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METHODOLOGICAL APPROACH TO ASSESSING THE LEVEL OF CORPORATE SOCIAL RESPONSIBILITY OF AN AGRICULTURAL ENTERPRISE

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МЕТОДИЧНИЙ ПІДХІД ДО ОЦІНЮВАННЯ РІВНЯ КОРПОРАТИВНОЇ СОЦІАЛЬНОЇ ВІДПОВІДАЛЬНОСТІ СІЛЬСЬКОГОСПОДАРСЬКОГО ПІДПРИЄМСТВА

The article considers corporate social responsibility (CSR) as a set of voluntary actions a company takes to consider the interests of society, employees, consumers, local communities, and the environment. The study focuses on identifying the main areas of CSR for agricultural enterprises, in particular, environmental responsibility, responsibility to employees, the local community, ethical animal husbandry, transparent production, and partnership. For each of these areas, a corresponding set of quantitative and qualitative indicators has been developed, including: expenditure on biogas complexes, the share of environmentally certified plant protection products, injury rates, social package costs, the share of employees covered by training and bonuses, the amount of financial support for local infrastructure, the number of social initiatives, veterinary service costs, the level of ethical auditing of partners, contract transparency, the level of participation in sustainable development programs, etc. 23 indicators were identified and grouped into six areas, making it possible to construct an integral indicator based on Harrington's desirability function.

This approach provides a comprehensive assessment of corporate social responsibility, considering industry specifics and the possibility of practical application of the results for forming a sustainable development strategy. The feasibility of using an integral indicator as a universal tool that combines quantitative and qualitative characteristics within a single scale is justified. The paper focuses on developing a methodological approach to assessing an enterprise's corporate social responsibility level based on an integral indicator using Harrington's desirability function. The proposed methodological approach to assessment is adapted to the specifics of agricultural enterprises and is based on expert assessments, statistical methods, and functional analysis. The practical application of the methodological approach involves testing it on a real agricultural enterprise, which makes it possible to verify its effectiveness and formulate sound management recommendations in sustainable development.

У статті корпоративна соціальна відповідальність (КСВ) розглядається як комплекс добровільних дій підприємства, спрямованих на врахування інтересів суспільства, працівників, споживачів, місцевих громад і довкілля. У межах дослідження увагу зосереджено на виявленні основних напрямів КСВ сільськогосподарських підприємств, зокрема екологічної відповідальності, відповідальності перед працівниками, місцевою громадою, етичного тваринництва, прозорого виробництва та партнерства. Для кожного з цих напрямів сформовано відповідну групу кількісних і якісних показників, що включають: витрати на біогазовий комплекс, частку екологічно сертифікованих засобів захисту рослин, рівень травматизму, витрати на соціальні пакети, частку працівників, охоплених навчанням і преміюванням, обсяг фінансової підтримки місцевої інфраструктури, кількість соціальних ініціатив, витрати на ветеринарне обслуговування, рівень етичного аудиту партнерів, відкритість контрактів, рівень участі у програмах сталого розвитку тощо. Усього ідентифіковано 23 показники, згруповані за 6 напрямками, що дозволило побудувати інтеграль-

ний показник на основі функції бажаності Харрінгтона. Такий підхід забезпечує комплексну оцінку корпоративної соціальної відповідальності підприємства, враховуючи галузеву специфіку та можливість практичного застосування результатів для формування стратегії сталого розвитку. Обґрунтовується доцільність використання інтегрального показника як універсального інструменту, що дозволяє об'єднати кількісні й якісні характеристики у межах єдиної шкали. У роботі особливу увагу приділено розробці методичного підходу до оцінювання рівня корпоративної соціальної відповідальності підприємства на основі інтегрального показника з використанням функції бажаності Харрінгтона. Запропонований методичний підхід до оцінювання адаптовано до специфіки сільськогосподарських підприємств і базується на поєднанні експертних оцінок, статистичних методів та функціонального аналізу. Практичне застосування методичного підходу передбачає апробацію на прикладі реального сільськогосподарського підприємства, що дає змогу перевірити її ефективність і сформулювати обґрунтовані управлінські рекомендації в контексті сталого розвитку.

Key words: corporate social responsibility, management, integral indicator of corporate social responsibility, Harrington's desirability function, agricultural enterprise, methodological approach, sustainable development, non-financial reporting.

Ключові слова: корпоративна соціальна відповідальність, управління, інтегральний показник рівня корпоративної соціальної відповідальності, функція бажаності Харрінгтона, сільськогосподарське підприємство, методичний підхід, сталий розвиток, нефінансова звітність.

PROBLEM STATEMENT

In the current conditions of social, economic, and environmental instability, the issue of implementing corporate social responsibility is becoming particularly relevant, especially for agricultural enterprises, which not only influence the economic development of regions but also shape the social well-being of local communities. The agricultural sector plays a strategically important role in ensuring food security, preserving natural resources, and supporting rural areas, which requires enterprises to take a responsible approach to their activities' environmental, social, and ethical aspects.

However, in practice, most agricultural enterprises lack unified tools adapted to the specifics of the industry that would allow them to objectively assess the level of CSR and transform it into practical management decisions. This significantly complicates forming a long-term development strategy focused on sustainable development and improving reputational capital. Thus, an urgent scientific and practical task is to develop an effective methodological approach to assessing the level of CSR that would take into account the peculiarities of the functioning of agricultural enterprises, ensure the objectivity, comparability, and clarity of results, and serve as a basis for making informed management decisions.

ANALYSIS OF RESEARCH AND PUBLICATIONS

The issue of corporate social responsibility in agricultural business and its role in sustainable development is actively discussed in contemporary economic literature. Research shows that CSR is

not only an element of image policy, but also a factor in the long-term competitiveness of an enterprise, especially in the agricultural sector.

A significant contribution to developing the theoretical and methodological foundations of social responsibility of agricultural businesses has been made in the work of Drabchuk T.I. and Koval O.Yu. [1], which emphasizes its role in ensuring the sustainable development of rural areas. The authors emphasize that agricultural business has both an economic and a social function, and implementing CSR principles contributes to developing local infrastructure, improving the population's quality of life, and strengthening the region's social capital.

The further development of the CSR concept in the context of international transformations in the agricultural business is reflected in the publication by Kopishynska K.O. and Hrabina A.Yu. [2], which substantiates the need to adapt the social policy of enterprises to global challenges, in particular, digitalization, greening, and growing consumer expectations. The authors point to the importance of strategic CSR management for increasing the international attractiveness of Ukrainian agricultural enterprises. Valuable analytical positions are also presented in the study by Polenkova M. V. [3], which examines the mechanisms of forming social responsibility of agricultural enterprises in the context of sustainable development. It has been proven that the effectiveness of social initiatives depends on the coordination between the agricultural business's environmental, economic, and social components, as well as on the ability of the enterprise to adapt its management practices to changes in the external environment.

Considerable attention is paid to the implementation of CSR in the agricultural business of Ukraine in the publication by Grebennikova A. A. [4], which reviews the problems of introducing social responsibility into the practice of Ukrainian agricultural enterprises and proposes directions for its improvement. Particular emphasis is placed on the insufficient level of transparency of non-financial reporting and the need to develop industry standards.

Separately, it is worth mentioning the works that formed the basis for the methodological apparatus of this study, in particular the works of Stanasyuk N.S., Pasinovich I.I., and Tomashevskaya A.R. [5], which substantiate modern approaches to CSR assessment, and Akhnovskaya I.O. and Lepikhova O.Yu. [6], who analyzed the mechanisms for implementing CSR in Ukrainian enterprises.

In choosing assessment tools, the studies by T.B. Khlevytska, S.V. Filippova, and M.I. Sukhoteryna [7] are also critical, as they examine the comparative characteristics of CSR effectiveness assessment methods.

Foreign studies [8–10] also consider approaches to measuring CSR at the corporate governance level.

Thus, reviewing scientific works indicates a high scientific interest in CSR issues. Still, there is a need to develop a methodological approach to assessing an agricultural enterprise's CSR level using the Harrington desirability function.

FORMULATION OF THE ARTICLE'S OBJECTIVES

The article's primary purpose is to develop a methodological approach to assessing an agricultural enterprise's CSR level.

THE PAPER MAIN BODY

Assessing a company's CSR involves examining the range of its social practices and how it responds to critical social demands from both internal and external audiences. To choose the right CSR assessment tools, the following aspects must be considered:

- assessment objectives (for decision-making within the enterprise, for external stakeholders, etc.);
- method of obtaining source information for analysis;
- size of the enterprise and type of its economic activity;
- regulatory requirements and applicable standards;
- the reliability and completeness of the CSR information obtained about the company being studied;

- the professional level of the specialists who manage the company's social initiatives;
- the comprehensiveness and flexibility of the tools selected.

When selecting CSR assessment tools, it's essential to consider their purpose — whether for auditing, stakeholder communication, strategy development, or certification. For audits, tools must ensure objectivity, standardization, and regulatory compliance, often using methods like ISO 26000, GRI, SASB, or internal checklists. Tools must align with the standards the relevant certification body sets for certification.

Suppose CSR assessment is necessary for management purposes, such as developing a CSR strategy or improving stakeholder communication. In that case, the tools should identify weaknesses and focus on key opportunities. The methodological tools should be clear and intuitive, with visualizations to engage and inform the audience.

The source of data affects the choice of the CSR assessment method. Questionnaires or interviews are suitable if information is gathered through employee or stakeholder involvement. When data comes from existing databases, more technical methods apply. Information is often taken from company websites and non-financial reports, public tools for communicating corporate goals in economic, social, and environmental areas [5–7; 11].

In addition, even though the integral indicator itself is aggregated, it can be broken down into components for more detailed analysis, and new elements can be added as they emerge. This also creates additional opportunities for a more in-depth study of CSR in the enterprise and for identifying its problem areas. Thus, the CSR composite indicator is an effective, universal tool that allows for a comprehensive, objective, and easily comparable assessment of an enterprise's CSR.

The basic principles for calculating the composite indicator of the CSR level of an agricultural enterprise are presented in Fig. 1.

To ensure the reliability of the assessment, the calculation of the integral indicator must be carried out in a specific logical and temporal sequence. This systematic approach allows companies to identify opportunities for improvement and demonstrate their commitment to the principles of sustainable development.

The assessment of corporate social responsibility involves a series of sequential steps based on the principles of the PDCA cycle (Fig. 2).

Adherence to this step-by-step CSR assessment management process ensures effective CSR assessment and identifies opportunities for improving sustainable development and social responsibility.

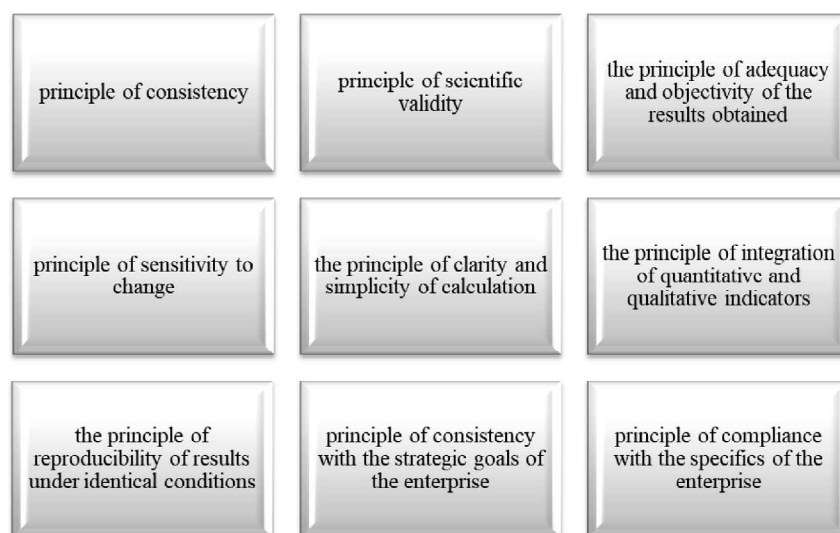


Fig. 1. Principles for calculating the integral indicator of the level of social and economic development of an agricultural enterprise

Source: compiled by the author based on [8—10].

This structured approach ensures that CSR initiatives are aligned with the organization's overall strategy and contribute to long-term success.

Managers must combine diverse quantitative and qualitative data with different scales and units when calculating the integral CSR indicator. The

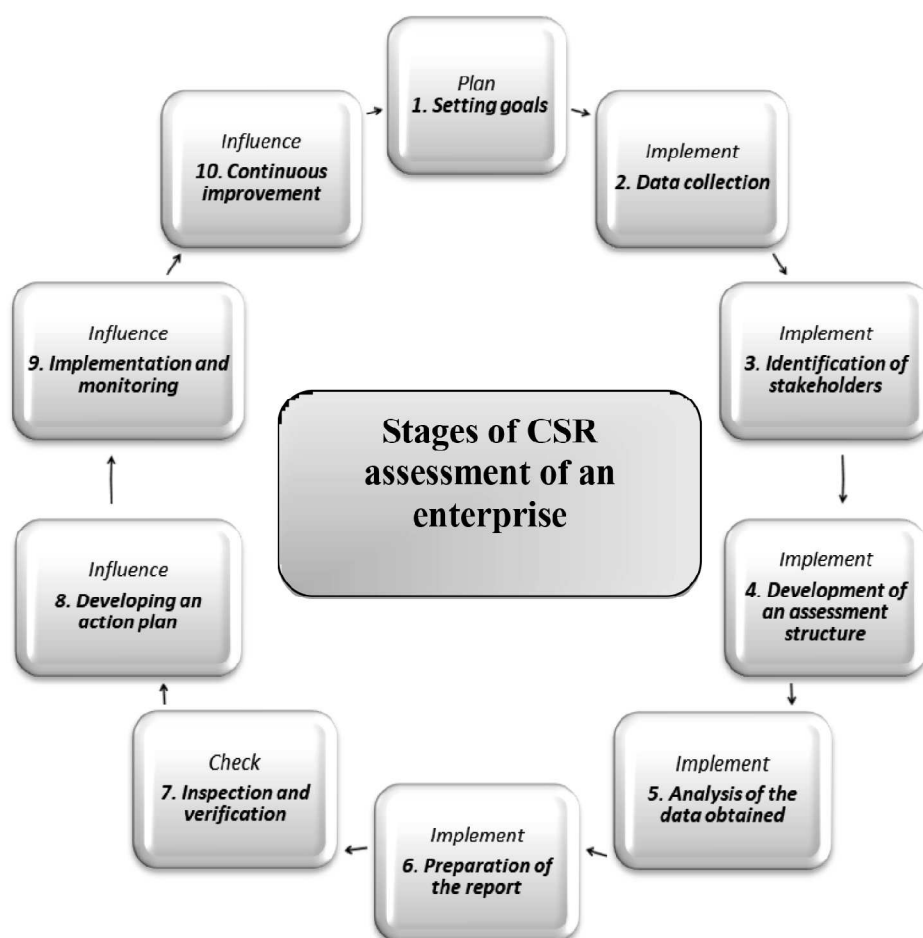


Fig. 2. Management stages of CSR assessment (based on the PDCA cycle)

Source: developed by the author.

results need to be presented on a unified scale for effective use in decision-making.

Given the above limitations, one of the relevant ways to construct a generalized indicator of corporate social responsibility is the Harrington desirability function. The general Harrington function is based on converting the actual values of individual indicators into a single desirability scale. The generalized desirability function is defined as the geometric mean of individual optimization functions:

$$D_{integr} = (\prod_{i=1}^n d_i)^{1/n} \quad (1),$$

where d_i — the partial desirability value for the indicators under study;

n — the number of corporate social responsibility indicators under study.

If, during the calculation, it is assumed that the components of corporate responsibility have different weights and it is necessary to take this into account, the following formula is used for analytical calculation:

$$D_{integr} = \prod_{i=1}^n d_i^{w_i}, \sum_{i=1}^n w_i = 1 \quad (2).$$

Empirical studies have shown that companies use many indicators to analyze corporate social responsibility.

The integral CSR indicator was calculated using data from a real Ukrainian agricultural enterprise (name undisclosed). Twenty-three indicators, $X_1, X_2, \dots, X_{23}$, were identified, allowing for a broad assessment of social initiatives. However, this complexity made the evaluation cumbersome. To address this, a sequential comparison mechanism was proposed, grouping all data into six key areas:

1. Environmental responsibility;
2. Responsibility to employees;
3. Responsibility to the local community;
4. Ethical animal husbandry;
5. Transparent production and quality;
6. Partnership and trust. (Fig. 3)

Then, summary indicators were calculated for each group, based on which the integral indicator of the enterprise's CSR was calculated.

It should be noted that quite different indicators can measure the areas of CSR of an agricultural enterprise.

The calculation of partial desirability indicators (d_i) for the selected indicators (Fig. 3) of the CSR level of an agricultural enterprise was based on the Harrington exponential function:

$$d_i(Y) = \exp(-\exp(-a(Y-b))) \quad (3),$$

where $d \in (0;1)$ — the desirability function value (the closer to 1, the better);

Y — the normalized or standardized value of the indicator (for example, through Z-score);

a, b — the function's parameters (they determine the steepness and shift of the graph).

Since the Harrington function works best with normalized variables, each indicator was first converted to a standardized Z-score:

$$Z_i = \frac{X_i - \bar{X}_i}{\sigma_i} \quad (4),$$

where X_i — the actual value of the i -th indicator;

$\bar{X}_i$ — the sample mean;

σ_i — the sample standard deviation.

To find the parameters a and b for the Harrington function, both parts of the function were double logarithmized:

$$\ln(-\ln(d)) = -a(Z - b) \quad (5).$$

For convenience, the inverse form was used to calculate parameters a and b :

$$\ln(-\ln(d)) = \frac{b-Z}{a} \quad (6).$$

The function parameters were calculated for the interval based on the availability of two points (the minimum and optimal values of the corresponding indicators, which experts established):

$$\begin{cases} \ln(-\ln(d_1)) = \frac{b-Z_1}{a} \\ \ln(-\ln(d_2)) = \frac{b-Z_2}{a} \end{cases} \quad (7).$$

For further calculations, the second equation was subtracted from the first:

$$\ln(-\ln(d_1)) - \ln(-\ln(d_2)) = \frac{Z_2 - Z_1}{a} \quad (8),$$

from here

$$a = \frac{Z_2 - Z_1}{\ln(-\ln(d_1)) - \ln(-\ln(d_2))} \quad (9).$$

Next, b was found:

$$b = Z_1 + a \times \ln(-\ln(d_1)) \quad (10).$$

The developed algorithm for calculating the integral indicator of the enterprise's CSR level based on the application of the Harrington function is presented in Fig. 4.

It should be noted that the calculation used target minimum and maximum indicators of corporate social responsibility for agricultural enterprises, which were established based on industry standards, regulatory requirements, and the enterprise's strategic goals. In general, expert assessments and statistical calculations based on a sample of the enterprise or its competitors may also be used to determine these indicators, provided that relevant quantitative information for a specific period is available.

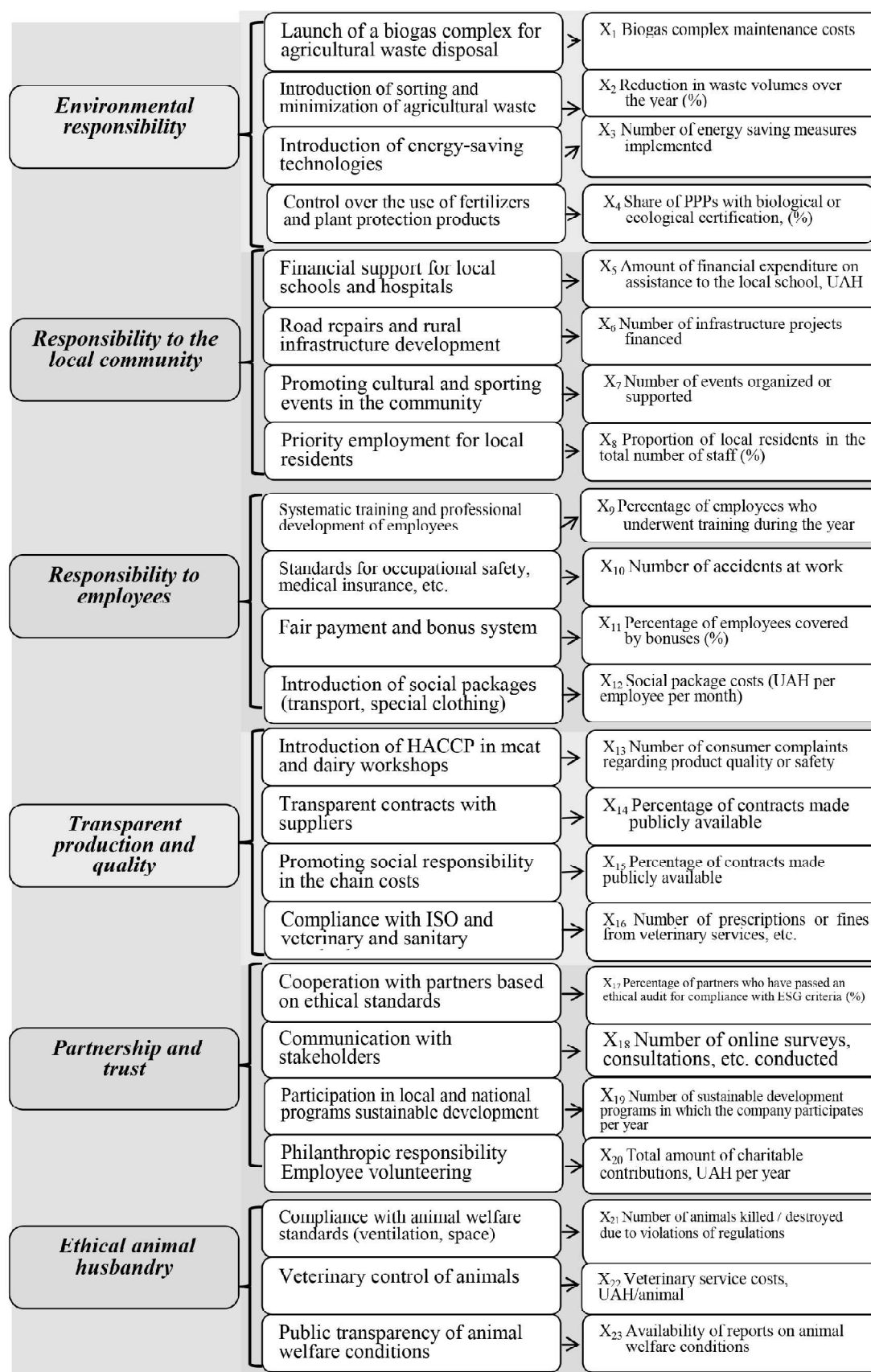


Fig. 3. System of recommended indicators for calculating the integral indicator of the level of CSR of an agricultural enterprise in key areas

Source: developed by the author.

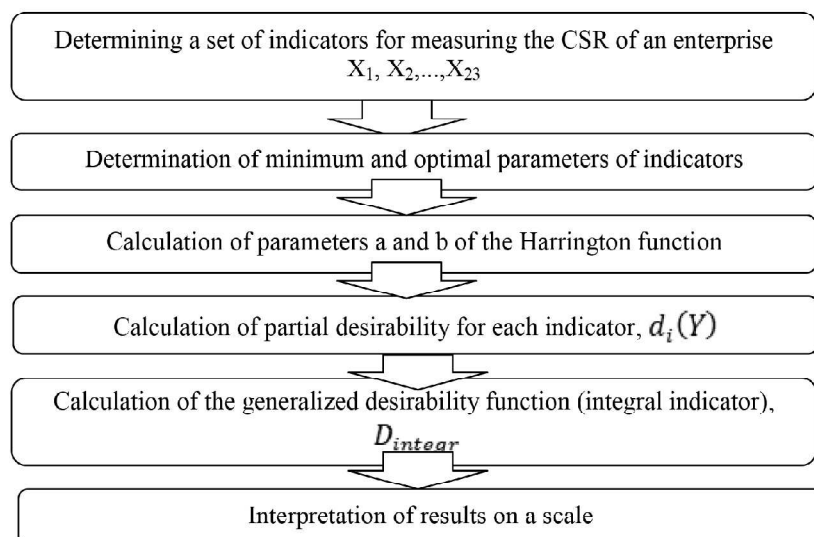


Fig. 4. Algorithm for calculating the integral indicator of the enterprise's CSR level based on the Harrington function

Source: developed by the author.

The integral level was assessed using the traditional scale used for the Harrington desirability function (Table 1).

The developed methodological approach to assessing an agricultural enterprise's CSR level meets several requirements, making it possible to use it to analyze various enterprises, regardless of their size and industry affiliation. Among these requirements, the main ones are [14]:

- the ability to reflect the standard features of corporate social responsibility analysis of different enterprises;
- the ability to be adequate and provide results that are close to reality;

Table 1. Typical rating scale according to the Harrington function

Meaning d	Interpretation of the CSR level
0,81 – 1,00	Very good (excellent)
0,63 – 0,80	Good
0,37 – 0,62	Satisfactory
0,20 – 0,37	Unsatisfactory
0,00 – 0,19	Unacceptable (very poor)

Source: compiled by the author based on [12, 13].

Table 2. Calculation of the integral indicator of the CRS level of agricultural enterprise for 2023–2024.

Key areas of CSR for the company under review	d_{2023}	d_{2024}
Environmental responsibility	0,18612	0,49248
Social responsibility to the community	0,25298	0,32734
Responsibility to employees	0,42831	0,47909
Ethical animal husbandry	0,22056	0,50114
Transparent production and quality	0,11465	0,34385
Partnership and trust	0,42092	0,60942
Integral indicator of the enterprise's CSR level D_{integr}	0,24333	0,44767

Source: calculated by the author.

— the ability to use the approach for management decision-making;

— ensuring the comparison of several enterprises;

— the ability to identify the most responsible objects.

The results of the calculation show that despite specific positive dynamics in 2023–2024, the company we studied had significant problems in implementing corporate social responsibility, since in several areas, in particular, "social responsibility to the community," "ethical animal husbandry," "transparent production and quality," the partial CSR level indicator in 2024 was unsatisfactory. Only in the areas of "environmental responsibility," "partnership and trust,"

and "responsibility to employees" did the company achieve satisfactory results in 2024. The overall CSR level of the company in 2024 increased by 0.2 points compared to the previous year, which made it possible to change the rating from unsatisfactory to satisfactory (Table 2).

The most significant contribution to the growth of the integral indicator in 2024 came from "Environmental Responsibility" and "Ethical Animal Husbandry", mainly due to the launch of a €3.2 million biogas complex. Using agricultural waste, this facility reduced emissions, improved environmental conditions, created jobs, and enhanced the company's image as socially responsible, improving the quality of life for the local population.

In 2024, agricultural enterprise management increasingly focused on "ethical animal husbandry," responding to growing consumer interest in animal welfare and production methods [15]. This shift is driven by evolving social values, greater awareness, and the rise of responsible consumption. Consumers now link animal living conditions to product quality and seek to avoid supporting cruelty, even indirectly. Moreover, industrial livestock farming contributes to greenhouse gas emissions, soil degradation, and water pollution, while ethical practices align with more sustainable, eco-friendly production [16–17]. These trends influence expectations across all business sizes, prompting enterprises to expand social initiatives supporting ethical animal husbandry.

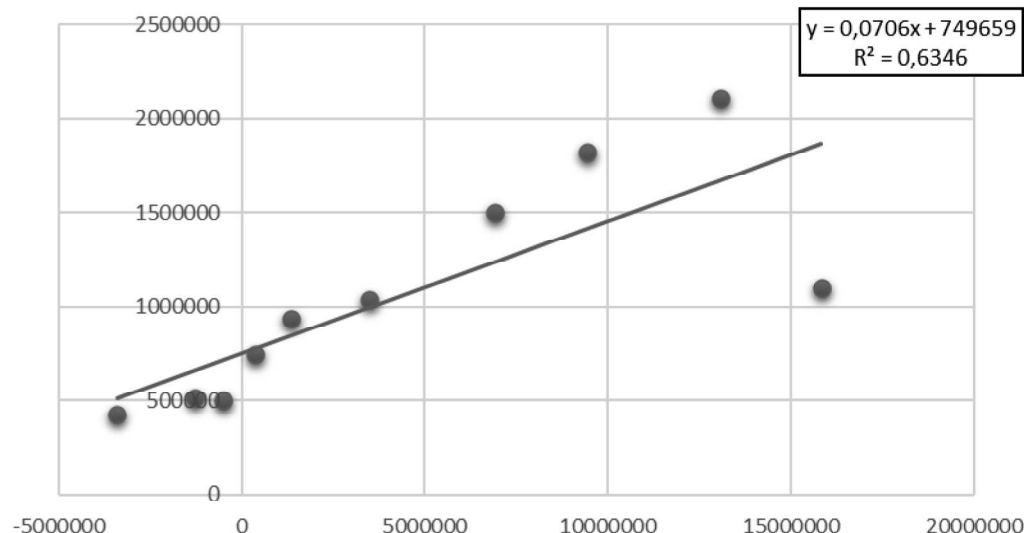


Fig. 5. Scatter plot of a linear single-factor model with a trend equation

Source: constructed by the author.

In general, the results obtained for the integral CSR indicator at the enterprise confirm the need to change approaches to the implementation of social policy and to develop a strategic action plan to activate relevant initiatives at the enterprise.

The next step in our research was to calculate the forecast values of income growth due to an annual increase in total corporate social responsibility expenditures by 0.5%, followed by constructing a forecast for 2025—2027. For this purpose, we used Excel statistical tools for financial indicators, namely, creating a scatter plot of a linear single-factor model and applying the trend function and equation calculation, based on which the forecast was constructed (Fig. 5).

It should be noted that the correlation between social costs and income growth is relatively high: 0.7965, which indicates a significant relationship between these indicators. The linear regression model explains 63.46% of the variation in income ($R^2 = 0.6346$). It should be noted that income growth has historically fluctuated from significant positive to negative values (for example, in 2020—2023, there were negative values), but in 2024 it rose sharply to UAH 15,837,500. The forecast for 2025—2027 is conservative: only a slight increase in income growth (less than 1% per year) is expected, despite the sharp jump in 2024. This may indicate that the model does not consider possible structural changes or external shocks, but focuses on the medium-term trend of smoothed growth (Table 3).

Thus, the projected income growth indicators, assuming a stable annual increase in social spending of 0.5%, will amount to:

$$Y_{2025} = 831\,202 \text{ UAH};$$

$$Y_{2026} = 835\,279,15 \text{ UAH};$$

$$Y_{2027} = 839\,560,16 \text{ UAH}.$$

The forecasting model is based on linear regression between social costs and income growth. The relationship between these variables is quite strong, but not absolute ($R^2 = 0.6346$), meaning that there may be other factors that significantly affect income growth. Thus, the most significant positive impact on income growth is exerted by expenditures on social infrastructure support and employee bonuses, while spending on fertilizer use control, on the contrary, reduces income growth. All these relationships are confirmed by the corresponding regression and correlation coefficients, which allow us to assess their impact in the model quantitatively. Having constructed a single-factor linear regression with total CSR expenditures and forecast values, we

Table 3. Initial data for calculating the projected values of income growth from total CSR expenditures, UAH

Year	Income growth	Total CSR expenditure	Forecasted income growth values
	Y	X	Y
2015	1350000	935000	815670
2016	3476000	1036500	822835,9
2017	9450000	1824000	878433,4
2018	13081600	2108000	898483,8
2019	6913603	1500000	855559
2020	-525396	500000	784959
2021	379901	745000	802256
2022	-3402500	430000	780017
2023	-1288900	515000	786018
2024	15837500	1100000	827319
2025		1155000	831202
2026		1212750	835279,15
2027		1273387,5	839560,16

Source: calculated by the author.

note that the forecast is cautious and does not predict significant income growth in the coming years, even under rising social spending.

CSR's impact on revenue is hard to quantify due to its indirect, long-term nature. Activities like waste management, community involvement, or ethical practices improve reputation and loyalty over time but don't immediately translate into profit. Moreover, isolating CSR's effect from other income factors like market trends or advertising is challenging. CSR outcomes also rely on public perception, which is difficult to measure or express in financial terms.

CONCLUSIONS

The study confirmed the relevance and practical significance of developing a methodological approach to assessing the level of CSR of agricultural enterprises. The proposed approach, based on an integral indicator using the Harrington desirability function, allows for a comprehensive, objective, and adaptive assessment of the CSR of economic entities in the agricultural sector. The results of testing the model on a real agricultural enterprise demonstrated its practical effectiveness, particularly in identifying strengths and weaknesses in implementing social initiatives and forming sound management decisions.

In the context of the growing role of the agricultural sector in achieving sustainable development goals, promising areas for further research include improving tools for in-depth CSR assessment, taking into account industry specifics, developing digital platforms for automated monitoring of social indicators, as well as studying the impact of CSR levels on the investment attractiveness and competitiveness of agricultural enterprises. Particular attention should be paid to researching regional and cultural factors that determine the specifics of CSR perception and implementation in agricultural production.

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