

# Calculating the indicator of sustainable development with integrated information flows of managerial accounting in commercial organizations

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## Առևտրային կազմակերպություններում կառավարչական հաշվառման ինտեգրված տեղեկատվական հոսքերով կայուն զարգացման ցուցանիշի հաշվարկման մոտեցում Հակոբյան Արփինե Ս.

*Կառավարչական հաշվառման և աուդիտի ամբիոնի դասախոս,  
Հայաստանի պետական տնտեսագիտական համալսարան (Երևան, ՀՀ)*

**Ամփոփագիր.** Կայունությանն առնչվող ֆինանսական հաշվետվությունների միջազգային ստանդարտների հրապարակումը, և մասնավորապես 2024թ.-ի հունվարի մեկից ուժի մեջ մտած IFRS-S1, IFRS-S2 ստանդարտները ֆինանսական տեղեկատվության կառավարման նոր պահանջներ են առաջադրում, խնդիր դնելով ESG նպատակադրումներով սահմանել, գնահատել և մշտադիտարկել գործունեության ռիսկերն ու հնարավորությունները հաշվի առնող առանցքային ցուցանիշներ, ինչին գործնականում հասնելու համար հաշվետվողականության և չափելիության նոր մոտեցումներ են անհրաժեշտ:

Մասնագիտական գրականության ուսումնասիրության և փորձագիտական մեթոդի կիրառմամբ ներկայացվել է ինտեգրված տեղեկատվական հոսքերով առևտրային կազմակերպությունների կայուն զարգացման գնահատման մոտեցում կիրառելով բնապահպանական, սոցիալական և գործընկերային արդյունքներով ինտեգրային ցուցանիշ: Այն ընդհանրացնում է ինչպես ֆինանսական, այնպես էլ ոչ ֆինանսական բնույթի, չափման տարբեր միավորներով տեղեկատվություն: Առաջարկվող մոտեցումը հնարավորություն է ստեղծում իրականացնելու ESG կատարողականի մշտադիտարկում և դրա հիմքով արդյունավետ որոշումներ կայացնել:

**Հանգուցաբառեր և բառակապակցություններ`** IFRS-S1, IFRS-S2, կայուն զարգացում, գործունեության առանցքային ցուցանիշներ, փորձագիտական մեթոդ, ընդհանրական գնահատում, կառավարչական որոշումներ

## Подход к расчету показателя устойчивого развития с интегрированием информационных потоков управленческого учета в коммерческих организациях

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**Аннотация.** Публикация международных стандартов финансовой отчетности, связанных с устойчивым развитием, и в частности стандартов IFRS-S1, IFRS-S2, вступивших в силу с 1 января 2024 года, предъявляет новые требования к управлению финансовой информацией. Становится необходимым определять, оценивать и контролировать ключевые показатели, которые учитывают риски и возможности деятельности с целями ESG, что требует новых подходов к подотчетности и измеримости, которые должны быть достигнуты на практике.

На основе изучения профессиональной литературы и экспертного метода был представлен интегральный индекс с экологическими, социальными и партнерскими результатами с использованием подхода к оценке устойчивого развития коммерческих организаций с интегрированными информационными потоками.

Предложенный подход обобщает как финансовую, так и нефинансовую информацию с использованием различных единиц измерения, позволяя отслеживать показатели ESG и принимать на ее основе эффективные решения.

**Ключевые слова и словосочетания:** распределение косвенных затрат, группировка затрат, метод учета затрат по видам деятельности, совершенствование учета затрат, финансовая информация

## Introduction

Developments in the field of accounting in recent years, in particular the publication of international standards of financial reporting related to sustainability [9, 10] impose certain requirements for the formation of financial information in commercial organizations highlighting the problems of setting goals and integrated assessment in the social, environmental and governance directions of business. These developments influence the development of methodology approaches [1; 12] for calculating the generalized indicator of sustainable development with financial and non-financial information in accordance with the provisions of the ESG concept in commercial organizations.

A number of authors [2; 3; 4; 5; 6; 7; 8; 11] have addressed the issue of generalized assessment of sustainable development. In the context of the latest developments, the relevance of developing approaches that record the social, environmental and managerial results of activity in the ESG context

and provide uniform measurability at the level of the entire organization is increasing.

The purpose of the article is to present an approach to evaluating sustainable development by combining key performance indicators that reveal opportunities and risks in commercial organizations in accordance with the international standards of financial statements related to sustainability.

## Analysis

The approach to creating a management accounting system based on ESG principles combines the emerging information into one general indicator. Both financial and non-financial information with different metrics are generalized, giving a general assessment of the organization's sustainable development. The approach makes possible to draw operational conclusions and monitor the level of sustainable development of a commercial organization. The construction of the formula of the generalized indicator includes a number of stages.

**Table 1.** *The sequence of steps for calculating the generalized indicator of sustainable development*

1st step	The key performance indicators(KPIs) are selected.
2nd step	The selected indicators are grouped into "Financial", "Customers", "Cost and Internal processes", "Growth and Expansion", "Environmental" groups.
3rd step	The target values of the KPIs are defined.
4th step	The calculation of actual values is carried out.
5th step	The impact (positive or negative) on the general indicator is assessed .
6th step	Values are normalized, due to which indicators with different measurement units receive [0,1] values.
7th step	The weight of each indicator included in each of the Structural indicators is determined.
8th step	Structural indicators of sustainable development are calculated.
9th step	Structural indicators are combined into a generalized indicator of sustainable development.

*Source:* Prepared by the author.

Taking into account the information flows formed in the organization, it is necessary to select the indicators characterizing the defined main, target strategic goals, which will differ from organization to organization, depending on many factors.

For the calculation of the generalized indicator, it is necessary to select only those KPIs that at the moment correspond to the strategic goals of the organization, which makes it possible to:

1. reduce the number of calculated indicators,
2. take into account the organization's goals, features and capabilities,
3. identify the factors preventing the achievement of the main strategic goal.

After grouping the KPIs, the target values of each of them are defined, which will become the

basis of comparison for the calculation of the general indicator.

Then the actual values of the indicators are calculated. Since the system, as we have already mentioned, can include indicators with different metrics, there is a difficulty in uniting the KPIs with different metrics into one indicator. In this context Min-Max normalization formulas were used:

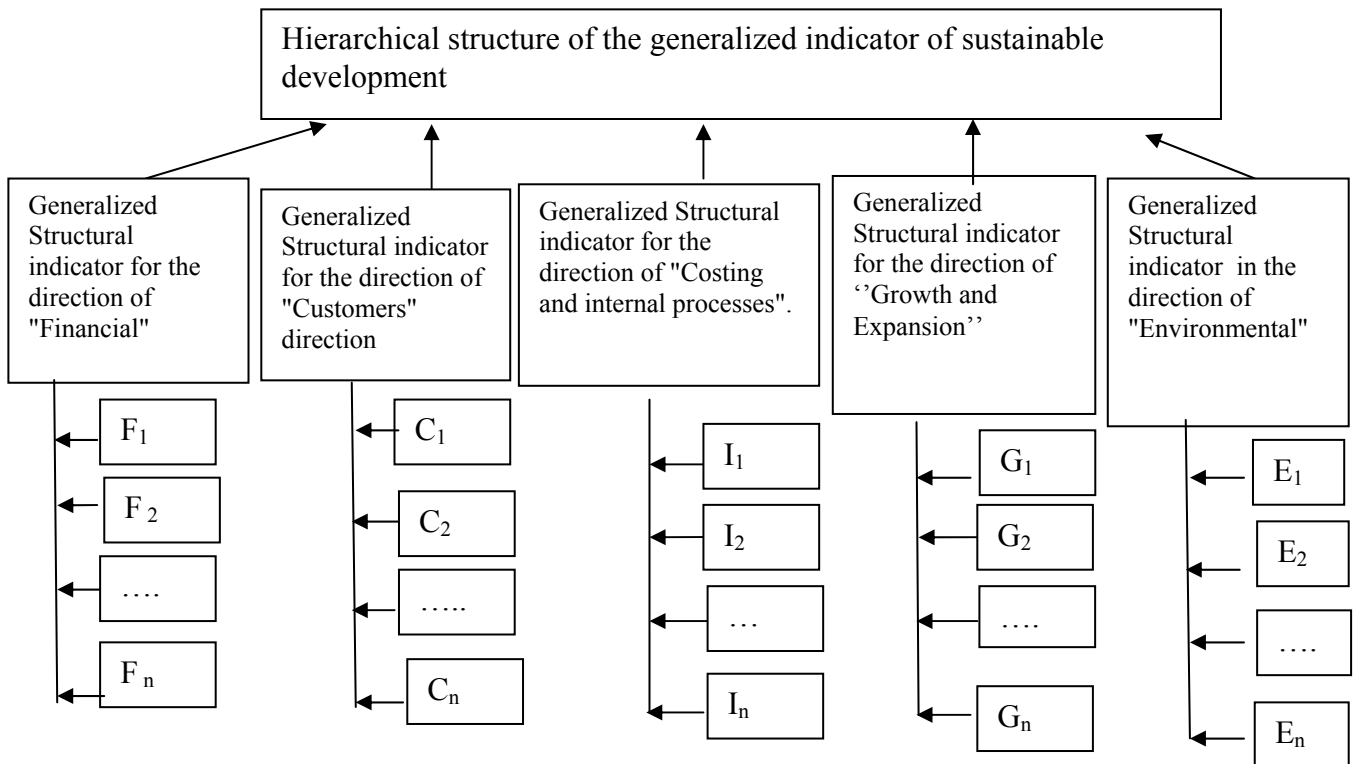
$$\frac{\text{Value}-\text{min}}{\text{max}-\text{min}} \quad (1)$$

(for indicators characterizing growth positively)

$$\frac{\text{Max-value}}{\text{max}-\text{min}} \quad (2)$$

(for indicators characterizing growth negatively).

Due to the normalization, the KPIs get values from 0 to 1, which makes it possible to get structural indicators in that range.



**Figure 1:** Hierarchical structure of sustainable development assessment indicators with management accounting information flows  
 Source: Prepared by the author.

Another problem of calculating integral indicators is the determination of the weights of the component elements. In the considered sources of literature, the expert method is often used, through surveys of the top financial management of organizations. In determining the weights of the indicators included in each structural indicator, expert or formal methods are used, but taking into account the high degree of subjectivity of the results obtained using this approach, we set equal weights for all the indicators included in the groups. After the calculation of the structural indicators, the calculation of the generalized indicator is performed. In the studied literature, the authors mainly use geometric mean and additive formulas for the generalized indicator formula. We used the additive approach with the following formula:

$$Y_{SD} = \sum_{i=1}^n \alpha_{SDi} \times Y_i \quad (3)$$

Where:  $Y_{SD}$  - is the generalized indicator of sustainable development of the organization with the information flows formed in the managerial accounting system,

$\alpha_{SDi}$  - is the weight of each structural indicator included in the generalized indicator,

$Y_i$  ( $i=1,5$ ) - the structural indicators of "Financial", "Customers", "Cost and Internal processes", "Growth and Expansion", "Environmental" directions,  $Y_F$ ,  $Y_C$ ,  $Y_I$ ,  $Y_G$ ,  $Y_E$ , respectively, which are calculated as follows:

$$Y_1 = Y_F = \sum_{i=1}^n \alpha_{Fi} \times F_i \quad (4)$$

$$Y_2 = Y_C = \sum_{i=1}^n \alpha_{Ci} \times C_i \quad (5)$$

$$Y_3 = Y_I = \sum_{i=1}^n \alpha_{Ii} \times I_i \quad (6)$$

$$Y_4 = Y_G = \sum_{i=1}^n \alpha_{Gi} \times G_i \quad (7)$$

$$Y_5 = Y_E = \sum_{i=1}^n \alpha_{Ei} \times E_i \quad (8)$$

Where:  $F_i$ ,  $C_i$ ,  $I_i$ ,  $G_i$ ,  $E_i$  - respectively: "Finances", "Customers", "cost and internal processes", "Growth and development", "Environmental" are the normalized values of the  $i$ -th KPI (key performance indicator) included in the structural indicators,  $\alpha_{Fi}$ ,  $\alpha_{Ci}$ ,  $\alpha_{Ii}$ ,  $\alpha_{Gi}$ ,  $\alpha_{Ei}$ , the weight of the  $i$ -th KPI in the structural indicator is a  $\alpha_{Fi} = 1/n_F$ ,  $\alpha_{Ci} = 1/n_C$ ,  $\alpha_{Ii} = 1/n_I$ ,  $\alpha_{Gi} = 1/n_G$ ,  $\alpha_{Ei} = 1/n_E$ .

It is also necessary to address the issue of measuring the general index. From the above, it is assumed that the value of the presented indicator generalizing the information will be from 0 to 1. The rating scale is a tool for characterizing the calculated generalized indicator. Various scaling approaches are used by the authors. We used the rating scale presented in Table 2.

**Table 2** Evaluation scale of the generalized indicator of sustainable development

The range of the calculated magnitude of the generalized indicator of sustainable development	Score
$0,8 < Y_{4Q} \leq 1$	High level
$0,6 < Y_{4Q} \leq 0,8$	Normal level
$0,4 < Y_{4Q} \leq 0,6$	Average level
$0,2 < Y_{4Q} \leq 0,4$	Unstable level
$0 \leq Y_{4Q} \leq 0,2$	Crisis level

Source: Prepared by the author.

The determination of the weight coefficients of the structural indicators included in the general index of sustainable development was made using the expert method. The method is simple to use and provides an opportunity to rank indicators participating in sustainable development with a certain accuracy with the help of expert evaluations. It involves the classification of research objects, assigning points to each of them according to importance. The most significant object is given more points according to the applied scale. This method is appropriate to apply in the case when there is a high degree of confidence in the professional knowledge of experts about the properties of the research objects. The rank and

weight (significance) of each investigated object is determined by the evaluation results. Each expert evaluates each component of sustainable development on a scale of 1 to 5. The significance (weight) of the indicator will be determined by the following formula.

$$a_i = \frac{\sum_{j=1}^m K_{ij}}{\sum_{j=1}^m K_{cj}} \quad (9)$$

where:  $a_i$  is the weight of the  $i$ -th component of sustainability,  $i$  is the number of the type of sustainable development,  $j$  is the number of the expert,  $m$  is the number of experts,  $K_{ij}$  is the score given to the  $i$ -th component by the  $j$ -th expert,  $K_{cj}$  is the sum of the points given by the  $j$ -th expert to all the components of sustainable development.

A concordance coefficient was used to assess the agreement level of experts' opinions, which is calculated as follows:

$$W = \frac{12 \times C}{K^2(H^2 - H)} \quad (10)$$

Where:  $C$  is the sum of the mean square deviations of the ranks of all research objects,  $K$  is the number of experts,  $H$  is the number of research objects.

The concordance coefficient ranges from 0 to 1, where 0 indicates complete disagreement and 1 indicates agreement. Assessment of non-randomness of expert opinion agreement was performed with the help of Pearson's significance test.

**Table 3** Results of a survey on the rating of sustainable development components by experts

Structural indicators of the generalized indicator of sustainable development	Expert's assessment																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Financial	5	5	5	4	5	5	5	5	4	5	5	5	5	5	4	5	5	5	5
Customers	2	2	4	3	2	1	1	2	3	2	3	1	2	1	1	1	3	2	1
Cost and internal processes	3	4	3	1	3	4	3	3	2	3	4	4	3	4	3	3	4	3	3
Growth and expansion	1	1	2	2	1	2	2	1	1	1	1	2	1	3	2	2	1	1	2
Environmental:	4	3	1	5	4	3	4	4	5	4	2	3	4	2	5	4	2	4	4
Structural indicators of the generalized indicator of sustainable development	Expert's assessment																		
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35			
Financial	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5				
Customers	1	3	1	2	1	1	2	2	1	2	1	2	2	1	2				
Cost and internal processes	4	4	3	3	3	3	4	3	3	3	3	3	4	3	3				
Growth and expansion	2	1	2	1	2	2	1	1	2	1	2	1	1	1	2				
Environmental:	3	2	4	4	4	4	3	4	4	4	4	4	3	4	4				

Questionnaires were prepared for rating the components of sustainable development. Financial directors, general directors, chief accountants, accountants, internal auditors of several commercial organizations under study acted as experts. A total of 35 experts participated in the survey, including qualified accountants, qualified auditors, qualified internal auditors, specialists who passed different levels of CHAEAA(Chamber of Auditors and

Expert Accountants of Armenia) and ACCA(Association of Chartered Certified Accountants) qualifications. The results of the survey are reflected in table 3. In order to characterize the results of the survey of experts' opinions, we carried out statistical processing of the data to assess the ambiguity of the received values (table 4).

**Table 4** *Statistical processing of survey results*

Structural indicators of the generalized indicator of sustainable development	Minimum score	Maximum rating	Total grade received	Arithmetic mean	The mean squared deviation	Dispersian
Financial	4	5	172	4,91	0,27990000	0,07837
Customers	1	4	63	1,8	0,7855	0,61714
Cost and internal processes	1	4	112	3,2	0,6232	0,38857
Growth and expansion	1	3	52	1,49	0,554	0,30694
Environmental	1	5	126	3,6	0,9	0,81143

Source: Prepared by the author.

Based on the results of the generalization of experts' assessments, it can be observed that, apart from the environmental component, the assessments given to other components are relatively unambi-

guous. Therefore, the level of agreement of experts' opinions was evaluated with the help of the concordance coefficient, the results of which are presented in table 5.

**Table 5** *Evaluation of expert opinions' consensus quality*

Structural indicators of the generalized indicator of sustainable development	The sum of the ranks	The deviation of the sum of the ranks from the arithmetic mean of the ranks (out of 105)	The squared deviations
Financial	172	67	4489
Customers	63	-42	1764
Cost and internal processes	112	7	49
Growth and expansion	52	-53	2809
Environmental	126	21	441
Total	525		9552

Source: Prepared by the author.

The concordance coefficient is equal to:

$$W = \frac{12 \times G}{K^2(H^2 - H)} = (12 \times 9552) / (35^2(5^3 - 5)) = 0.779$$

It is customary to consider the opinion of experts to be in agreement if the value of the coefficient is higher than 0.75.

According to Pearson's criterion,  $\chi^2(0.005; 29)$  is equal to 60.275, the critical value is greater than

the obtained value, characterizing the existence of consensus of experts' opinion.

Based on the results of the expert assessment data, we determined the weight of each of the structural indicators included in the general indicator of sustainable development (table 6).

**Table 6** *The results of rating structural indicators of sustainable development*

Structural indicators of the generalized indicator of sustainable development	The sum of the ranks	Computational rank	The weighting factor
Financial	172	5	0,33
Customers	126	4	0,24
Cost and internal processes	112	3	0,21
Growth and expansion	63	2	0,12

Environmental	52	1	0,1
Total	525	15	1

Source: Prepared by the author.

The generalized indicator of the sustainable development of commercial organizations formed by the information flows of the management accounting system will look like this:

$$Y_{SD} = 0,33Y_F + 0,12Y_C + 0,21Y_I + 0,1Y_G + 0,24Y_E$$

From the above, it can be concluded about the non-uniform effects of different aspects of activity for the general assessment of sustainable development in commercial organizations. In the conditions of variability of the internal environment and strategic goals, a rating should be made for each new reporting period, taking into account the main

goals of that period. The calculation of the generalized indicator of sustainable development in a commercial organization is recommended to be performed in the sequence presented in table 1. As for the selection of the main indicators of the activity participating in the calculation of the structural indicators, they can be changed due to the change of risks and opportunities in the given reporting period. Table 7 presents the results of indicator calculations based on published financial reports and on the basis of conditioning information containing commercial secrets received from organizations.

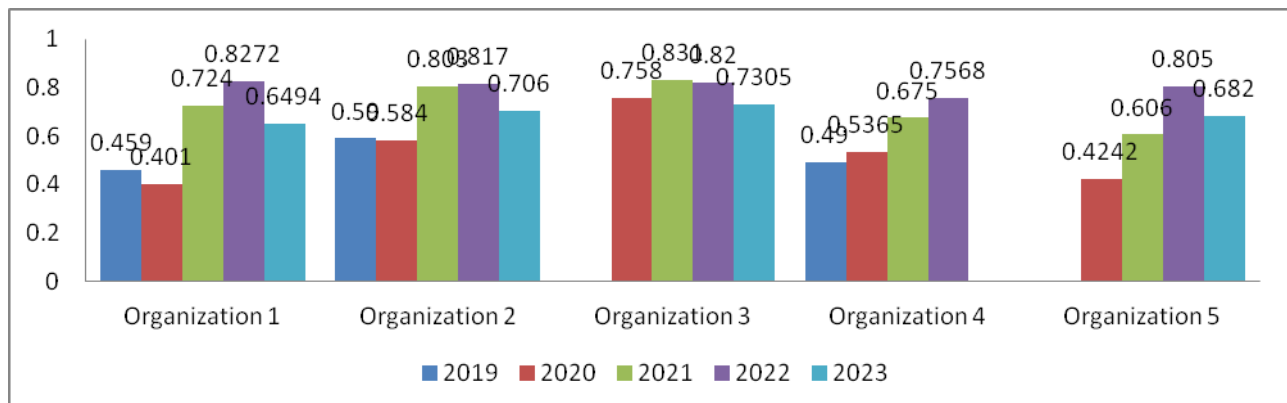
**Table 7** The results of the calculation of the generalized indicator of sustainable development with the proposed methodology in the commercial organizations studied in 2019-2023

The organization	The indicator of sustainable development				
	2019	2020	2021	2022	2023
Organization 1	0,459 / Average level/	0,401/ Average level/	0,724 Normal level	0,8272 /High level/	0,6494 /Normal level/
Organization 2	0,59/ Average level/	0,584/ Average level/	0,803 /High level/	0,817 /High level/	0,706 Normal level
Organization 3	-	0,758 Normal level	0,831 /High level/	0,82 /High level/	0,7305 Normal level
Organization 4	0,49 / Average level/	0,5365 / Average level/	0,675 Normal level	0,7568 Normal level	-
Organization 5	-	0,4242 / Average level/	0,606 /Normal level/	0,805 /High level/	0,682 Normal level

Source: Prepared by the author.

On the basis of the accumulated information presented in the table by years, the trend of sustainable development of the organization can be observed. It is obvious that until 2022, the indicator registered a positive trend in the studied organizations, but in 2023, a decline is observed in all organizations. In four of the studied

organizations: Organization 1, Organization 2, Organization 3, Organization 5, after registering a “High level” of growth and stable development compared to the previous year in 2022, a decrease was observed to a “Normal level”, and the decrease of the indicator was -0.1778, -0.111, -0.0895, -0.123 respectively, or: -17.788%, -11.1%, -8.95%, 12.3%.



**Figure 2.** The trend of the indicator of sustainable development in the studied organizations in 2019-2023

Source: Prepared by the author.

**Table 8** *The results of the calculation of the indicator of sustainable development formed in the management information system*

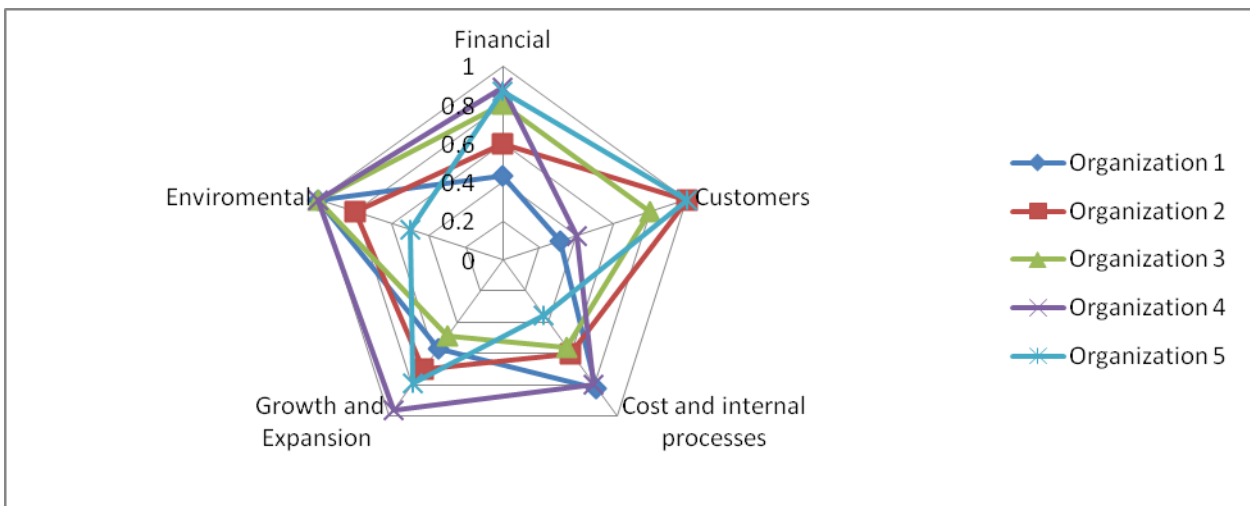
The organization	Structural indicators of the generalized indicator of sustainable development					The Indicator in 2023
	Financial	Customers	Cost and internal processes	Growth and Expansion	Environmental	
Organization 1	0,433	0,31	0,825	0,567	1	0,6494 /Normal level/
Organization 2	0,6	1	0,6	0,7	0,8	0,706 /Normal level/
Organization 3	0,8	0,8	0,56	0,489	1	0,7305 /Normal level/
Organization 5	0,87	1	0,36	0,79	0,5	0,682 /Normal level/

Source: Prepared by the author.

The data presented in the table show that Organization 1 has fully achieved the strategic goals set for 2023 only in the environmental direction, and the lowest indicator of 0.31 was recorded in the direction of customers, that is, the goals in this direction were achieved by only 31 percent. The

recorded results create the need to revise and retarget the goals for the next reporting period.

As a result, a decision can be made to take appropriate steps to improve low-performing indicators, in particular to create a new program of marketing activities, with cost planning and control in that direction.



**Figure 3.** *Structural indicators of sustainable development in commercial organizations in 2023*

Source: Prepared by the author.

During the study period, the lowest indicator was registered in the "cost and internal processes" direction in Organization 5, the objectives of which were achieved only by 36 percent. Here, the main problem was related to the decrease in the marginal profit for the type of product that has the largest share in the sales structure. Therefore, the decisions here will be related to the identification of the factors affecting the increase in the weight of the defective production and the reduction of their influence, as well as the review of the structure of realization. It should be noted that the maximum rating of 1 for the environmental component in Organization 1 and Organization 3 is related to the fact that the goals in that direction are small in number, not well defined, and were formed only as a result of summarized performance data.

**Conclusions.**

A methodology for evaluating the sustainable development of commercial organizations has been proposed, using an integrated indicator with environmental, social and partnership results, which creates an opportunity to monitor ESG performance. The approach also allows to assess the level of achievement of the goals of each direction according to structural indicators, and on the basis of this to initiate certain changes in the strategic goals or in the planned ways to achieve them as with the recorded results, attention is especially drawn to those indicators for which the goals were not achieved. This will be the basis for making more justified managerial decisions in the future regarding the weakest aspects of the activity of the responsibility centers.

Thus, the proposed approach makes it possible to monitor the level of development of KPIs with the information generated in the managerial

accounting system and the generalized indicator of sustainable development calculated with their help is a tool for measuring the organization's sustainable development performance. At the same time, the use of indicators of the achievement of goals with the directions of financial, social, environmental and governance information flows provides an opportunity to ensure complex and comparable measurability, becoming a basis for both strategic goal-setting directions and management decisions related to the entire activity.

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