romania. The selection criteria were based on the availability of detailed financial data reported for the year 2024 and classification within the same business size category, determined by turnover and number of employees. The analyzed entities were anonymized and labeled generically as E1–E5.

The data used in the analysis were extracted from official public sources and included the following financial indicators: turnover, total revenues, total expenses, gross profit, net profit, number of employees, fixed assets, current assets, inventories, receivables, cash and bank accounts, equity, share capital, total liabilities, and deferred revenues.

Based on these data, the following key performance indicators were calculated: Return on Assets (ROA), Return on Equity (ROE), Current Ratio, Debt Ratio, and Asset Turnover.

To account for the economic sustainability component, an additional indicator—revenue per employee—was introduced. This was calculated as the ratio of total revenues to the number of employees, reflecting the efficiency of human resource utilization and the economic potential for remuneration—an increasingly relevant aspect given labor market pressures and the need for long-term profitability in agriculture.

In order to ensure comparability between indicators expressed in different units and to construct a unified score, all six indicators were normalized to a scale from 0 to 100 using the min-max method. The resulting score ranges from 0 to 100, with 100 representing the best performance.

The formula applied was:

Normalized score = $(X_i - X_{min})/(X_{max} – X_{min}) * 100$, where:

X_i = the value of the indicator for the analyzed entity,

X_{min} și X_{max} = the minimum and maximum values of the indicator across the sample.

For the debt ratio—a negative-impact indicator—a reverse formula was used:

Negative score = $(X_{max} – X_i)/(X_{max} – X_{min}) * 100$.

This adjustment ensures that a lower debt value translates into a higher score, reflecting superior performance.

The indicators were grouped into two main components: financial performance (based on the five financial indicators) and economic sustainability (based on revenue per employee). These two components were then aggregated into a final composite score.

For each entity, a financial performance sub-score (arithmetic mean of the five financial indicators) and an economic sustainability sub-score (normalized score for revenue per employee) were calculated.

Finally, the composite score was computed as the arithmetic mean of the two sub-scores:

Composite Score = (Financial Sub-score + Sustainability Sub-score) / 2

The results were graphically represented using a radar chart, allowing for a comparative visualization of each entity's performance across all analyzed dimensions.

RESULTS AND DISCUSSIONS

The proposed model was applied by normalizing six key indicators: ROA, ROE, Current Ratio, Debt Ratio, Asset Turnover, and Revenue per Employee. Each indicator was converted to a scale from 0 to 100, enabling comparability across entities. The normalized values reveal significant differences between the entities analyzed.

Table 1

Normalized Scores and Composite Scores

	E1	E2	E3	E4	E5
Normalized ROA	100,00	0,00	2,55	19,79	14,95
Normalized ROE	100,00	0,00	11,51	67,33	24,45
Normalized Current ratio	100,00	11,28	25,84	0,00	26,44
Normalized Debt ratio	100,00	54,40	0,00	6,41	68,03
Normalized Asset Turnover	0,00	100,00	90,56	30,64	29,46
Normalized Revenue/Employee	80,14	54,60	0,00	100,00	93,47
Composite Scores	80,07	43,87	13,05	62,42	63,07

Entity E1 recorded a composite score of 80.07, ranking first among the five. It achieved maximum values for profitability (ROA, ROE), liquidity, and financial autonomy, indicating a stable and well-capitalized position. The only weak point is asset turnover, suggesting inefficient use of invested resources. Additionally, revenue per employee shows above-average labor efficiency. E1 appears to be a mature and financially balanced farm, but with room to improve operational efficiency.

Entity E2 obtained a composite score of 43.87, reflecting high activity but a lack of profitability. It stands out for excellent asset turnover (100) and a moderate level of debt (54.40). However, the complete absence of profitability (ROA and ROE = 0) is concerning, especially in the context of low liquidity (11.28). Revenue per employee (54.60) is moderate, indicating an acceptable productivity level. E2 seems to operate efficiently, but it struggles to

generate value, which may suggest an unsustainable cost structure or low selling prices.

Entity E3 scored 13.05, revealing a vulnerable financial profile. Profitability (ROA 2.55 and ROE 11.51) is extremely low, and both liquidity (25.84) and financial autonomy (debt ratio 0) suggest short-term financial imbalances. Despite a high asset turnover (90.56), the revenue per employee (0) points to severe weaknesses in economic sustainability. E3 appears to be a structurally challenged farm requiring urgent measures to improve efficiency and profitability.

Entity E4 has a final score of 62.42. Its main strengths include a high ROE (67.33) and maximum revenue per employee (100), reflecting strong productivity. In contrast, its liquidity is zero, which may indicate blocked funds in low-liquidity assets or poor cash flow management. Additionally, its asset turnover (30.64) and low debt ratio (6.41) suggest a cautious approach with room for growth. E4 is efficient in human resource use but requires financial consolidation to become more resilient.

Entity E5, with a score of 63.07, represents a generally balanced profile. It performs well in revenue per employee (93.47) and debt ratio (68.03), but shows weaknesses in asset turnover (29.46) and liquidity (26.44). Profitability is moderate (ROA 14.95 and ROE 24.45), indicating a functional farm without strong capacity to rapidly scale performance. E5 is a solid model with moderate potential for improvement through investments in efficiency and working capital.

The composite scoring model proposed in this study provides strong analytical value by transforming a set of fragmented financial indicators into a single, easily interpretable outcome. Through normalized aggregation of key metrics, the model enables a global performance assessment without losing sight of the individual dimensions—profitability, liquidity, financial risk, operational efficiency, and economic sustainability. This approach supports comparative analysis between entities, highlights structural imbalances, and provides a relevant overview for diagnosis and decision-making.

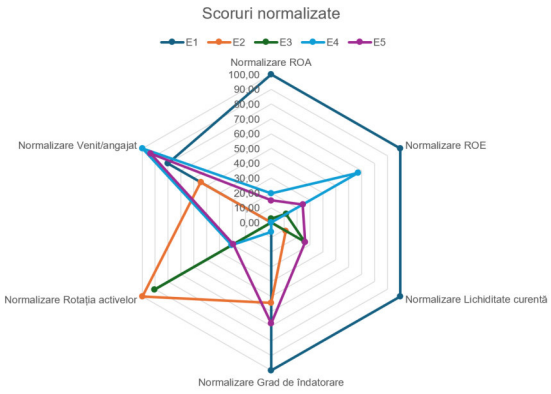

Figure 1 – **Normalized scores**

The individual scores for each indicator were illustrated using a radar chart, allowing an intuitive visualization of each entity's performance profile. The charts highlight significant internal imbalances (e.g., maximum scores in some indicators and minimum in others), emphasizing the usefulness of an integrated and synthetic approach in performance assessment.

The results demonstrate the added value of the proposed composite score as a synthetic tool for evaluating financial performance. In a sector marked by high variability and dependence on external factors, such as agriculture, the isolated evaluation of financial indicators provides a fragmented and often insufficient perspective for making strategic decisions. The composite scoring model enables the coherent integration of essential performance dimensions—profitability, liquidity, operational efficiency, financial leverage, and economic sustainability—into a single reference value.

This approach enhances comparability among entities with different financial profiles and facilitates the rapid identification of strengths and weaknesses. Moreover, the associated graphical representation (radar chart) amplifies the practical utility of the model, offering clear and intuitive visual support. Thus, the composite score not only simplifies the evaluation process but transforms it into a decision-making tool applicable in various contexts—from internal managerial analysis to external reporting, funding applications, or sectoral benchmarking.

Table 2

Composite Score and Regional Variations

Entity	Conty	Composite Score
E1	Iași	80,07
E2	Vaslui	43,87
E3	Neamț	13,05
E4	Botoșani	62,42
E5	Iași	63,07

Although the sample size is limited (5 entities), a positive correlation can be observed

between the composite score and counties with a more developed economic profile (e.g., Iași), while less developed counties (e.g., Vaslui, Neamț) are associated with lower scores.

This observation suggests that the financial performance of farms is not exclusively influenced by internal factors, but also by the economic and institutional characteristics of the region in which they operate. Infrastructure, access to advisory support, logistics connectivity, and the local educational environment can all influence the ability of agricultural entities to achieve sustainable performance.

To validate the consistency of the composite score, pearson correlation coefficients were calculated between the final score and two key financial indicators: net profit and turnover. The results indicate a strong correlation between the composite score and net profit ($r = 0.74$), confirming that the proposed score is a relevant reflection of the financial performance of the entities. The correlation with turnover was weaker ($r = 0.3$), suggesting that the volume of sales alone is not sufficient to characterize overall performance without considering resource efficiency and financial structure.

CONCLUSIONS

This study proposed an integrated approach to evaluating the financial performance of agricultural entities, by constructing a composite score that combines key indicators of profitability, liquidity, operational efficiency, debt, and economic sustainability. The model was applied to a sample of five crop-based entities from the North-East Region of Romania, using financial data reported for the year 2024.

The results revealed significant differences between entities in terms of their financial performance structure. Entity E1 stood out with a strong and balanced financial profile, achieving high or maximum scores across most indicators. In contrast, entities such as E3 recorded low scores, reflecting structural problems in resource management and operational efficiency.

The practical relevance of the model lies in its ability to synthesize performance in a comparable way, offering a useful diagnostic tool for managers, investors, and financing institutions. Moreover, the analysis suggested a potential correlation between the level of financial performance and geographical location, with more economically developed counties hosting entities with higher scores.

Although the proposed model has some limitations—such as the small sample size and equal weighting of indicators - it provides a valuable synthetic evaluation tool. The composite score is easy to calculate, interpretable, and replicable, making it suitable for both academic research and practical application in the agricultural sector. From this perspective, it can be considered a robust scoring model, with the potential to be improved and expanded in future studies.

Farmers, financial consultants, and agricultural managers can use this model as a quick self-assessment tool, for year-over-year comparisons or in the process of accessing funding. The overall score and visual analysis can support the identification of critical points and inform investment or financial optimization decisions.

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