

The subject of this study is sustainable development accounting, particularly its role in shaping environmental and social indicators of enterprises.

The paper pays special attention to the issue of insufficient integration of environmental and social aspects into conventional financial accounting. It identifies the need to devise methodologies that include social and ecological indicators in financial reporting, to provide a more comprehensive understanding of the impact of enterprise activities on society and the environment.

The results demonstrate that the implementation of sustainable development accounting allows for a comprehensive assessment of the financial, social, and environmental impact of the enterprise. Analysis of sources proves that enterprises that use this approach have better opportunities for risk forecasting and resource management, which increases their competitiveness and responsibility to society.

The interpretation of the results emphasizes that the success of sustainable development accounting is conditioned by the ability to integrate comprehensive data about the impact of enterprise activities on the environment and society into the general management system. Such integration allows enterprises not only to meet regulatory requirements but also to enhance their overall value and image.

The features and distinctive characteristics of the results are that they enable companies to conduct more transparent and responsible business. The implementation of sustainable development accounting systems gives enterprises the ability not only to reduce the negative impact on the environment but also to effectively engage resources to address social issues.

The domain of practical application of the results extends to corporate governance, socially responsible business, investment analysis, and environmental assessment. It includes internal and external regulation, stakeholder requirements, and strategic planning at enterprises

Keywords: accounting, sustainable development, environmental and social indicators, entrepreneurship

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FORMING THE CONCEPTUAL FOUNDATIONS OF A SUSTAINABLE DEVELOPMENT ACCOUNTING SYSTEM AND REFLECTING ITS RESULTS IN REPORTING

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1. Introduction

Key aspects in the development of accounting are to devise consistent theoretical and methodological approaches. Such approaches allow analyzing conventional and new views on accounting, as well as formulating theoretical, legal, and methodological foundations of the accounting and analytical process on their basis. This leads to conceptual

changes in accounting, which require the construction of new theoretical concepts to support qualitatively new forms of scientific research in the field of accounting. It is necessary to carry out research based on a comprehensive analysis of already known theories of accounting development, taking into consideration their importance for accounting and analytical and related management and technological systems.

Under the conditions of a market economy, enterprises are forced to change the orientation of their activities, to look for and choose sustainable development strategies to ensure competitive advantages. In this context, accounting and analytical information becomes a key strategic asset. With the growth of business dynamics and the strengthening of market competition, there is a need to design an effective accounting and analytical system that would contribute to sustainable development. Such a system should provide comprehensive management of the enterprise through the construction of a single information platform for social and environmental activities, which increases the quality of management decisions.

It is necessary to develop mechanisms for the collection, processing, and purposeful transmission of information to stakeholders who use these data not only for the benefit of the enterprise but also for the formation of a responsible attitude towards the environment. This is especially important for enterprises with a significant social and environmental impact. It is also important to pay attention to the negative impact of the activities of enterprises on the environment and their often reckless use of resources in the pursuit of maximizing profits.

The evolution of the legislation in Eastern European countries, particularly in the areas of accounting and analytical regulation, contributes to positive changes in the improvement and implementation of accounting practices. The new requirements of the society for the transparency of information and directives of the European Parliament and the Council of the EU, arising from the processes of European integration, also play a key role. These changes are particularly relevant for sustainable development accounting, which requires standardization and regulation to effectively document processes. An important step is the introduction of systematized information in the format of extended annual financial reports, which serve as the basis for accounting for sustainable development.

2. Literature review and problem statement

Costs related to environmental activities differ from other costs of the company and depend on the scope of its operations and the degree of impact on the natural environment [1]. However, such conventional tools of economic analysis do not allow managers to accurately determine the effectiveness of the implementation of eco-social strategies and the impact of the company's economic policy on the state of the environment. This statement emphasizes the exclusion of environmental costs from economic analysis using conventional accounting tools. All this gives reason to assert that the main means for integration and reflection of ordinary operating, social, and environmental costs should be accounting for sustainable development, which is an independent direction in the field of organizational accounting. The concept of sustainable development accounting is determined by its principles, functions, goals, and objectives.

A significant contribution to the development of accounting methodology and its periodization is work [2], in which five paradigms of accounting are distinguished: simple natural accounting, chamber accounting, simple monetary accounting, double static accounting, and double dynamic accounting. However, in the cited work, a sixth paradigm is proposed – double information dynamics. But

it still does not reveal all areas of the company's activity according to the three-part system of sustainable development.

In [3], it is proposed to supplement the accounting system with a seventh level in the new paradigm, which should be focused on ensuring the convenience of accounting for various business entities. In this context, the choice of the form of accounting and reporting should be based on the subject's contribution to the creation of the gross national product, without harming either the efficiency of economic activity, or state or branch management. At the same time, attention is paid to the implementation of the seventh level of the new paradigm, the necessary specialized type of accounting, which completes the formation of a holistic view of the interaction of the enterprise with the environment both at the level of branch management and at the micro level. However, under modern conditions, with sufficient development of accounting, there is no really large-scale application of the principles of eco-social accounting in practice or accounting known as Sustainable Development Accounting (SDA).

The purpose of SDA should be to coordinate environmental, social, and economic aspects of business, to identify potential environmental and social risks and problems, as well as to develop ways to overcome them. Environmental and social challenges affect the operational activities of enterprises, their financial condition, and the preparation of financial statements. Management accounting data is generated for enterprise leaders, managers at various levels of authority and responsibility, helping them make informed decisions.

SDA makes it possible to assess eco-social factors and prepare reports on environmental and social accounting according to established standards, oriented to external and internal users. This information is available to owners, creditors, investors, tax authorities, government agencies, the public, and other interested parties.

Similar to financial accounting, SDA should be mandatory for enterprises, unlike management accounting. Accounting using synthetic and analytical accounting methods is regulated by the Law of Ukraine "On Accounting and Financial Reporting in Ukraine", which applies to all organizations located on the territory of Ukraine. Collection and analysis of information at the request of management is justified if the value of the information obtained exceeds the costs of obtaining it.

Financial accounting covers all economic operations of the enterprise, reflecting only actual activities without forecasted amounts. Management accounting is part of the enterprise management system and is aimed at providing information for making optimal management decisions. It is used to control the effectiveness of the organization's current activities, plan business strategy and tactics, and optimize the use of material, labor, and financial resources. Also, this type of accounting is used to evaluate the efficiency of business operations, determine the profitability of various types of products, and ensure the impact on production and sales processes for making effective management decisions [4]. However, SDA and its management must comply with regulatory documents from the Government of Ukraine and bodies authorized to regulate accounting. Accordingly, violation of financial accounting methodology may result in administrative and criminal liability.

Management accounting methodology is not subject to regulation by state bodies; it is determined by the organization

itself, taking into account the specificity of its activity and the peculiarities of the decision-making and problem-solving process. In financial accounting, the principle of double entry on interconnected accounts is used. In management accounting, the application of this rule is not mandatory.

SDA focuses on the environmental and social aspects of the company's activities. At the same time, financial accounting covers the entire organization, considering it as a single economic entity. Management accounting is carried out by cost formation locations, production divisions and centers of responsibility, and only if necessary is combined for the entire enterprise.

These types of accounting differ not only in terms of content, but also in the periodicity and terms of reporting. In SDA, as in financial accounting, reporting can be done monthly, quarterly, or annually, with reports being submitted days, weeks, or months after the end of the reporting period. In management accounting, data is submitted more often – daily, weekly, or monthly.

Thus, when using the obtained critical provisions and interrelated elements of continuous accounting and analytical support, it becomes possible to represent SDA at the micro-level of the enterprise (Fig. 1).

Financial accounting information describes the results of the enterprise for the past period, based on actual data. Management accounting, on the contrary, focuses on future indicators, regulating and controlling the implementation of the decisions made. SDA data provide an objective assessment of the impact of the company's activities on the environment and the social domain, making it possible to identify negative consequences.

Managers of enterprises may not even realize that they are conducting environmental accounting within the existing standards of financial and management accounting. An enterprise as a system of managers and managed elements with an information chain includes economic, social, and environmental indicators. These indicators are obtained from primary documents and reports, transmitted orally or through communication channels, grouped and summarized in the subsystem of financial and managerial environmental accounting. Subsequently, they are used for the analysis of economic activity, planning, forecasting and control

(internal and external audit). This information becomes the basis for making management decisions regarding the improvement of the subsystem and the construction of a new, more grouped, and generalized information flow.

At the micro level, SDA should be considered as a specialized part of accounting, which is a scientifically based system of continuous monitoring, evaluation, systematization, and generalization of information about social and ecological processes that arise as a result of the activities of a business entity.

Its purpose is to build and regularly update an information model that allows for a complete and objective assessment of the enterprise's environmental and social activities during the reporting period and in dynamics. This model determines how socio-ecological processes affect the financial and economic prospects of the enterprise. Specific directions are formed taking into account the needs of information users (Fig. 2).

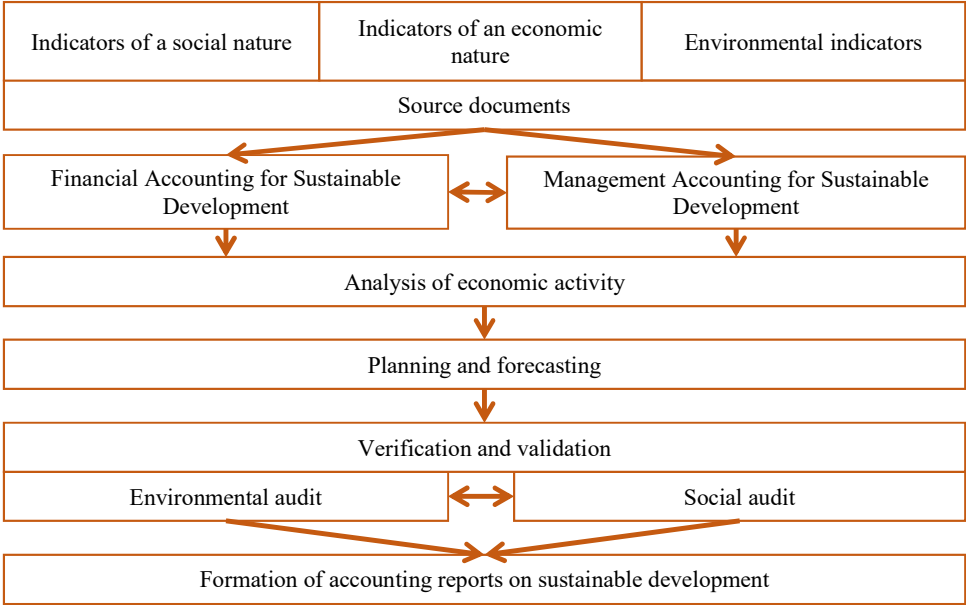


Fig. 1. Organization of accounting for sustainable development at the level of entrepreneurship
Note: constructed on the basis of our research and [2, 4]

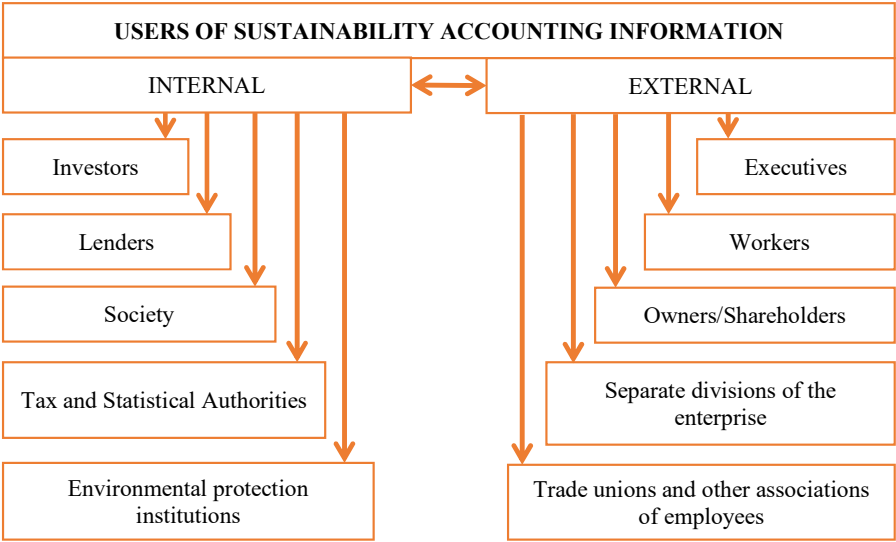


Fig. 2. Users of sustainable development accounting information
Note: constructed on the basis of our research and [1, 3]

To ensure responsible investment, investors need to be given access to details on environmental protection measures. This will help them assess the environmental risk and potential returns of their investments. Regulatory bodies use environmental and social accounting data to set tax rates that reflect the impact of economic activity on nature and society in different regions, as well as to monitor compliance with relevant laws. Banking institutions need information about the environmental status of the companies that receive financing, especially in view of the possible increase in harmful emissions as a result of their operations.

It can be argued that the identification and adequate allocation of costs for environmental and social initiatives is critical to determining the cost of goods and justifying investment decisions based on accurate cost-benefit calculations. Companies that adhere to the standards of social responsibility usually occupy a more favorable position in the competitive environment, receiving advantages through recognition and trust from consumers and investors.

Internal users, including management and company departments, have access to a significant information base provided by SDA's management and financial accounting systems. However, access to this information is limited and depends on the hierarchical level, authority, and responsibility of the manager. A characteristic feature of SDA is its ability to self-regulate, where priority is given to satisfying the company's internal needs.

Given the potential of accounting for environmental and social costs, it is advisable to focus on the development of procedures for accounting for both external and internal costs. Currently, the key task in the field of environmental and social accounting is to improve the system of allocation of costs for environmental protection and social security of employees. This emphasizes the need to design an optimal system for calculating and analyzing costs arising in the context of interaction with the environment and social aspects of activity.

Analyzing [5], it is proposed to distinguish two types of enterprises regarding their relationship to the representation of information in their reporting: enterprises with disclosure of information about responsibility in their own reports on sustainable development and disclosure of information about sustainable development in annual reports.

Environmental responsibility is becoming important for companies of all sizes, along with reporting. Although SMEs currently do not have the same regulatory reporting requirements as larger organizations, the EU is considering extending the Corporate Sustainability Reporting Directive to SMEs in 2026. Regardless, SMEs are likely to engage in sustainability disclosures due to economic, environmental, supply chain and public pressure considerations. [5]. However, work [6] states that it is advisable to provide SMEs with the necessary resources to make the transition or to provide

companies with a basis for voluntary reporting on sustainable development indicators. A standardized reporting framework can simplify the sustainability reporting process, potentially reducing the burden on SMEs, and helping them manage their workload more effectively. However, this can lead to transparency challenges with stakeholders. Therefore, for SMEs, the issue of standardization or free choice of principles for the formation of reports on sustainable development is very important.

The fundamental role of the corporate social responsibility (CSR) system is the implementation of environmental and social planning. This process is represented in detail in Fig. 3, which illustrates the steps and stages that should be followed to effectively integrate these aspects into the overall strategy of the enterprise.

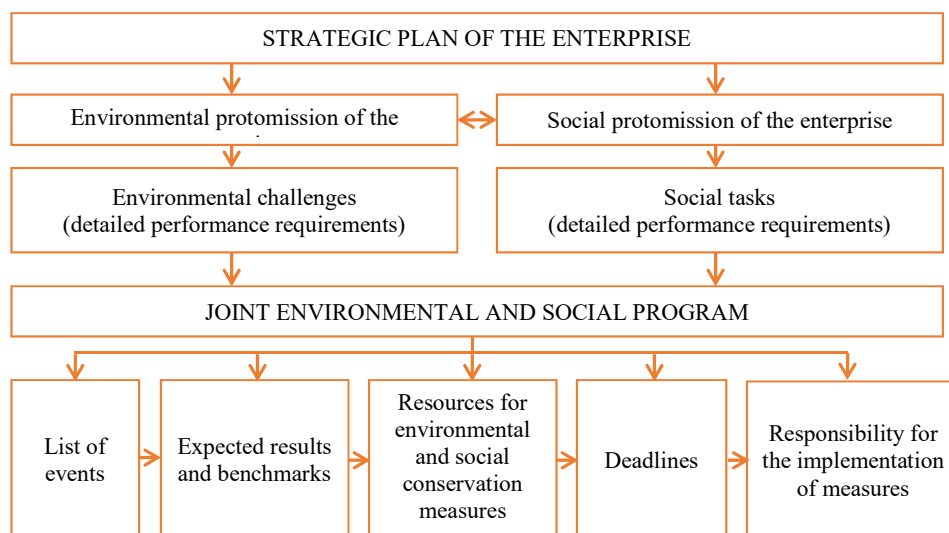


Fig. 3. The process of environmental and social planning at the enterprise
Note: constructed on the basis of our research and [5, 6]

The organization must design, implement, and provide support for a program aimed at achieving established environmental and social goals in accordance with the corporate mission and strategic vision. The program should include the following elements:

- a detailed list of planned events;
- expected results and indicators that will make it possible to assess the effectiveness of measures;
- a list of the necessary resources for the performance of each of the tasks;
- specific deadlines for each task;
- clear distribution of responsibility among team members for achieving each of the goals;
- processes of monitoring and controlling the implementation of the program to ensure its successful implementation.

Organizational goals should be established in such a way that long-term plans cover a period of 3 years or more. At the same time, social initiatives have shorter deadlines, such as a month, quarter, half-year, or year, to ensure rapid implementation and the ability to respond quickly to changes. Environmental goals should be established taking into account the environmental significance and impact of the company's activities on the environment, focusing on priority aspects of nature protection [7, 8]. However, the development of environmental and social tasks must be

integrated into the general strategic framework of the enterprise, meeting the main goals of the organization. Responsibility for their implementation should be assigned to specialized divisions that focus on environmental protection issues. Evaluation of the effectiveness of these tasks should be carried out not only on the basis of the results of the work of these divisions but also taking into account the general situation at the enterprise, including the impact of their activities on the state of the environment and social indicators as a whole.

The current growing interest in environmental and social accounting among top management and middle managers is noted as a positive trend [9]. However, the implementation of such systems is accompanied by certain challenges. In particular, difficulties arise due to a lack of understanding of the essence and potential of the new information system, as well as problems related to its structuring and organization. This requires not only technical support but also significant training and resource investments to enable its effective functioning.

Experience shows that an effective accounting system at an enterprise should cover three key aspects: accounting for costs and liabilities, accounting for assets and benefits, and reporting that demonstrates the organization's sustainable development. These components provide a comprehensive approach to financial affairs and allow tracking of how resources are used to achieve long-term sustainable development goals.

Although most researchers agree that accounting can be considered as a system [10, 11], each of them offers a different approach to structuring its elements. In turn, it should be related to the theory of system analysis, which contains several subsystems. These subsystems should be divided into components and elements with defined internal and external connections.

In work [12], individual and integrated accounting subsystems are highlighted. But, on the one hand, individual systems cannot provide a continuous principle of accounting. Such accounting is devoid of permanent application. On the other hand, integrated accounting systems [13, 14] cannot be universal and can be applied at different levels of management. An integrated accounting system is extremely rarely universal for use by enterprises of various types of economic activity. All this gives reason to assert that there is a need for a presented general SDA system, which would take into account the four main components of the SDA system (theoretical, methodological, practical, and organizational). This visualization can be represented in the form of a vector of accounting and analytical information formation. At the same time, the main directions are the principles of adjusting information taking into account the needs of stakeholders (Fig. 4).

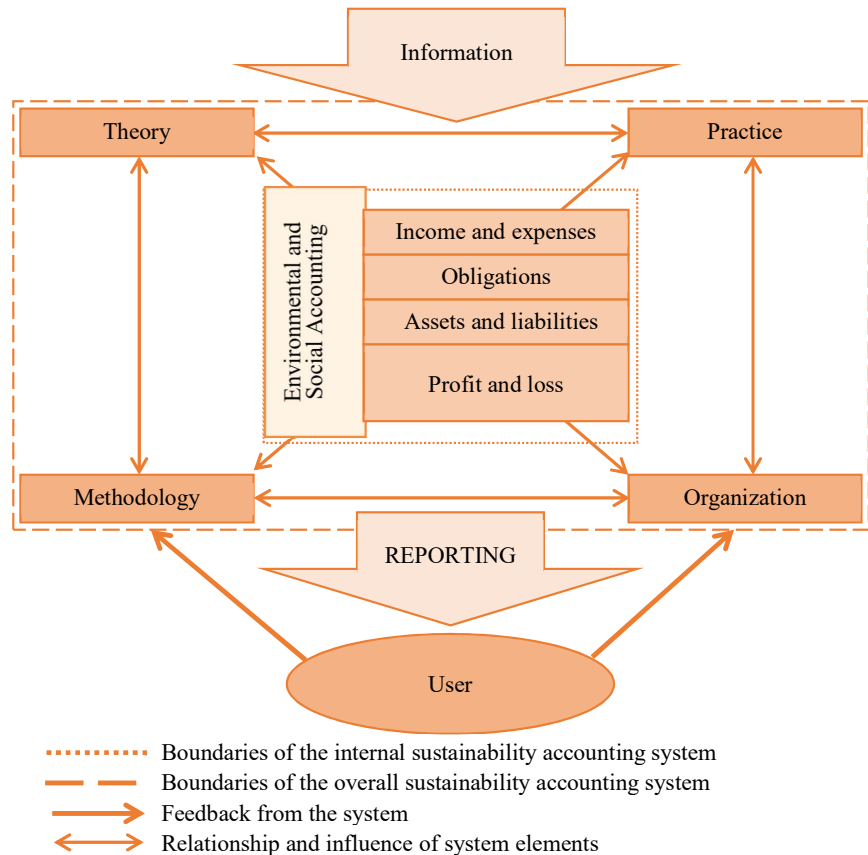


Fig. 4. Components of the sustainable development accounting system
Note: constructed on the basis of our research and [15]

The SDA system is organized in the form of three subsystems: internal, general, and external. The internal subsystem is responsible for the declaration of specific rules and procedures that regulate the representation of information on the social and environmental aspects of the enterprise. The formation of this subsystem is directly influenced by all components of the overall subsystem:

- methodology – development of specific tasks, principles, methods, and techniques within the framework of CSR;
- theory – devising theoretical foundations for understanding and formulating the conceptual foundations of SDA;
- organization – adaptation and implementation of best practices and rules for representing information that meet the requirements of users at a specific enterprise;
- practice – direct implementation of SDA, based on already existing theory, developed methodology and organizational processes under the real conditions of the company's activities.

It is quite important to find common approaches and agree on concepts for the development of ecological and economic systems [15]. However, the concept of sustainable, safe, and viable development requires a rethinking of conventional economic paradigms aimed at their humanization and environmentalization.

The general component of the SDA system integrates accounting data and documents, which through internal and general components are transformed into an external element of the system – reporting. This reporting reflects the social and environmental component of the organization's activities. Based on the analysis of the reported information, users form an idea not only about the economic and financial

state of the enterprise but also assess how effectively the enterprise fulfills its obligations to the social and environmental environment. Users who are properly aware of the competencies have the opportunity to influence the improvement of the general and internal SDA system.

The principles of environmental and social accounting promulgated by the International Financial Reporting Standards Board are gaining global importance. The lack of national standards for accounting for environmental information prompted the development of specialized recommendations for accountants. These recommendations are intended to help in reporting the economic consequences of the enterprise's environmental impact in monetary terms. It is noted that environmental and social accounting is a key element of sustainable development of organizations. Its reports should reflect the company's attitude to the protection of the ecological and social environment, as well as illustrate how the use of natural and social resources affects the financial position of the enterprise.

One of the main problems is the lack of a single methodology for accounting for sustainable development. The concept of sustainable development accounting is often confused with other concepts, such as methodology, method, approach, model, concept. This leads to confusion and inconsistencies in accounting systems, making it difficult to integrate environmental and social aspects into conventional financial accounting. There is a need to devise consistent theoretical and methodological approaches for accounting for sustainable development, which take into account the environmental and social aspects of enterprise activity.

Another important aspect is the insufficient integration of environmental and social aspects into conventional financial accounting. Traditional tools of economic analysis do not allow managers to accurately determine the effectiveness of the implementation of eco-social strategies and the impact of the company's economic policy on the state of the environment. This emphasizes the need to develop new methodologies that include social and environmental indicators in financial reporting.

An additional problem is the lack of a clear structure and systematization of accounting and analytical information. Most enterprises are only beginning to accumulate the necessary knowledge and methods in this area, which leads to insufficient integration of environmental and social aspects into their accounting systems. It is important to design mechanisms for the collection, processing, and purposeful transmission of information to stakeholders who use this data not only for the benefit of the enterprise but also for the formation of a responsible attitude towards the environment.

In addition, there is a problem with the lack of standards and regulation of sustainable development accounting. The evolution of legislation in the field of accounting and analytical regulation contributes to positive changes in the improvement and implementation of accounting practices. However, the lack of national standards for accounting for environmental information led to the development of specialized recommendations for accountants, which aim to help in reporting the economic consequences of the impact of the company's activities on the environment in monetary terms.

In view of the above, the core of the problem is the need to devise an integrated and standardized methodology for accounting for sustainable development, which takes into account environmental, social, and economic aspects of enterprise activity. This methodology should be adapted to the

modern conditions of the market economy and ensure effective management of the enterprise through the construction of a single information platform for social and environmental activities. Implementation of such a methodology will allow enterprises to increase their competitiveness, responsibility to society, and the ability to long-term risk forecasting and resource management.

Therefore, the unsolved problem is to devise a comprehensive accounting system for sustainable development, which integrates all aspects of the company's activities and ensures transparency and responsibility to society and nature. This study aims to build such a system that will allow companies to effectively manage their environmental and social performance, increasing their overall value and public awareness.

3. The aim and objectives of the study

The purpose of our research is to devise conceptual foundations for the accounting system of sustainable development, which will ensure the effective reflection of the results of sustainable development in the reporting of enterprises.

To achieve the goal, the following tasks were set:

- to offer options for representing accounting objects in the reporting of sustainable development of enterprises;
- to identify SDA objects by the possibility of their representation in the accounting and analytical system and reporting of enterprises;
- to determine the principles of forming the net value of assets according to the principles of sustainable development.

4. The study materials and methods

The object of our study is the system of accounting for the sustainable development of enterprises. The research focuses on the integration of environmental, social, and economic aspects in the accounting practice of enterprises, as well as on the development of a methodology that will ensure effective management of resources, responsibility to society and the environment, and long-term risk forecasting.

The main hypothesis of the study assumes that the microsystem of accounting covers all forms of economic accounting of the enterprise, which is a quantitative and qualitative reflection of economic activity aimed at its control and management. This accounting includes observation, perception, measurement and registration of business facts, phenomena, and processes, taking into account economic, social, and environmental components. However, depending on the specificity of the accounting information, the SDA system includes not only operational (operational and technical), statistical, financial, and management accounting. SDA is also distinguished not only by the ability to account but also by deep analytical support for the formation of accounting information.

SDA serves as an accounting and analytical tool that enables the formation of information flows and their systematization with further transition to the analytical stage. This stage plays a key role in the process of segregation of information into monetary and non-monetary, internal, and external [16]. Monetary information culminates in the data of monetary financial accounting of sustainable development, which mainly contain monetary indicators. The non-monetary indicators of management accounting of sus-

ticular importance for providing reliable information about the impact of the company's activities on the environment and the social domain. In general, the purpose of accounting is to record events and communicate performance information to users, facilitating informed decision-making.

5. Results of constructing a sustainable development accounting system and its representation

Based on the analysis of theoretical and technical works and key provisions, it is possible to build a graphic model of the system for accounting and analytical support to sustainable development for the enterprise (Fig. 5). This system is not static in time and space but adapts and changes, responding to changes in the internal and external environment, as well as to the information needs of users for effective decision-making. An important aspect is that there is active feedback between the system of accounting and analytical support and its users, which enables constant interaction and optimization of processes according to needs and requirements.

Growing requirements for the information component in the enterprise management system play a key role in ensuring its effectiveness. Adequate, high-quality, and systematized information about the internal environment allows management to evaluate the effectiveness of various organizational and economic, agronomic, social, and environmental measures. Based on this analysis, depending on changing conditions, strategic plans can be adjusted. When a manager has access to quality information, his/her decisions become timelier and more effective, which contributes to the overall success of the enterprise [20].

The diagram illustrates the stages of formation of accounting and analytical support for sustainable development, organized into six main stages on the left, with corresponding microsystems and system-forming components on the right.

Stages of formation of accounting and analytical support for sustainable development:

- I Stage Collection of information**
- II stage Systematization**
- III stage Analysis**
- IV stage Justification and assessment**
- V stage Reporting**
- VI stage Planning and control**

Accounting microsystems (level of accounting information formation):

- Operating unit
- Statistical block
- Household block
- Financial block
- Management block
- Tax block

Analytical support microsystems (level of formation of analytical information):

- Operational analysis
- Current analysis
- Accounting for sustainable development

System-forming components of accounting and analytical support for sustainable development management:

- Goal
- Subjects
- Objects
- Methods
- Strategy
- Principles
- Technology
- Functions

Technical and informational macro systems of accounting and analytical:

- Macrosystem of control/audit
- Budgeting macrosystem
- Accounting macrosystem
- Analytical macrosystem

The formation of accounting and analytical information:

- Summarizing analytical information
- Summarizing/accounting information

Information Flow:

- Primary information:** Flows from the first two stages (Collection and Systematization) into the Accounting and Analytical microsystems.
- Prospective information:** Flows from the third stage (Analysis) into the Accounting and Analytical microsystems.
- Reporting information:** Flows from the fourth and fifth stages (Justification and Reporting) into the Accounting and Analytical microsystems.

Accounting and Analytical Information Flow:

- Accounting financial reporting** and **Accounting non-financial reporting (sustainable development reporting)** are the primary outputs of the Accounting microsystems.
- Budgeting and control** is the primary output of the Analytical support microsystems.

Formation or change of goal, strategy, principles. Changing or establishing the rules of the accounting and analytical policy organization is the final outcome of the process, influenced by the reporting and budgeting and control stages.

Fig. 5. Generalized system of accounting and analytical support for the sustainable development of enterprises

Taking into account the influence of the internal and external environment on the activity of the enterprise, there is a need for budgeting. The basis of budgeting is the development of production programs that determine the planned cost of each type of product. The process includes an analysis of expected costs, which are based on technological requirements, soil and climatic conditions, production standards, as well as cost standards for labor, materials, and other resources. Rational use of land and capital assets, implementation of advanced agro-zootechnical and organizational measures are also taken into account. Taking into account these factors, the total cost of production is determined. Budgeting helps not only in the control and analysis of deviations from the plan but also provides management with a reasonable and objective assessment of important links in the system of enterprise functioning [21].

Businesses often establish financial responsibility for environmental pollution and use of natural resources, but often do not report on the specific consequences and impacts of their activities. Despite this, some large companies in Ukraine have begun to publish information about their environmental and social activities. In particular, not all large enterprises from Eastern European countries disclose reports on sustainable development in accordance with GRI standards and other relevant standards.

There are several conflicting factors influencing the decision to publish environmental data. On the one hand, disclosure of information about environmental activities can cause threats and potential conflicts, especially if it indicates the negative impact of the company's activities on the environment. On the other hand, transparency can encourage a higher level of trust and loyalty among consumers and investors, as well as compel enterprises to be more responsible in managing the environmental and social aspects of their activities.

Integrating the typology of methods for representing the results of environmental and social activities proposed by various researchers and enterprises can be a significant step in the direction of achieving a comprehensive understanding. This combination with a general chart of accounts for accounting inflows and outflows of resources opens up all the key advantages for the enterprise. In this context, two main approaches to reporting are possible, which are given in Table 1. These approaches make it possible not only to standardize the accounting process. They also provide a deeper understanding of how environmental and social responsibility affects a company's financial performance when scaling up production. At the same time, there is an opportunity to thereby increase transparency and improve information support for making informed management decisions.

The purpose of the sustainable development accounting system (SDA) is to provide users with up-to-date information about assets, sources of their formation, costs related to environmental security, as well as income generated due to environmental protection measures. This approach to accounting makes it possible to clearly define and substantiate five key components of the sustainable development system at the enterprise:

- accounting of assets and sources of their formation – provides a complete understanding of the company's assets and the mechanisms of their receipt;
- accounting of environmental and social obligations – makes it possible to monitor and manage the obligations that the enterprise has to society and the environment;

- accounting of environmental and social costs and revenues – provides an understanding of the economic impact of environmental and social initiatives on the financial position of the enterprise;

- reporting on sustainable development is an integrated reporting that reflects not only financial results, but also the impact of the company's activities on the environment and society;

- audit (control) of eco-social activities – regular review and evaluation of the effectiveness of measures aimed at sustainable development and ensuring the formation of the so-called “green profit”. Green profit is the added value that is formed as a result of compliance with the conditions of social responsibility and environmental safety

Table 1

Options for reflecting accounting objects in the reporting of sustainable development of enterprises

Option 1: Accounting and Taxonomy of Reporting	Option 2: Financial statements supplemented by separate sustainability reports
Integrated balance sheet	Options for corporate reports:
Integrated report on financial results	– social report
Integrated cash flow report	– environmental report
Integrated Statement of Equity	– eco balance
Extended notes to the annual report on the results of environmental and social activities	– management report
	– report on social responsibility
	– report on incoming/outgoing flows of materials (in value/monetary terms)

Such a comprehensive accounting system enables not only the transparency of the enterprise's activities but also helps enhance its responsibility towards society and nature.

5. 2. Identification of objects of sustainable development accounting with the possibility of their representation in the accounting and analytical system and reporting of enterprises

As part of the study, the classification of accounting objects was carried out in order to assess the possibilities of their reflection in the accounting and analytical system of sustainable development and reporting of enterprises. This process involved the identification and analysis of objects that can be represented in the system, based on their importance for environmental, social, and economic aspects of the activity. The classification results are shown in Fig. 6, which illustrates different categories of objects and certifies their place and role within the framework of comprehensive reporting aimed at sustainable development. This information serves as the basis for further improvement of the accounting system and provides for the accuracy and completeness of the enterprise's reporting.

The objects of the sustainable development accounting system (SDA) are various aspects of the enterprise's economic activity, which include assets, liabilities, sources of financing, income, and expenses, as well as other elements related to the economic and eco-social domains. These objects are affected by various accounting methods, including documentation, inventory, valuation and costing, accounting and double-entry accounting methods, and the preparation of balance sheets and statements.

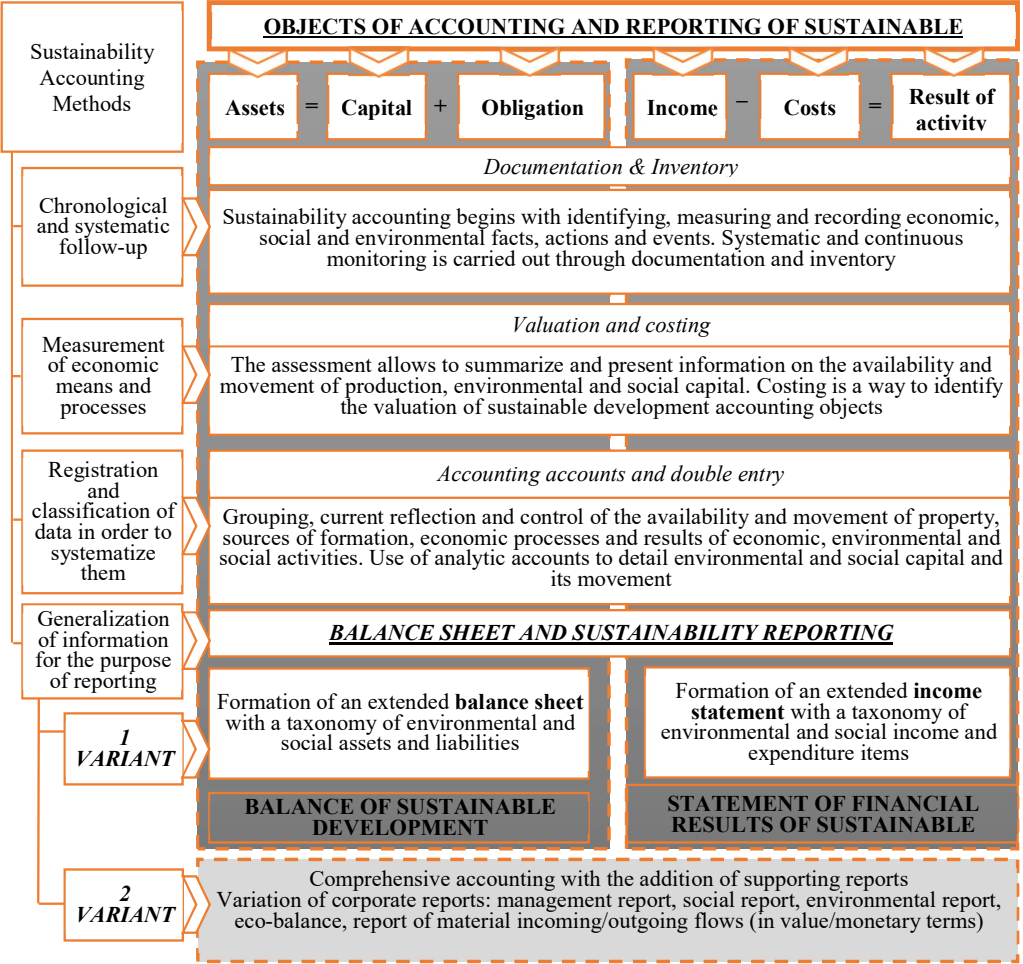


Fig. 6. Objects of sustainable development accounting by the possibility of representation in the accounting and analytical system and reporting of enterprises

These methods play a critical role in ensuring the accuracy, completeness, and compliance of accounting information with the requirements of sustainable development. They make it possible to adequately reflect the interaction and characteristics of the specified objects, ensuring the management of the company's resources in accordance with the principles of sustainability. The results of this interaction and the impact of accounting methods on SDA objects are often visualized in the form of graphic models, as, for example, shown in Fig. 5, which helps to better understand and analyze the structure and dynamics of economic activity.

5. 3. Formation of the net value of sustainable development assets

Net asset analysis plays an important role in understanding a company's financial health, especially in the context of sustainable development. Net assets reflect the real value of resources that a business can use to realize its long-term goals, including environmental and social initiatives.

Scaling production and growth in net assets can indicate an increase in equity capital, which in turn can be used to finance projects aimed at improving the environmental and social responsibility of the enterprise. Thus, the integration of eco-social capital into the general capital structure of the enterprise can contribute to its sustainable development, simultaneously responding to the challenges of the modern business environment and the demands of stakeholders.

Careful management and analysis of net assets is therefore critical to maintaining and expanding sustainability efforts, as well as to ensuring the financial stability and ability of the enterprise to adapt to changing conditions.

In national accounting practice, a clear distinction between the concepts of net assets and equity is often not made, which can lead to some confusion in terminology. Thus, the professor defines net assets as the value of the property of the business entity, which corresponds to the equity calculated as the difference between the value of the property and the loan capital [22]. On the other hand, other researchers consider net assets as the excess of the value of assets over the company's liabilities [23, 24].

This difference in definitions is important for understanding the financial condition of the enterprise, especially in the context of sustainable development, where it is necessary to accurately understand the capital structure for adequate planning of investments in environmental and social initiatives. Net assets, taking into account these definitions, serve as an important indicator of the financial health of the enterprise and its ability to independently develop and cover obligations, which is important for investors, creditors, and other interested parties.

Modeling of ecosystem elements and characteristics of their flows based on empirical studies [25, 26] makes it possible to accurately depict the behavior and interactions in the ecosystem. Through the use of mathematical models

and scenario analysis, it is possible to assess how changes in means and sources of resource formation affect system performance. This allows us not only to better understand the dynamics of ecosystems but also to effectively manage the assets of ecological resources to prevent their degradation or decrease in quality.

The inclusion of environmental and social capital in the structure of the company's equity can lead to an increase in total assets. Such an increase and its impact on the net value of sustainable development assets can be visualized in Fig. 7, where these changes are graphically represented. Such graphical representations are important for illustrating financial indicators and contribute to a better understanding and decision-making regarding the management of sustainable development at enterprises.

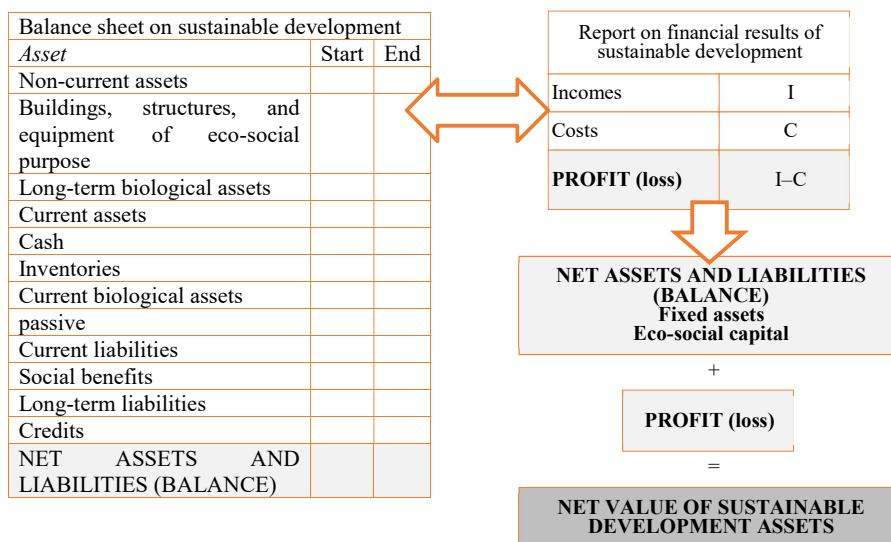


Fig. 7. Visualization of the calculation of the net value of assets of the sustainable development of the enterprise

The value of the net assets of sustainable development of the enterprise includes the assessment of all assets that are formed at the expense of economic, environmental, and social capital. These net assets reflect real sustainable development capital and represent property owned by the company's owners, such as shareholders or participants. The following formula can be used to quantify this value:

$$NP = SA - L, \quad (1)$$

where NP is the net profit from eco-social activities inclusive;

SA – the sum of assets, which includes all assets of the enterprise, including economic, environmental, and social assets;

L – liabilities representing all current and long-term liabilities of the enterprise.

In addition, specific capital, such as eco-social capital, can be taken into account:

$$ESC = EC + SC - L, \quad (2)$$

where ESC is eco-social capital;

EC – environmental capital;

SC – social capital;

L – commitment.

Formula (1) makes it possible to get a balanced view of the value of the company's assets, taking into account its

liabilities, and reflects the contribution of sustainable development to the total value of the company.

The growth of net sustainable development assets is indeed an indicator of an increase in the eco-social capital of a company, especially when this growth occurs at the expense of the capitalization of retained earnings in environmental and social initiatives. This indicates the efficient use of resources and the company's orientation to long-term development prospects, which includes not only economic growth, but also a contribution to a sustainable social and ecological environment.

The positive dynamics of net assets is a key indicator for investors and creditors, as it indicates the ability of the enterprise to grow, sustain and adapt to changing market conditions. It also demonstrates its responsible attitude towards

the use of natural resources and social responsibility.

On the other hand, a decrease in net assets may indicate problems in economic activity, such as inefficient use of resources or excessive depletion of ecological resources. It can also be a sign of the presence of internal and external challenges that prevent the enterprise from maintaining a stable level of sustainable development. Such trends require careful analysis and prompt management intervention to correct management strategies and optimize resource potential.

The indicator of the value of eco-social capital plays a key role in the evaluation and management of the sustainable development of the enterprise. Its functions can be defined in detail as follows:

1. Measure of sustainable development of current activities. The indicator helps measure how effectively the enterprise integrates environmental and social aspects into its activities, and also monitors progress in achieving the goals of sustainable development.

2. Criteria of real eco-social investment (internal norm of eco-profitability). The effectiveness of investments made in environmental and social projects is determined, making it possible to assess their profitability and risks.

3. A means of determining the effectiveness of eco-social investments. The indicator helps assess how effectively resources are used to achieve environmental and social goals, as well as to monitor the impact of these investments on the overall activity of the enterprise.

4. A tool for managing the entire capital structure. The use of the indicator allows the management of the company to better manage the distribution of capital, ensuring the optimal relationship between economic, environmental, and social components.

5. Impact on the level of the company's market value (image, business reputation, goodwill). Eco-social capital can significantly influence the company's perception by the market, its public image and business reputation, which in turn can increase its market value and attract new investments.

The use of this indicator allows the enterprise not only to assess its current state but also to plan future actions aimed

at improving the environmental and social impact, as well as to ensure an increase in investment attractiveness and, as a result, an increase in profitability.

The majority of analytical and empirical studies emphasize the formation of a derivative concept that combines the ideas of capital preservation and the assessment of sustainable development of enterprises (Fig. 8).

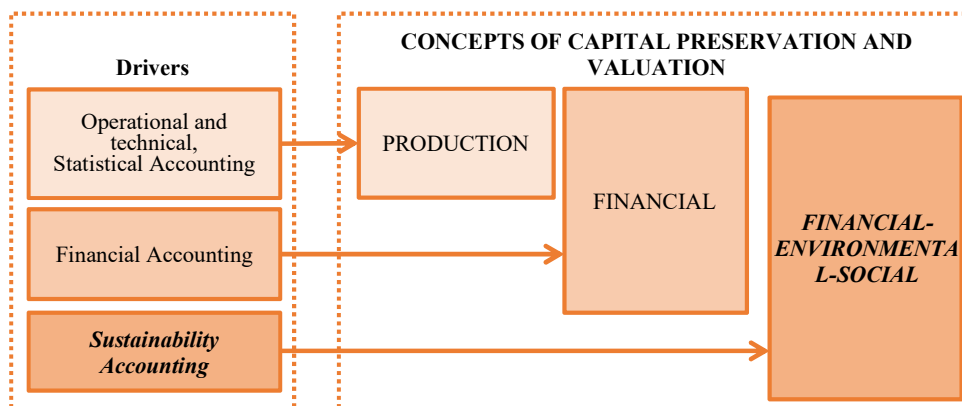


Fig. 8. Representation of the valuation and preservation of capital for the sustainable development of the enterprise

The above Fig. 8 focuses on the concepts of conservation and capital appreciation, which include financial, environmental, and social aspects. These aspects are integrated into production processes, which requires an integrated approach to accounting from the organization. Operational-technical, statistical, and financial accounting is considered with a special emphasis on accounting for sustainable development. This emphasizes the importance of adapting conventional accounting systems to the needs of sustainable development, including a comprehensive assessment of the enterprise's impact on the environment and the social environment, which contributes to the preservation of capital and strengthening its value in the long term.

The concept of capital preservation is based on the identification by the business entity of the types of capital that must be preserved. This includes distinguishing the return on capital employed from the resources required to support it. Accordingly, valuation methods in financial accounting allow determining net profit, and the accounting system itself does not provide an adequate reflection of the company's activities in the social and environmental domains. Therefore, the SDA system acts not only as a mechanism for documentation and synthesis of information but also as an element of analytical work, which includes analysis, control, and budgeting.

6. Discussion of results within the framework of devising concepts of capital preservation under conditions of sustainable development

The results obtained in the form of a generalized SDA system (Fig. 5) can be explained through the integration of environmental and social indicators into the financial systems of enterprises, which allows for a more accurate reflection of their real impact on the environment and society. The peculiarity of the proposed solutions is the construction of double information dynamics, which ensures simultaneous consideration of both financial and non-financial aspects of

activity. This provides an advantage in the form of a more complete and balanced understanding of the impact of enterprise activities, differentiating them from conventional models that focus only on economic indicators.

The use of such integrated indicators makes it possible to comprehensively assess the effectiveness of various sustainable development strategies. Figure 6 shows a model of an accounting system that applies these principles, demonstrating the relationships between different types of data and their impact on strategic decision-making. Our study revealed that the introduction of an innovative approach to accounting for sustainable development, which integrates environmental, social, and financial indicators, significantly strengthens the possibilities of analyzing the impact of the company's activities on the environment and social structure (Fig. 7).

Figure 8 illustrates the ability of the accounting system to provide important information that affects all aspects of enterprise management.

The proposed characterization of SDA has several significant features compared to existing approaches to accounting, which conventionally focus exclusively on the financial aspects of the enterprise's activities. Compared to the methods described in [27, 28], the proposed approach provides greater integration of environmental and social indicators and allows for a deeper analysis of the long-term impact of the enterprise on sustainable development. This is made possible by balanced accounting, which takes into account not only immediate financial results but also social and environmental costs and revenues, which are often overlooked in conventional accounting systems.

The use of SDA makes it possible to identify not only the current state of the enterprise but also to forecast potential risks and opportunities related to the environmental and social aspects of its activity, which is critically important for making informed management decisions. These features emphasize its innovation and importance for enterprises that strive for sustainable development and responsibility towards society and the natural environment.

The proposed solutions effectively solve the problem by integrating environmental and social aspects into accounting. This is due to the improvement of decision-making processes at enterprises, where the use of SDA principles is confirmed by the improvement of eco-social risk management for the formation of the concept of capital preservation.

The financial concept, together with financial accounting, is dominant at the current stage and is widely used in reporting according to international standards [29, 30]. But under the conditions of the transition of global business practice to the system of sustainable development, the financial approach is characterized as a primitive system of keeping documentation and applying accounting procedures. Therefore, the principle of capital preservation according to the rules of SDA is a modern innovative solution for representing the value formed in the financial result of economic activity, which is visualized in Fig. 8.

Limitations of this study include dependence on the quality of input data and the need for long-term training and adaptation of staff to new accounting approaches. Such limitations must be taken into account when attempting practical application while calculating the net value of the assets of sustainable development of the enterprise, as well as in further theoretical studies to optimize processes.

Disadvantages of the study include limited generalization of the results due to the specificity of the Ukrainian enterprises that participated in the pilot project. This can make it difficult to directly apply the results in other regional contexts or in enterprises of other industries without additional adaptations.

The development of this study may consist in expanding the empirical base to include a larger number of enterprises from different industries and countries, which will make it possible to generalize and improve the accounting model of sustainable development. A deeper study into the influence of non-financial indicators on the long-term value of the enterprise is also possible, including an analysis of the relationships between environmental stability, social responsibility, and economic efficiency.

7. Conclusions

1. By integrating both an integrated approach to accounting and supporting reporting, businesses can more effectively report on their environmental and social performance. This double method allows for a more detailed representation, promoting compliance with GRI standards among enterprises that apply the principles of sustainable development not only in the process of economic activity but also in the process of collecting, registering, and representing data for accounting. The results highlight the need for transparency and the potential to increase stakeholder trust through detailed disclosure of environmental and social performance.

2. Our study has deepened the classification of accounting objects within the framework of Sustainable Development Accounting (SDA), explored their possibilities for representation in accounting and reporting systems. This analysis confirmed that the classification of assets, liabilities, income, and expenses according to SDA is not only con-

sistent with standard accounting practices but also includes a strategic level for managing environmental and social impacts. This integration plays a critical role in increasing the strategic and operational transparency of enterprises, highlighting the direct link between sustainable practices and corporate accountability.

3. It was highlighted how the assessment of net assets, including environmental and social factors, offers a valuable indicator for increasing the investment attractiveness of enterprises. The study found that assessing eco-social capital is integral to understanding the broader economic impact of sustainability initiatives. It emphasized the importance of this assessment to inform strategic decisions that balance economic growth with environmental protection and social responsibility. The analysis also indicated the need for constant improvement and adaptation of accounting practices to better reflect the dynamic nature of sustainable development.

Conflicts of interest

The authors declare that they have no conflicts of interest in relation to the current study, including financial, personal, authorship, or any other, that could affect the study and the results reported in this paper.

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Data availability

All data are available, either in numerical or graphical form, in the main text of the manuscript.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the current work.

References

1. Savchenko, O., Datsiy, O., Baida, A., Zima, G. (2015). Environmental costs: problems of law, accounting and taxation. *Ekonomika ta derzhava*, 5, 11–19. Available at: http://www.economy.in.ua/pdf/5_2015/4.pdf
2. Maliuha, N. M. (2006). *Kontseptsiya rozvytku bukhhalterskoho obliku v Ukraini teoroetyko-metodolohichni osnovy*. Zhytomyr: ZhDTU, 84.
3. Zhuk, V. M. (2009). Paradyhma bukhhalterskoho obliku ekonomiky harmoniynoho rozvytku. *Ekonomichni nauky. Seriya: «Oblik i finansy»*. Zbirnyk naukovykh prats, 6 (24), 171–182. Available at: <https://magazine.faaf.org.ua/paradigma-buhgalterskogo-obliku-ekonomiki-garmoniynogo-rozvitku.html>
4. Matviychuk, M. Z. (2013). Teoretychni aspekty funktsionuvannia upravlinskoho obliku na pidpriemstvi. *Innovatsiyna ekonomika*, 6 (44), 299–305. Available at: http://nbuv.gov.ua/UJRN/inek_2013_6_73
5. Gasparyan, V. (2023). Perspectives of accounting valuation of the ecosystem of sustainable development. *Economics, Finance and Accounting*, 2 (12), 65. <https://doi.org/10.59503/29538009-2023.2.12-65>
6. Noori, H., Yao, J., Hussein, W. (2023). Sustainable Development Education in Accounting: Embedding Environmental and Social Responsibility. *International Journal of Recent Research in Social Sciences and Humanities (IJRSSH)*, 10 (4), 126–131. Available at: https://www.researchgate.net/publication/375244527_Sustainable_Development_Education_in_Accounting_Embedding_Environmental_and_Social_Responsibility
7. Tao, F. (2023). The essence of accounting under the sustainable development view. *Highlights in Business, Economics and Management*, 18, 201–205. <https://doi.org/10.54097/hbem.v18i.12557>

8. Othman, R., Ameer, R. (2024). Rethinking accounting education for a sustainable future: charting a course for sustainable development goals 2030. *Meditari Accountancy Research*. <https://doi.org/10.1108/medar-05-2023-2009>
9. Kryukova, I., Ivanchenkova, L., Lagodiienko, N. (2024). Organization of accounting of business entities of the agricultural sector based on sustainable development. *Business Navigator*, 2 (75). <https://doi.org/10.32782/business-navigator.75-4>
10. Koriahin, M. V., Kutsyk, P. O. (2015). *Kontseptualnyi rozvytok metodolohiyi bukhhalterskoho obliku*. Lviv: LKA, 239.
11. Alrowwad, A. M., Alhasanat, K. A., Sokil, O., Halko, S., Kucherkova, S. (2022). Sustainable transformation of accounting in agriculture. *Agricultural and Resource Economics: International Scientific E-Journal*, 8 (2), 5–29. <https://doi.org/10.51599/10.51599/are.2022.08.02.01>
12. Adams, C. A. (2020). Sustainability Reporting and Value Creation. *Social and Environmental Accountability Journal*, 40 (3), 191–197. <https://doi.org/10.1080/0969160x.2020.1837643>
13. Alexander, A., Walker, H., Delabre, I. (2022). A Decision Theory Perspective on Wicked Problems, SDGs and Stakeholders: The Case of Deforestation. *Journal of Business Ethics*, 180 (4), 975–995. <https://doi.org/10.1007/s10551-022-05198-8>
14. Beckmann, M., Schaltegger, S., Landrum, N. E. (2020). Sustainability management from a responsible management perspective. *Research Handbook of Responsible Management*. <https://doi.org/10.4337/9781788971966.00016>
15. Ramazanov, S. (2016). The problem of sustainable development and the integrated model of eco-economic management under the global crisis. *Ekonomika rozvytku*, 2 (78), 63–72. Available at: http://nbuv.gov.ua/UJRN/ecro_2016_2_12
16. Burritt, R. L., Schaltegger, S., Christ, K. L. (2023). Environmental Management Accounting – Developments Over the Last 20 years from a Framework Perspective. *Australian Accounting Review*, 33 (4), 336–351. Portico. <https://doi.org/10.1111/auar.12407>
17. Vasylishyn, S., Ulyanchenko, O., Bochulia, T., Herasymenko, Y., Gorokh, O. (2021). Improvement of analytical support of economic security management of the agricultural enterprises. *Agricultural and Resource Economics: International Scientific E-Journal*, 7 (3), 123–141. <https://doi.org/10.51599/are.2021.07.03.08>
18. Chowdhury, R., Sarasvathy, S. D., Freeman, R. E. (2023). Toward a Theory of Marginalized Stakeholder-Centric Entrepreneurship. *Business Ethics Quarterly*, 34 (1), 1–34. <https://doi.org/10.1017/beq.2022.29>
19. Christ, K. L., Burritt, R. L. (2023). Exploring effectiveness of entity actions to eliminate modern slavery risk – Early Australian evidence. *The British Accounting Review*, 55 (1), 101065. <https://doi.org/10.1016/j.bar.2021.101065>
20. D'Amato, D., Korhonen, J., Toppinen, A. (2019). Circular, Green, and Bio Economy: How Do Companies in Land-Use Intensive Sectors Align with Sustainability Concepts? *Ecological Economics*, 158, 116–133. <https://doi.org/10.1016/j.ecolecon.2018.12.026>
21. Sokil, O. (2018). Taxonomy of agricultural enterprises' sustainable development reporting. *Agricultural and Resource Economics: International Scientific E-Journal*, 4 (1), 120–135. <https://doi.org/10.51599/are.2018.04.01.08>
22. Derii, V. A., Deriy, M. A. (2014). *Oblikovi ta analitychni komponenty nefinansovoi zvitnosti ta yikh rol v ekonomichnii systemi*. Zbirnyk naukovykh prats Vinnytskoho natsionalnoho ahrarnoho universytetu, Ser. Ekonomichni nauky, 2, 95–103.
23. Dijkstra-Silva, S., Schaltegger, S., Beske-Janssen, P. (2022). Understanding positive contributions to sustainability. A systematic review. *Journal of Environmental Management*, 320, 115802. <https://doi.org/10.1016/j.jenvman.2022.115802>
24. Al Sharari, F., Yemelyanov, O., Dziurakh, Y., Sokil, O., Danylovysh, O. (2022). The energy-saving projects' impact on the level of an enterprise's financial stability. *Economic Annals-XXI*, 195 (1-2), 36–49. <https://doi.org/10.21003/ea.v195-04>
25. Zbarsky, V. K., Trusova, N. V., Sokil, O. H., Pochernina, N. V., Hrytsaienko, M. I. (2020). Social and Economic Determinants for the Development of Resource Potential of Small Forms of Agrarian Production in Ukraine. *Industrial Engineering & Management Systems*, 19 (1), 133–142. <https://doi.org/10.7232/iems.2020.19.1.133>
26. Sokil, O., Podolchak, N., Kniaz, S., Sokil, Y., Kucher, L. (2022). Sustainable Development Prediction of Start-ups in Ukraine. *Journal of Environmental Management and Tourism*, 13 (7), 1901. [https://doi.org/10.14505/jemt.v13.7\(63\).10](https://doi.org/10.14505/jemt.v13.7(63).10)
27. *International Financial Reporting Standards* (2009). Kyiv: Federation of Professional Accountants and Auditors of Ukraine, 1608.
28. Ostapiuk, N. A. (2011). *Bukhhalterskyi oblik u protsesakh zberezhennia kapitalu pidpriemstva. Problemy teorii i ta metodolohiyi bukhhalterskoho obliku, kontroliu i analizu*, 2 (20). 330–334. Available at: <https://eztuir.ztu.edu.ua/bitstream/handle/123456789/4757/32.pdf?sequence=1&isAllowed=y>
29. Geels, F. W. (2019). Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective. *Current Opinion in Environmental Sustainability*, 39, 187–201. <https://doi.org/10.1016/j.cosust.2019.06.009>
30. Gunarathne, N., Lee, K.-H. (2021). The link between corporate energy management and environmental strategy implementation: Efficiency, sufficiency and consistency strategy perspectives. *Journal of Cleaner Production*, 293, 126082. <https://doi.org/10.1016/j.jclepro.2021.126082>