Ministry of Education and Science of Ukraine
Dnipro State Agrarian and Economic University

ACCOUNTING, FINANCIAL, AND ECONOMIC SUPPORT FOR SUSTAINABLE DEVELOPMENT OF THE AGRICULTURAL SECTOR: THEORETICAL FOUNDATIONS AND PRACTICAL RECOMMENDATIONS

Collective Monograph

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The monograph is focused on scientific, methodical and practical aspects of accounting, financial, and economic support for the sustainable development of the agricultural sector in Ukraine. The collective monograph was published within the framework of the state budget research topics "Innovative development of accounting, taxation and control in the system of ensuring the economic stability of enterprises" (state registration number 0121U109731), "Financial support for structural modernization and innovative development of agroindustrial production in Ukraine" (state registration number 0124U000027), "Information technologies and mathematical methods for the development of the agricultural sector of the economy" (state registration number 0120U105338).

The monograph is intended for policymakers and stakeholders in agriculture, accountants, banking and finance specialists, agricultural managers, farmers, researchers and postgraduate students in agricultural economics.

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CONTENT

2.3. SUSTAINABLE DEVELOPMENT MONITORING BASED ON AN INTEGRATED ACCOUNTING AND ANALYTICAL SYSTEM

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Sustainable development is one of the key concepts of modern socio-economic development, which determines the directions of activity of states, business and society in the conditions of limited resources and environmental challenges. Achieving the goals of sustainable development requires an effective monitoring system that ensures timely identification of trends, risks and opportunities for further improvement of strategies and practices. Integration of accounting and analytical processes into a single system is a prerequisite for providing a comprehensive approach to evaluating economic, social and environmental aspects of sustainable development. Integrated accounting and analytical systems allow you to automate the collection, processing and analysis of large data ranges, increasing the accuracy and promptness of management decisions.

Modern challenges, such as digitalization of the economy, strengthening requirements for corporate social responsibility, introduction of international standards of reporting on sustainable development (including GRI, ESG criteria), make the need to improve traditional approaches to monitoring and management of development of organizations and territories. At the same time, the absence of a holistic integrated accounting and information analysis system leads to data fragmentation, complicates the evaluation of results and forecasting. Thus, the development and implementation of an integrated accounting and analytical system for monitoring sustainable development is a topical area of scientific research, which is important for both the theory of accounting and analysis, as well as for the practice of managing sustainable development in enterprises, in regions and at the state level.

The concept of sustainable development was formed at the end of the twentieth century as a response to the exacerbation of global environmental, economic and social problems. One of the fundamental documents that has laid the ideas of sustainable development was the report of the World Environmental and Development Commission and Development of the UN "Our Common Future" (1987), in which sustainable development is defined as development that meets the needs of the current generation, without threatening the possibility of meeting the needs.

Sustainable development involves a harmonious combination of three main components: economic, social and environmental. The economic component is aimed at ensuring steady growth and increasing the well -being of society. The social component involves a fair distribution of goods, overcoming poverty, and ensuring equal opportunities for all citizens. The environmental component is to preserve natural resources, environmental protection and environmental safety.

Thus, sustainable development is not just an economic growth or environmental preservation, but an integrated model of development of society, based on the balance between meeting the needs of people and environmental protection.

In 2015, a new Global Sustainable Development Program was adopted at the UN Summit - the Agenda (Agenda 2030), which defined 17 sustainable development and 169 tasks for them. These goals cover the key areas of human development: poverty elimination, quality education, gender equality, clean water and sanitation, responsible consumption, climate change and others.

The principles of sustainable development are the basis for the formation of strategies and politicians at global, national and local levels. They reflect the basic values and guidelines that must be followed to achieve sustainable development goals.

The basic principles of sustainable development are given in Table 2.3.1

Table 2.3.1

Basic principles of sustainable development

Principle	Essence
1. The principle of integration of economic, social and environmental aspects	All decisions should take into account at the same time economic efficiency, social justice and environmental sustainability. Ignoring at least one of these components leads to unbalanced development and negative consequences in the long run.
2. The principle of inter -trial justice	The needs of the current generation should be met in such a way that they do not worsen the living conditions of future generations. This principle requires the rational use of natural resources, conservation of biodiversity and minimizing environmental risks.
3. The principle of participation	Sustainable development is possible only with the active participation of all stakeholders - state bodies, business, public organizations and citizens. The involvement of the population in the planning, implementation and control processes contributes to their effectiveness and legitimacy.
4. The principle of prevention of harm.	Instead of eliminating the effects of environmental or social problems, it is necessary to prevent their occurrence. Preventive measures are more effective and economically appropriate in the long run..
5. The principle of “pollutant pays”	Responsibility for environmental pollution rests with the one who caused it. This stimulates economic entities to introduce environmentally friendly technologies and a responsible attitude to the environment.
6. The principle of fair distribution of goods and resources	Development should provide equal access to resources, opportunities and benefits for all segments of the population, regardless of gender, age, place of residence or income level.
7. The principle of openness and accessibility of information	The public has the right to timely and reliable information about the state of the environment, social processes and economic development. This contributes to conscious decision -making at all levels.
8. The principle of adaptability and flexibility	Sustainable development strategies should be able to adapt to changing conditions, new challenges and risks such as global crises, technological changes or climate changes.

In addition, an important aspect is the territorial balance of development. Sustainable development involves not only the development of large cities, but also the support of

rural areas, the regions that are lagging in development, with equal opportunities for all communities.

Modern business operates in conditions of increased attention to the issues of sustainable development, ethical conduct of economic activity and social responsibility to society. In the context of business activity, the concept of sustainable development has become implemented in the concepts of corporate social responsibility and ESG - approaches (ecology, social responsibility, corporate governance). Companies are increasingly integrating the principles of sustainable development into their strategies as a means of improving their competitiveness and attracting investors.

The social responsibility of business has become an integral part of the strategy of companies that focus on sustainable development. Business social responsibility covers a wide range of aspects, including environmental responsibility (the efforts of companies to minimize the negative impact on the environment, in particular through reduction of emissions, rational use of resources, waste processing and implementation business, honesty in cooperation with partners, suppliers and clients, as well as prevention of corruption), social initiatives (community investments, participation in charitable projects, support of educational programs, health care and cultural activities).

As a result, the concept of sustainable development is based on the idea of a comprehensive approach to human development, where economic growth, social well - being and environmental protection are considered as interrelated and equally important goals. The principles of sustainable development are guidelines for creating a fair, safe and prosperous world for present and future generations.

Effective monitoring and management of sustainable development processes require a clear system of indicators (indicators) that allow you to quantify and qualitatively evaluate the achievements of certain goals. Sustainable development indicators are an important tool for making sound decisions at national, regional and local levels.

Sustainable development indicators are quantitative or qualitative characteristics that reflect changes in the state of economic, social and environmental spheres of society in the context of achieving sustainable development goals. Their main task is to provide objective information to evaluate the dynamics of development, identify problematic zones and make management decisions. The system of sustainable development indicators is an extremely important element in the mechanism of implementation of sustainable development principles. It provides measurement of progress, identification of problem areas and creates an information basis for effective management of sustainable development at all levels.

The need to develop a system of indicators is due to several factors, in particular, the multidimensionality of sustainable development; the need to measure the results and consequences of implementation of sustainable development strategies; Provision of transparency and accountability of management processes. The basic requirements for sustainable development indicators are summarized in Fig. 2.3.1.

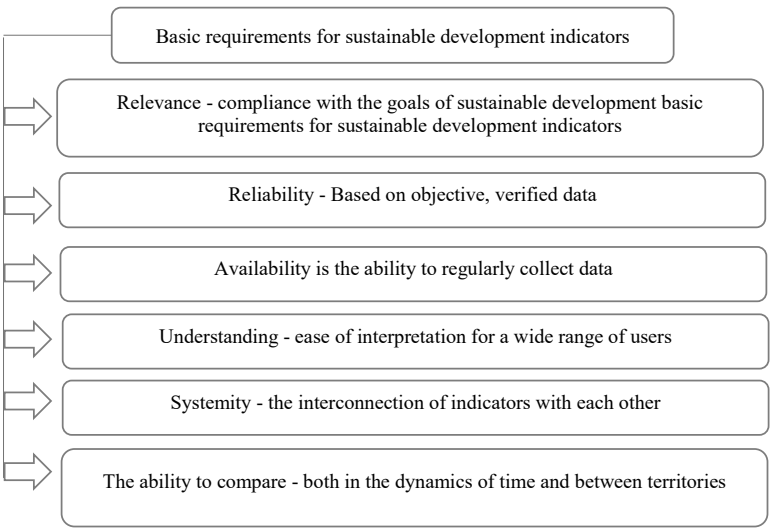

Fig. 2.3.1. Basic requirements for sustainable development indicators

One of the first international attempts to create a system of the UN Sustainable Development Commission was to create a basic set of 58 basic indicators grouped in thematic areas: social, economic, environmental and institutional aspects.

In 2015, 17 Sustainable Development and more than 230 global indicators were defined in 2015 with the adoption of the Sustainable Development Agenda by 2030 (Agenda 2030) to evaluate their achievement. The main groups of these indicators cover areas such as poverty, food security, health and prosperity, education, gender equality; clean water and sanitation; available and net energy; decent labor and economic growth; innovation and infrastructure; reduction of inequality; sustainable development of cities; consumption and production; control of climate change; conservation of oceans and land ecosystems; peace and justice; Partnership for sustainable development. Each of the goals has the appropriate tasks, as well as quantitative and high -quality indicators that allow you to track progress.

A typical indicator system has a multi -level structure. Basic indicators (general, universal indicators) are the same for all countries or regions (for example, Gross internal product per capita, poverty levels, greenhouse gas emissions). Specific indicators: consider the features of national or regional development (for example, the level of renewable energy in a particular country). Complex indices: combine several indicators into a single generalized indicator (for example, the Human Development Index, the environmental stability index). Sustainable development monitoring is also often used so

-called signal indicators, which indicate the appearance of potential threats or deviation from the desired trend. Examples of the main indicators in the components of sustainable development are shown in Fig. 2.3.2.

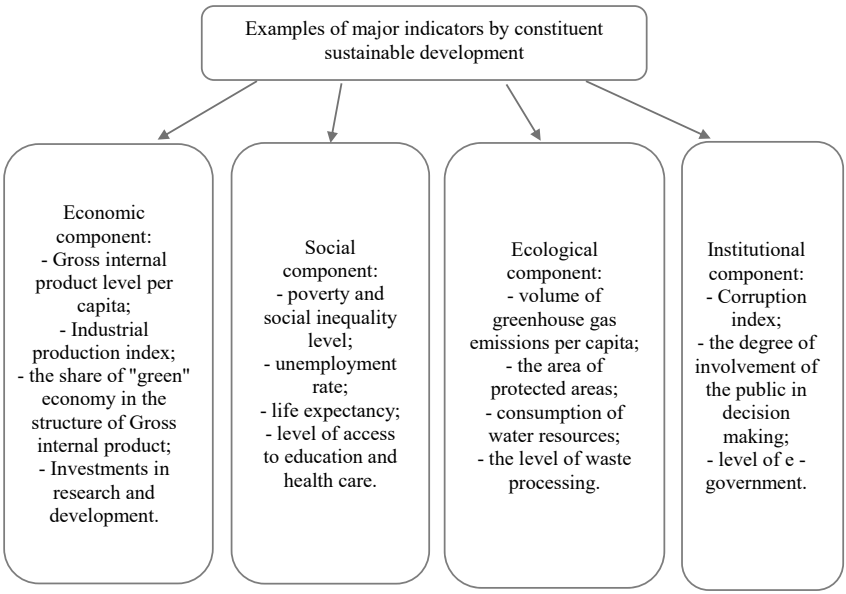

Fig. 2.3.2. Examples of major indicators by constituent sustainable development

Despite significant achievements in creating indicators, there are a number of calls, in particular, the different availability of statistics in different countries and regions; ambiguity of evaluation of some phenomena (for example, the impact of innovation on the environment); the problem of complex measurement of quality of life and welfare; The need to reconcile global and local indicators. It is also important to keep in mind that the indicators should be dynamic - in the process of changes in development priorities, there is a need to adapt the indicator system to new challenges and realities.

Further development of the system of sustainable development indicators involves:

- Big Data integration and digital technologies for information collection and processing;
- deepening the relationship between indicators and decision -making at different levels of management;
- development of localized systems of indicators for assessing the sustainable development of territorial communities and enterprises;
- increasing transparency and availability of data for all stakeholders.

In modern conditions, monitoring of sustainable development requires the effective organization of processes of collection, processing, analysis and interpretation of data.

One of the key tools for ensuring this process is accounting and analytical systems that integrate financial, economic, environmental and social information to support management decisions and evaluate development results.

The accounting and analytical system is a set of techniques, processes, technical means and staff that provides organized accumulation, processing and analysis of information for the needs of internal and external use. In the context of sustainable development, accounting and analytical systems should be focused not only on financial results, but also on environmental and social aspects of the organization or territory.

The main functions of accounting and analytical systems in the context of sustainable development are data collection, processing and systematization of information, analysis and interpretation of data, reporting, maintenance of management decisions. Accounting and analytical systems ensure regular accumulation of large amounts of data related to economic indicators, environmental impact and social development. These data can include both traditional financial indicators (income, expenses, profit) and non -financial indicators (emissions, number of environmental incidents, employee involvement).

Systems allow you to structure data on various aspects of sustainable development, providing comprehensive analysis. This includes the creation of databases, the segmentation of information by type of activity, regions, time periods, etc. With the help of analytical modules, accounting and analytical systems conduct a deep analysis of trends, reveal correlations between economic efficiency and environmental impact or social sphere, determine the risks and opportunities for further development. Systems generate integrated reporting, which reflects both financial and non-financial performance in accordance with international sustainable development standards (GRI Standards, Integrated Reporting <IR>, ESG-Standards, etc.). Objective and up-to-date information, formed based on accounting and analytical data, provides management of the ability to make informed decisions on strategic planning, investing, improving the efficiency of processes and reducing the negative impact on the environment.

Unlike traditional accounting and financial systems, integrated accounting and analytical systems for sustainable development should take into account such specific features as multidiscipline data (the need for processing not only financial but also environmental and social information), use of non-financial indicators (inclusion monitoring sensors, sociological surveys, etc.), big data analytics (use of modern technologies for the processing of large volumes of heterogeneous information), forecasting (construction of models of forecasting of development scenarios, taking into account environmental and social risks).

The presence of an effective accounting and analytical system, focused on sustainable development principles, is important for different groups of users of information, in particular the management of companies to make strategic decisions and increase the confidence of investors; investors and shareholders to evaluate the companies' business model and the risks of investing; state bodies for monitoring the implementation of national sustainable development plans and formation of state policy; The public to ensure the transparency of companies and raise awareness of their environmental and

society. Modern accounting and analytical systems actively use digital technologies (Fig. 2.3.3). The introduction of such systems can improve the quality of data, reduce the time for their processing, identify hidden trends and make more effective management decisions.

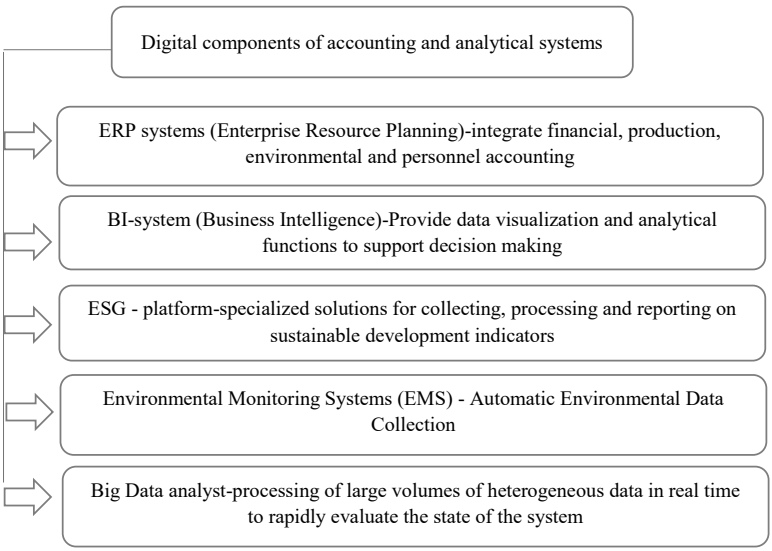

Fig. 2.3.3. Digital components of accounting and analytical systems to monitor sustainable development

Despite numerous advantages, the use of accounting and analytical systems faces some difficulties, in particular, the fragmentation of data between different units of organizations; lack of unified standards of collection and processing of non -financial information; insufficient level of digital literacy of staff; high cost of introducing complex analytical systems; Problems of reliability and completeness of data. Overcoming these challenges requires a comprehensive approach to the development of accounting and analytical systems, advanced training of staff and the introduction of digital technologies.

Therefore, accounting and analytical systems play a key role in ensuring effective monitoring of sustainable development. They ensure objective measurement of progress, support sound management decisions, and promote the transparency of organizations. The development of integrated accounting and analytical systems is an integral part of the successful implementation of sustainable development strategies at all levels-from enterprises to state.

Integrated accounting and analytical systems are an effective tool for ensuring a holistic approach to assessing the impact of activities on all areas of sustainable development. Due to the possibility of operative collection, processing and analysis of large ranges of data, they create the basis for predicting trends, risk assessment and developing effective management decisions. The development and implementation of integrated accounting and analytical systems as a tool for monitoring sustainable development is an extremely urgent area for both business and public administration. It helps to ensure balanced development, increase the efficiency of resource management, reduce environmental load and social risks, which meets the global challenges and needs of modern society.

The integrated accounting and analytical system are a complex organizational and technical platform that provides the combination, processing, analysis and storage of data required to monitor economic, environmental and social indicators of sustainable development. The main purpose of such a system is to create a single information space to support the decision -making process based on complex and up -to -date information.

The structure of the integrated accounting and analytical system is formed on a modular principle and includes several basic subsystems (Table 2.3.2).

Table 2.3.2

The structure of integrated accounting and analytical system

The subsystem of the integrated accounting and analytical system	The task of the integrated accounting and analytical system subsystem
Data collection subsystem	Provides accumulation of information from various sources: internal information systems of the enterprise (ERP, CRM, HRM), external databases, environmental monitoring systems, sociological research, open registers, etc. It is important that this subsystem maintains both automatic and manual data input
Data Processing and Verification Subsystem	Data obtained from different sources require standardization, errors, verification for reliability and coordination with each other. The subsystem provides the quality of data required for further analysis
Analytical subsystem	Responsible for data processing, construction of analytical models, comparative analysis, forecasting and modeling of development scenarios. It is in this subsystem that complex estimates of sustainable development indicators are formed
Report management subsystem	Forms regular and special reports in accordance with the requirements of international and national sustainable development standards (GRI, ESG, SDGS). Supports Flexible Data Formats for Different User Group.
Data visualization subsystem	Provides visual presentation of information in the form of graphs, diagrams, cards, interactive panels (Dashboard), which facilitates data perception and allows you to quickly identify problem areas
Safety and access subsystem	Is responsible for protecting data from unauthorized access, ensuring the confidentiality of information and managing the rights of users of the system
Integration subsystem	Provides interaction of an integrated accounting and analytical system with other enterprise information systems or external platforms by using API, data exchange protocols, integration modules.

Integrated accounting and analytical system provides a wide range of functional capabilities that contribute to effective management of sustainable development processes:

- comprehensive monitoring of economic, environmental and social indicators - the system allows you to track key indicators of activity in all three dimensions of sustainable development, to identify deviations and trends;
- support of management decisions - thanks to analytical functions, the system forms reasonable recommendations for strategic and operational management;
- evaluation of the effectiveness of implementation of sustainable development programs - the system analyzes the degree of achievement of the set goals and objectives within the framework of relevant strategic documents or corporate initiatives;
- risk analysis - integrated accounting and analytical system helps to identify risks (environmental, social, economic) and opportunities for further development, which allows to form adaptive strategies;
- automation of reporting processes - the system automatically generates reports in accordance with international standards, reducing the load on employees and minimizing the risks of errors;
- forecasting and modeling of development scenarios - thanks to the built -in forecasting algorithms, the integrated accounting and analytical system allows you to evaluate the likely scenarios of changes in key sustainable development indicators on the basis of different assumptions;
- multi -service analysis - the system is able to simultaneously evaluate several interconnected criteria, which ensures the complexity of approach to evaluation of activity;
- Flexibility of settings and scalability - an integrated accounting and analytical system can be adapted to the specific activity of a particular organization, industry or region, as well as scaled according to increased needs.

It is important for the effective functioning of the integrated accounting and analytical system to implement modern technological solutions, in particular, Big Data technology for processing large volumes of heterogeneous data; machine learning to identify hidden patterns and improve predictive models; cloud technologies to ensure data accessibility and optimization of IT infrastructure costs; IOT (Internet of Things) for automatic collection of environmental and production data in real time; blockchain technologies to increase the accuracy and protection of data.

The integrated accounting and analytical system are an integral part of effective monitoring of sustainable development. Its structure should ensure the collection, processing, analysis and visualization of information from various sources, while functionality should be focused on supporting management decisions and ensuring transparency of activity. The use of such systems contributes to a more comprehensive approach to the management of sustainable development and creates preconditions for achieving long -term goals of economic growth, social well -being and environmental safety.

Effective monitoring of sustainable development requires not only high-quality data, but also the use of appropriate models of collection, processing and analysis of information. Such

models allow you to systematically evaluate the achievements of sustainable development goals, identify risks, predict changes and optimize management decisions.

Collecting data for sustainable development purposes involves the integration of various sources of information and the use of methods that provide representativeness, relevance and reliability of data. Basic data collection models include surveys and questionnaires (used to obtain information on social aspects of sustainable development: employment level, access to education, level of welfare of the population, etc.), monitoring with the help of sensory networks and IOT (allows to collect environmental and production data in real time: level of pollution, water, water Statistical bodies, business registration information, tax revenues, social payments), Open Data and Big Data Approaches (use of open data sources (reporting companies, UN international databases, world bank) and large volumes of unstructured information (social networks, satellite monitoring certain aspects of sustainable development). The choice of data collection model depends on the specifics of the evaluated indicator, the resources of the organization and the required accuracy of the results.

Sustainable development monitoring data requires streamlining, cleaning and transformation of information for further analysis. Basic processing models include ETL processes (Extract, Transform, Load) (Standard Data Working Model: Data Extract from Different Sources, Convert into the desired format and download into a centralized data warehouse), data purification models (provide for detecting and correcting data. Different sources into a single data set, unified by structure and format), standardization of data (use of uniform classifiers, codes and methodological approaches, which ensures the comparability of data between different sources and periods), the use of metadata (support of basic data on the source, collection method, relevance period, which improves the quality of analysis). Quality data processing is the key to the accuracy and reliability of further conclusions.

Analysis of data for monitoring of sustainable development involves the identification of patterns, evaluation of dynamics, construction of forecasts and formation of management recommendations. The main analysis models include several types of analytics. Descriptive analytics (descriptive analysis) provides an assessment of the current state of monitoring objects, identification of basic trends and characteristics by individual sustainable development indicators. Diagnostic analytics examines the causes of certain changes in sustainable development indicators, identifies dependencies and factors of influence. Prognostic analytics uses mathematical models and machine learning algorithms to predict future changes in key indicators. Prescriptive analytics formulates recommendations for optimization of processes and achieving the desired results of sustainable development based on the modeling of different scenarios. Index analysis involves the construction of aggregate sustainable development indices based on a set of individual indicators, which allows to estimate the overall level of sustainability of the object. SWOT analysis in the context of sustainable development involves the identification of strengths and weaknesses, opportunities and threats to ensure a balanced development of an organization or region. Multiple statistical analysis means the use of clustering, factor and regression analysis methods for a deeper understanding of complex relationships between indicators. Each model of analysis has its advantages and

restrictions, so in practice, a combination of several approaches is often used to obtain a comprehensive assessment.

Data collection, processing and analysis models are key elements of effective sustainable development. Their correct choice and application depend on the reliability of the assessment of the current state, the objectivity of forecasting future changes and the effectiveness of management decisions. Modern technological solutions make it possible not only to automate these processes, but also to significantly increase their analytical depth, which is an important prerequisite for achieving sustainable development goals at global, national and corporate levels. Modern information and communication technologies, including database management systems (SQL, NOSQL), are actively used to implement these models; Business Intelligence (Power Bi, Tableau, Qlik) platforms; artificial intelligence -based analytical platforms (IBM Watson, Google AI); Cloud data for data processing (AWS, Microsoft Azure, Google Cloud); GIS technologies (ARCGIS, QGIS) for spatial data analysis. The integration of such tools into a single accounting and analytical system can significantly improve the quality and speed of information processing, as well as expand analytical capabilities.

In the context of digital transformation, information technologies play a key role in ensuring effective monitoring of sustainable development processes. They allow to collect large amounts of heterogeneous data, to process them promptly, to carry out a deep analytical analysis, to visualize the results and to provide access to information to a wide range of stakeholders. The use of information technologies increases the accuracy, timeliness and quality of monitoring, contributes to increased transparency and validity of management decisions.

Integration of IOT devices allows to receive in real time accurate data on consumption of resources, emissions of pollutants, the state of the environment. This allows you to respond promptly to critical changes and maintain process stability. Cloud services provide flexible access to data and computing capacities from anywhere in the world. They allow to combine data from different organizations and territories to build national or international monitoring systems.

AI/ML technologies are used for automatic processing of large data ranges, identifying hidden dependencies, predicting future trends and optimizing management decisions to achieve sustainable development goals. Geoinformation systems (GIS technologies) make it possible to perform spatial analysis of data, visualize information on maps, analyze the territorial distribution of sustainable development problems (eg, pollution level, infrastructure availability). Blockchain can be used to ensure the transparency and reliability of monitoring data, especially in the issues of accounting of greenhouse gas emissions, and the management of environmental initiative certification.

Examples of use of IT technologies in Sustainable Development Monitoring are given in Table 2.3.3.

Among the advantages of using information technologies in monitoring of sustainable development, it is advisable to distinguish: Increasing the speed of information processing (data are processed almost in real time, which allows to respond promptly to

deviations), expanding analytical capabilities (deep analytics helps to identify complex relationships between different aspects of sustainable development), reduction of costs). Improvement of transparency and accountability (information systems contribute to data openness and attract a wide range of stakeholders in progress assessment).

Table 2.3.3

Examples of using IT technologies in sustainable development monitoring

IT technologies	Applied solution
Air quality monitoring systems	Using sensors to collect data on concentration of harmful substances and create open cards of contamination in real time
Aggregated Platforms of Sustainable City Development (Smart City Dashboards)	Integration of energy consumption, transport, safety, state of the environment for the formation of a comprehensive picture of sustainable development of urban territories
Analysis of satellite images	Use of satellite data to evaluate land use changes, forests, reservoirs, agricultural land
ESG analytics platforms	Information systems that combine the financial, environmental and social information of companies to evaluate their compliance with the principles of sustainable development

Despite the numerous advantages, the use of information technologies faces certain challenges, in particular, the issue of personal data protection and confidentiality; high costs for the introduction of modern technologies; the need for data standardization and analysis techniques; shortage of qualified personnel to work with analytical systems; providing digital inclusion for different population groups. Overcoming these challenges is an important condition for the effective use of information technologies in the interests of sustainable development.

Information technologies open new opportunities for qualitative monitoring of sustainable development. They allow to carry out a more complete, accurate and prompt analysis of processes that influence the economic, environmental and social dimensions of society. In the future, improving technological solutions and expanding their application will help to achieve more effective sustainable development goals at global and local levels.

In the context of rapid digitalization of the economy and strengthening requirements for transparency of activity of enterprises, accounting and analytical systems are of particular importance. They become not only a means of fixing business operations, but also a tool of strategic management, assessing the efficiency of activity and monitoring sustainable development. Assessment of the current state of accounting and analytical systems reveals the main trends, problems and prospects of their development.

The general trends in the development of accounting and analytical systems are shown in Fig. 2.3.4.

Most enterprises are actively implementing information technologies in the field of accounting and analysis. There is automation of routine operations, use of electronic document circulation, integration of accounting programs with other business systems. The tendency to combine accounting, management, financial analysis and data analytics

into a single platform is observed in many enterprises. This allows you to ensure a holistic vision of the state of the enterprise in real time.

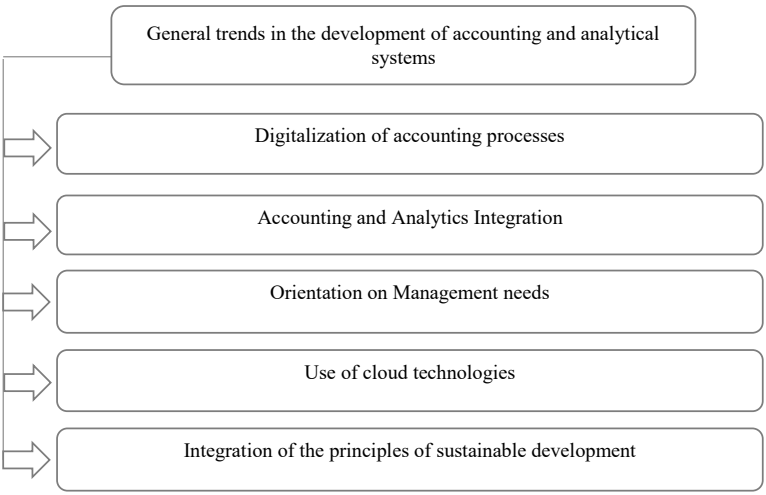

Fig. 2.3.4. General trends in the development of accounting and analytical systems

Modern accounting and analytical systems are increasingly focused on the needs of operational and strategic management. They provide information not only about past events, but also support the forecasting, planning and adoption of sound management decisions. Cloud solutions are popular due to their flexibility, scalability and accessibility. They allow businesses to reduce IT infrastructure costs and provide access to data from anywhere in the world. In response to the challenges of global stability of the enterprise, the indicators of environmental and social efficiency (ESG-indicators) begin to be introduced into their accounting and analytical systems, which contributes to the formation of a comprehensive system of monitoring of sustainable development.

Industrial enterprises often use ERP systems (Enterprise Resource Planning) that integrate accounting, production planning, material flow management and financial analytics. However, the degree of integration of analytical functions varies depending on the size of the enterprise and the availability of resources. In agriculture, accounting and analytical systems are focused mainly on the accounting of costs and income by types of products, as well as on the analysis of efficiency of use of land, resources, equipment. Digitalization here develops more slowly due to the limited financial resources and the specifics of the industry.

CRM-Relationship Management is actively implementing CRM and services in combination with accounting modules. The focus is on sales monitoring, inventory

accounting, consumer behavior analysis and optimization of logistics processes. Banks and insurance companies have a high level of development of accounting and analytical systems, including complex risk management systems, credit portfolio analysts, assets management and compulsory reporting in accordance with international standards (IFRS, BASEL III). It should be noted the presence of problematic aspects of functioning of accounting and analytical systems at enterprises. In many enterprises, accounting and analytical systems remain fragmented, individual modules work autonomously, which complicates obtaining a holistic information picture. Analytical potential is often limited to basic financial indicators. Many businesses do not use modern forecasting methods, scripts and risk assessment. Modern integrated accounting and analytical platforms require significant financial investments in the acquisition of licenses, adaptation of systems to business needs and staff training. Effective use of accounting and analytical systems requires the highly qualified employees in the field of accounting, finance, analytics and information technology, which is often a problematic aspect. Existing accounting and reporting standards do not always consider the current requirements for sustainable development and digital transformation, which limits the ability to integrated new accounting approaches.

At the same time, the transition to integrated accounting and analytical platforms should be distinguished among the prospects for the development of sustainable development monitoring based on accounting and analytical tools. We believe that the spread of accounting systems, management analytics, financial management and monitoring of sustainable development indicators is expected. Intellectual systems will be able to automatically analyze large amounts of data, formulate forecasts and recommendations for management decisions. Enterprises will integrate into accounting and analytical systems ESG indicators to assess the impact of their activities on the environment and society. Thanks to cloud technologies and automation of processes, the enterprise will be able to receive up -to -date data for real -time analysis. The development of international standards of integrated reporting will help to unify the requirements for accounting and analytical systems, increasing their transparency and comparability.

The problematic aspects of the functioning of accounting and analytical systems at enterprises and the prospects for their elimination for the needs of monitoring sustainable development are summarized in Fig. 2.3.5.

The social responsibility of business in the context of sustainable development is an important element of the modern economic system, so it requires appropriate accounting. Financial and management accounting of social responsibility of business helps to increase the transparency of businesses before interested parties, such as shareholders, employees, state bodies and society; Provides effective management of social investment and improves the image of enterprises. Effective accounting support for social responsibility ensures the integration of social and environmental aspects into the overall strategy of the company and business development in accordance with the demands of society and the environment.

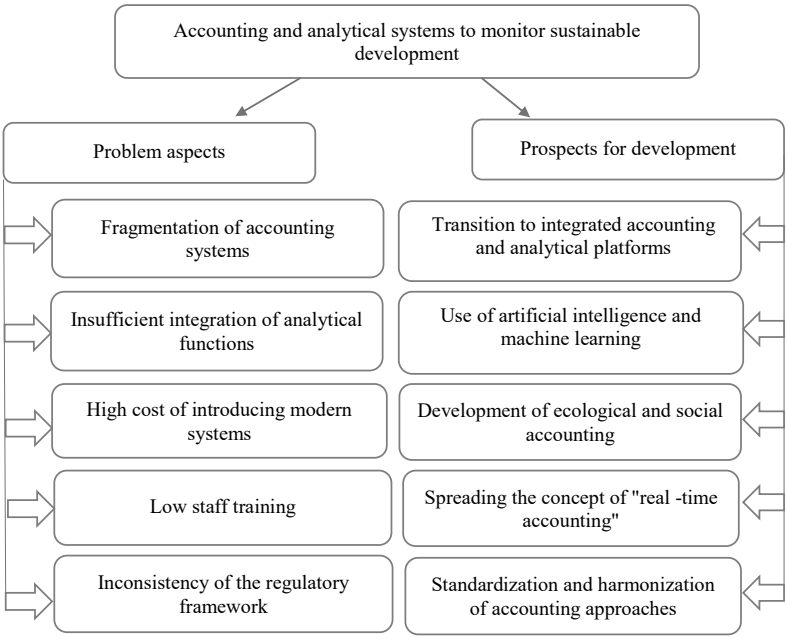

Fig. 2.3.5. Problem aspects of functioning of accounting and analytical systems at enterprises and prospects for their elimination for the needs of monitoring sustainable development

For social responsibility to be not just a declaration, but a real aspect of the company, it requires a clear accounting support. Social responsibility can be carried out in financial and non -financial forms, which provides a comprehensive approach to assessing the contribution of enterprises to the sustainable development of society. The financial accounting of business social responsibility includes reflecting the costs and investments related to social and environmental initiatives, charity or social projects, in relevant accounting items. Since social responsibility and in general the problems of society in economic dimension are increasingly subjects and subjects of a market economy, the measured components of this process are partially implemented within new or rethinking accounting objects. The choice of accounting objects is carried out taking into account that social activity of enterprises is to make decisions in the interests of the purpose and values of society, which is directed to the external environment for the formation of image in cooperation with the local community and authorities and necessarily involves the social block of the internal environment. A separate enterprise is not responsible for all social problems, but only those that generates its activities, which forms the accounting

objects. We consider it appropriate to distinguish the following basic objects of financial accounting of social responsibility of business: expenses for environmental measures; investments in social projects; costs of compliance with ethical standards of doing business; Charitable contributions and sponsorship support.

The disclosure of information in the report on the sustainable development of companies through non -financial (social) reports will allow you to present data not about how many good cases are done, but about what changes have been achieved on the results of these good cases. Therefore, reporting on the sustainable development of the company will allow stakeholders to evaluate the effectiveness of the company, based on their information requests, and the implementation of social measures will increase the business reputation of the company.

At the same time, management accounting of social responsibility of business is aimed at internal use of information to make strategic decisions. Among the tasks of management accounting of social responsibility of business should be distinguished evaluation of the effectiveness of social programs, determining the impact of social investments on financial results and formation of indicators of effectiveness of socially responsible activity. Management accounting methods allow to evaluate the contribution of each unit to the implementation of social initiatives, which contributes to the increase of management responsibility for the socio-economic development of the enterprise.

Companies calculate and monitor the costs of implementing social and environmental measures separately from the main activity. Internal control and audit mechanisms help to monitor the implementation of business programs, as well as evaluate their effectiveness and compliance with the goals set. Further development of accounting of social responsibility of business requires a comprehensive approach, including harmonization of international standards, state regulation in the field of social reporting, improving the method of measuring non -financial indicators of social responsibility and integration of digital technologies for automation of data collection and analysis.

Therefore, the assessment of the current state of accounting and analytical systems at enterprises indicates significant progress in the direction of digitalization and integration of accounting and analytical processes. However, there are numerous challenges related to technical, organizational and personnel aspects. Further development of accounting and analytical systems should be based on the introduction of innovative technologies, orientation on the requirements of sustainable development and increase of staff competence.

Sustainable development monitoring is an important tool for assessing the achievement of sustainable development goals at the level of enterprises, industries and the state. Modern challenges, including climate change, growth of social inequality, depletion of natural resources, require improvement of mechanisms of collection, processing and analysis of information. At this stage, it is urgent to develop comprehensive approaches to improving the system of monitoring of sustainable development, considering the latest technologies and concepts.

Existing systems are often characterized by distinct data in different directions of sustainable development - economic, social and environmental. The lack of unified data

for collecting and processing data complicates comparing the results of monitoring between different enterprises, regions and countries. Many systems work on outdated software platforms, which does not allow you to effectively process large amounts of data and promptly obtain analytical conclusions. The current systems mainly record the existing state of affairs, but the potential of the forecast analytics is used extremely limited. Often, monitoring is formally, without the active participation of the public, the scientific community, business and other stakeholders.

We believe that it is necessary to create a single information platform that would combine data from various sources: accounting systems of enterprises, environmental monitoring services, social surveys, state registers, etc. Such integration will ensure the completeness and reliability of the data. It is recommended to focus on international standards, including global reporting initiative (GRI), UN Sustainable Development Standards (SDG Indicators), SASB and others, which will harmonize sustainable development at global levels. Artificial intelligence tools, Big Data, cloud computing and blockchain for collecting, processing, analyzing and verifying data should be actively implemented. This will increase the efficiency and accuracy of monitoring. In addition to the basic data collection, accounting and analytical systems should provide opportunities for modeling of development scenarios, risk assessment, forecasting, and analysis of sustainable development trends. It is proposed to create public access mechanisms to monitoring results and organize regular consultations with representatives of business, scientists, public organizations and local communities to improve the quality and transparency of the system.

Effective monitoring is impossible without training. Education programs for employees of enterprises, analysts and civil servants on the use of modern accounting and analytical systems and sustainable development standards should be implemented. Methods for evaluating sustainable development indicators should be regularly reviewed and updated in accordance with new scientific developments, technological changes and international requirements.

The concept of integrated accounting and analytical system of sustainable development involves the formation of a list of structural components, which will include modules of data collection, data processing and validation, analytical module, reporting module and communication module (Table 2.3.4). Improvement of accounting and analytical tools of the Sustainable Development Monitoring System is a prerequisite for ensuring an effective transition to a stable model of economic development. Integration of modern technologies, standardization of approaches, attracting stakeholders and forecasting will allow you to create an effective and effective monitoring system that can ensure the achievement of global and national sustainable development goals.

The introduction of an integrated accounting and analytical system at the enterprise is a complex, step-by-step process that requires careful preparation, coordinated actions of all structural units and a clear strategic vision. Successful implementation of such a system provides an enterprise to increase the level of management efficiency, transparency of reporting, reduce costs and improve control over the implementation of sustainable development goals.

Table 2.3.4

Sctuine components of the integrated accounting and analytical system of monitoring of sustainable development

Module	Tasks
Data collection module	Automatic receipt of information from primary sources, including financial statements, environmental monitoring, results of social surveys
Data Processing and Validation Module	Providing data quality check, structuring and standardization in accordance with the requirements set
Analytical module	Formation of sustainable development indicators, construction of forecast models, analysis of deviations and risk detection
Reporting module	Automated Creation of Regular Reports for Internal Use and Publication, including in interactive formats
Communication module	Interactive interaction with external users of the system through web portals, mobile applications, social networks

In general, the process of introducing an integrated accounting and analytical system includes the following main stages:

- preliminary audit and determination of the needs of the enterprise;
- formation of requirements and technical projection;
- selection or development of software;
- system implementation: technical integration and settings;
- staff training;
- testing, launch and support;
- evaluation of implementation efficiency.

At the stage of the previous audit and determining the needs of the enterprise, a comprehensive survey of the current state of accounting, analytical and information processes at the enterprise is carried out. Audit covers the evaluation of available software and infrastructure; analysis of the needs for monitoring sustainable development (economic, environmental, social components); identification of existing problems and narrow places in the accounting and reporting system; study of staff competencies and degree of readiness. The results of the audit are the basis for the technical task for the development or adaptation of the integrated system.

Upon completion of the audit, a technical task is developed, which indicates the functional, technological and analytical requirements for the future system. At this stage, it is important to provide accounting for the specific activity of the enterprise; support for sustainable development indicators (in accordance with international or national standards); possibility of integration with available information systems (ERP, CRM, etc.); The need for automatic reporting and real -time analytics. System architecture is developed, data sources, information processing logic, control and protection mechanisms are determined.

Depending on the resources of the enterprise and the complexity of the requirements, two ways of selecting or developing software, in particular, the use of ready-made

software (such as BAS ERP, SAP, Microsoft Dynamics 365, Odoo, etc.) with appropriate adaptation or development of individual solutions based on open code or ordering of your own software in IT-computer. When choosing, special attention is paid to flexibility, scalability, the cost of support and the availability of technical support.

Implementation of the system, including technical integration and settings, covers the installation of the system on servers or cloud platforms; setting up interfaces, report patterns, user access; import of existing data; development of automation scenarios (for example, for monitoring CO_2-expels or costs of social programs); Testing the system on real data. In the case of complex structure of the enterprise, integration occurs in stages - first in the pilot unit, with further scaling.

The key factor in successful implementation is the training of users. At this stage, training and training sessions are held; Instructions, video tutorials, support documentation are developed; technical support (internal or external) is organized; Competent working groups or system administration centers are formed. Learning covers not only technical work with the system, but also the basics of sustainable development and principles of using analytical information to make decisions.

Before the final start, the system undergoes comprehensive testing at all levels of functioning; verification of accuracy of payments and reporting; Assessment of ease of use of interfaces. After successful testing, the system is officially put into operation. During the first months, active support of users, feedback, elimination of possible errors and improvement of individual modules are actively supported.

The final stage involves an analytical assessment of the results of the implementation, in particular, comparing the results achieved with the planned ones; measurement of economic, social and environmental effect; Formation of recommendations for further development of the system. If necessary, the functionality, expansion of the system or its integration with other digital control platforms are adjusted.

The step-by-step introduction of an integrated accounting and analytical system is an important condition for successful monitoring of sustainable development at the enterprise. Compliance with the logic of actions - from primary analysis to full operation - avoids errors, minimize the risks of implementation and ensure the expected results in the field of sustainable management.

The introduction of an integrated accounting and analytical system monitoring of sustainable development at the enterprise or in the organization provides not only the automation of individual accounting functions, but also the transformation of approaches to management, planning and control over the achievement of strategic goals. Such a system should provide the enterprise with significant advantages in the short and long term. Its effects cover economic, social, environmental and management components.

The expected results from the introduction of an integrated sustainable development monitoring system are shown in Fig. 2.3.6. One of the key advantages of the integrated accounting and analytical system is to provide quality and timely information support for the management process. Automated collection, processing and analysis of data allows the management to receive in real time generalized information on the state of basic

sustainable development indicators; detect deviations and risks in a timely manner, which allows to respond promptly to changes in the internal or external environment; make strategic decisions based on actual, reliable and related data; Introduce sustainable development policies at the level of units, based on objective information about their activities. The use of an integrated system minimizes the impact of the human factor, reduces the time for reporting and analytics, increases the accuracy of forecasting.

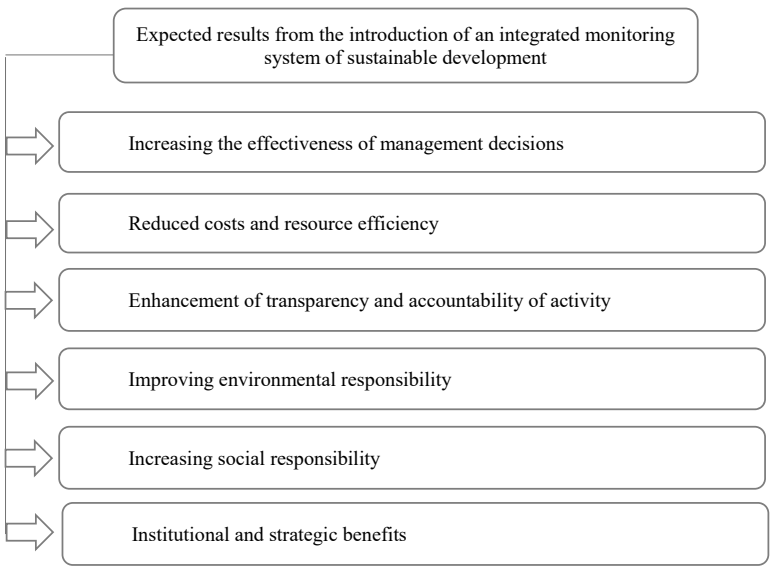

Fig. 2.3.6. Expected results from the introduction of an integrated monitoring system of sustainable development

The integration of accounting and analytical processes allows enterprises to significantly optimize their resources. Among the main effects is to reduce the cost of manual processing of information, duplication of functions and management decisions; reduction of paper reporting and transition to digital workflow channels; optimization of energy, raw materials, fuel and other resources through more accurate accounting and control; Reduction of environmental payments by introducing emissions and waste monitoring mechanisms. Thus, the system helps to increase the overall resource efficiency of the enterprise, which is an important component of sustainable development.

The integrated accounting and analytical system form a single information space that provides transparency of processes for both internal and external users of information. This includes automatic formation of standard and non -standard reporting in accordance

with the requirements of international and national standards; facilitating audit checks through centralized storage of information; simplification of the procedure of ESG reporting (environmental, social, management spheres); increased confidence of investors, partners and consumers in the enterprise; compliance with the principles of corporate social responsibility. Transparent monitoring system also provides public presentation of results in the field of sustainable development, which has a positive effect on the reputation of the organization.

Through the introduction of an integrated accounting and analytical system, the enterprise can monitor environmental indicators (emissions, water consumption, waste, use of alternative energy sources, etc.); analyze the dynamics of environmental load and take preventive measures; more efficiently implement environmental management policy; to prepare environmental passports, declarations and other forms of reporting. This contributes to compliance with environmental standards, reducing the negative impact on the environment and maintaining the image of an environmentally responsible manufacturer.

Monitoring of social aspects (employment, gender equality, labor protection, participation in community development) is also an important function of an integrated accounting and analytical system. The system allows you to track key social indicators in dynamics; analyze the effectiveness of social development programs; identify problem areas in the field of labor safety or labor relations; to prepare internal and external reporting in social aspect of sustainable development. Due to this, the enterprise forms a positive social image and increases the confidence of employees and the local community.

In the long run, the integrated accounting and analytical system becomes an important tool for the institutional development of the enterprise. It allows to form a culture of sustainable management; coordinate internal processes with sustainable development goals; implement the principles of integrated data based on data; To achieve compliance with international standards, such as ISO 14001, GRI, SDG Reporting Framework and more. The system also facilitates participation in international environmental and social initiatives, which opens access to new markets and investments.

Therefore, the introduction of an integrated accounting and analytical system for monitoring sustainable development is not only a technical improvement, but also a strategic step towards building a modern, efficient and socially responsible enterprise. The systematic approach to data collection and analysis makes it possible to achieve qualitative changes in decision -making, improve environmental security, social responsibility and overall business competitiveness.

Thus, the study found that sustainable development is a multidimensional concept that encompasses economic efficiency, environmental security and social responsibility. Enterprises seeking to achieve sustainable development goals should have tools for comprehensive monitoring of these three components based on reliable, structured and operational information. Analysis of the system of sustainable development indicators has allowed to distinguish key areas of measurement of progress - economic, environmental and social. However, the effectiveness of using these indicators depends on the

availability of information and analytical support, capable of synchronizing data from different sources and providing timely analytics for management needs.

The work substantiates the importance of introducing an integrated accounting and analytical system, which serves as a tool for monitoring the sustainable development of the enterprise. The developed concept of an integrated accounting and analytical system provides comprehensive monitoring of economic, environmental and social indicators of sustainable enterprise development in real time. Unlike existing approaches, the proposed system allows you to integrate data from heterogeneous sources (accounting, environmental monitoring, HR-Date) into a single analytical environment for prompt decision-making. Such a system not only optimizes management processes, but also strengthens competitiveness, forms an open, environmentally and socially oriented model of management, which meets the requirements of the modern knowledge economy. An innovative approach to assessing the effectiveness of sustainable development of enterprises based on dynamic analysis of key indicators in an integrated accounting and analytical system, which is to use automated collection and data analysis to assess the achievement of sustainable development goals, which increases the accuracy of assessment and efficiency of management measures.

The algorithm for the introduction of an integrated accounting and analytical sustainable development system, which covers all key stages, is generalized-from the previous audit to a full-fledged launch and evaluation of efficiency, which allows to provide a unified approach to the implementation of such projects in different sectors of the economy. The complex of expected effects from the introduction of an integrated system, in particular, increased transparency, improving the quality of management decisions, reducing costs and improving environmental and social responsibility of enterprises is determined, which allows to evaluate the feasibility of digital transformation of accounting functions in the context of sustainable development.

The practical importance of the conducted research is the development of a structured algorithm for the introduction of an integrated accounting and analytical monitoring system of sustainable development, which covers key technical, organizational and personnel stages, as well as determining the complex expected effects from the introduction of such a system, which include not only economic benefits. A typical algorithm for the introduction of an integrated accounting and analytical system has been developed-from the previous audit to the full launch of the system-takes into account the current requirements of digitalization, integration of data and adaptation to the individual needs of enterprises. The expected results of the introduction of an integrated accounting and analytical system include improving the efficiency of management decisions, reducing administrative costs, ensuring transparency of activity, as well as strengthening environmental and social responsibility. The system creates the basis for strategic management focused on achieving the goals of sustainable development and promotes the transformation of the enterprise into a more flexible, adaptive and responsible structure.

SCIENTIFIC EDITION

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COLLECTIVE MONOGRAPH
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