



ORIGINAL ARTICLE

The model of environmental accounting and auditing as a factor in increasing the efficiency of management decisions at industrial enterprises in the Republic of Kazakhstan

Beibit Korabayev¹  | Gulnara Amanova¹ | Bibigul Akimova¹ | Kunsulu Saduakassova¹ | Ainash Nurgaliyeva²

¹Department of Accounting and Analysis, L.N. Gumilyov Eurasian National University, 2 Satpayev Str., Astana, 010008, Republic of Kazakhstan

²Department of Economics, Toraighyrov University, 64 Lomov Str., Pavlodar, 140008, Republic of Kazakhstan

Correspondence

Beibit Korabayev, Department of Accounting and Analysis, L.N. Gumilyov Eurasian National University, 010008, 2 Satpayev Str., Astana, Republic of Kazakhstan.

Email: beibitkorabayev@gmail.com

Abstract

The relevance of the study is conditioned by the fact that the model of environmental accounting and auditing formed in the state can have a significant impact on the financial results of industrial enterprises. Within the framework of the sustainable development goals, environmental issues have come to the forefront and affect all countries in the global community. Consequently, accounting for the costs and benefits of environmental measures is crucial information on environmental activities. The purpose of the study is to investigate the environmental accounting and auditing model of the Republic of Kazakhstan and its impact on management decisions of business entities engaged in activities related to the impact on the environment. The leading method for studying this issue is the empirical one, namely, examining the practice of applying the principles of environmental accounting and auditing, as well as replicable methodology. The study establishes that an effective environmental accounting and auditing system can not only help a company to justify its costs and taxes effectively, but also to obtain certain benefits from the state related to stimulating environmental protection activities. In the Republic of Kazakhstan, the system of environmental accounting and auditing has just begun to take shape, and the model is not



yet fully formed. The legal and regulatory framework, the system of control and incentives for law enforcement, and the system of environmental accounting and auditing continue to be developed.

KEYWORDS

cost-benefit analysis, environmental activities, industrial enterprises, management decisions, sustainable development goals

JEL CLASSIFICATION

Q01, Q50, M41

1 | INTRODUCTION

The negative impact of industrial operations on the environment requires a system of environmental accounting and auditing to control environmental liability (Muller, 2018). The waste management carried out by a company requires measurement, assessment, and information disclosure (Yu et al., 2023; Zhang & Zhu, 2022). Environmental accounting is the systematization and documentation of information on the environmental activities of an economic operator in accordance with regulations on information accounting and the formation of environmental reporting. Environmental reporting by a business entity includes: reporting of types of environmental assets; reporting of revenues and expenditures on environmental activities; reporting of the sources of financing for environmental activities; reporting of the business entity's anthropogenic impact on the environment. The subjects of environmental accounting are industrial enterprises (especially large ones) with anthropogenic impact on the environment (Díaz et al., 2022; Song & Chen, 2022). The object of environmental accounting is the environmental protection activities of an enterprise (Aysanoa et al., 2022; Lin et al., 2021). The objects of environmental accounting can be divided into two groups: accounting objects that are relevant to the environmental activities of an enterprise and anthropogenic environmental factors. These are the following forms of environmental accounting (Anarbayev et al., 2023; Solanki, 2021):

1. Environmental management accounting is an accounting that focuses on material and energy flow information, and information on costs. This type of accounting can be further classified into the following areas:
 - o segmental environmental accounting – an internal tool of environmental accounting for selecting an investment activity or project related to environmental protection from all activity processes, and for assessing its impact on the environment over a certain period (Kazak, 2017, 2018);
 - o environmental accounting for ecological balance – an internal environmental accounting tool to support the quality management and process improvement model for sustainable environmental management.
 - o corporate environmental accounting – a tool for reporting relevant information to the public, compiled according to environmental accounting rules, which is called corporate environmental reporting (Anisimova, 2020). For this purpose, the costs and effects (in quantitative and monetary terms) of the enterprise's environmental protection activities are examined (Aysanoa et al., 2022).
2. Environmental financial accounting is financial accounting that focuses on reporting the costs of environmental liability and other environmental activities (Tommasetti et al., 2023).
3. Environmental national accounting is accounting at the national level, focusing on the study of natural resource stocks and flows, environmental costs, externalities, etc. (Shoeb et al., 2022).



There are three approaches to defining environmental auditing: ecological auditing assessing the level of compliance of business systems with environmental norms and standards; ecological auditing designed to assess the effectiveness of environmental management; and ecological auditing assessing the environmental impact of a company. Comprehensive environmental audit can be defined as a management tool in the process of systematic, evidence-based, periodic, and objective assessment of all activities of a company in relation to the environment, management preparedness, and compliance of all other business conditions with the requirements of the adopted environmental policy. It is based on optimal development of internal controls and practical implementation of systematic assessment for compliance with business regulations, standards, and adopted environmental protection policy (Kapitonov & Vilks, 2022; Ljubisavljević et al., 2017). Thus, environmental accounting and auditing are essential tools for increasing the environmental responsibility of businesses and for managing the costs of ecological measures (Shahini & Bali, 2023; Zhumabekova et al., 2023).

Therefore, the purpose of this study is to examine environmental accounting and auditing issues and their impact on management decisions of industrial enterprises in Kazakhstan. To achieve the set objective, statistical data on the costs of industrial enterprises in Kazakhstan for environmental protection activities, features of the Kazakhstan model of environmental accounting and auditing, and problems of environmental accounting and auditing in the country are studied. The novelty and importance of this work lie in its examination of the model of environmental accounting and auditing and its impact on management decisions in industrial enterprises within the context of the Republic of Kazakhstan. This study contributes to the international scientific community by shedding light on the current state of environmental accounting and auditing practices in Kazakhstan, where the model is still evolving.

2 | MATERIALS AND METHODS

The ongoing model of environmental auditing of environmental accounting and auditing in Kazakhstan is becoming increasingly significant in today's activities of business entities. This is related to the need to achieve the sustainable development goals, global economic processes, the planet's single ecological system, and other aspects. Conservation measures are costly, and therefore accurate accounting and auditing in this area enables better management decisions, not only for businesses and investors, but also for the government. The following research methods were used in the course of the study:

- theoretical – the analysis involved evaluating the impact of the accounting and auditing model on financial results, while synthesis helped integrate information from different sources to understand the overall picture. Concretization involved studying specific practices and methodologies related to environmental accounting and auditing. Generalization allowed for drawing overarching conclusions and identifying factors for the development of the environmental accounting and auditing system. Comparison was employed to analyze differences and similarities between different approaches; and
- empirical – study of international regulatory documentation in the field of environmental accounting and auditing; study of the environmental accounting and auditing model of the Republic of Kazakhstan; study of regulatory documentation in the field of environmental accounting and auditing and conservation activities of the Republic of Kazakhstan; study of statistics on the costs of industrial enterprises in Kazakhstan for environmental protection activities; study of the impact of environmental accounting and auditing on managerial decisions of industrial companies.

The study was based on international and Kazakh regulatory documents in the field of environmental accounting and auditing and conservation activities, the practice of applying environmental accounting and auditing issues, statistical data from the Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics (2021), and studies of scientists and practitioners on environmental accounting and auditing issues.



The study of the issue was carried out in three stages. The first stage involved the identification of the essence of environmental accounting and auditing, its necessity for modern industrial enterprises, and the users of environmental accounting and auditing information. The structure of environmental reporting, its subject, and entity are investigated. Forms of environmental accounting are studied. Approaches to defining an environmental audit are explored. The second stage analyzes the environmental accounting and auditing model of the Republic of Kazakhstan and the impact of the information obtained on the management decisions of industrial enterprises. First, on the basis of statistical data from the Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics (2021), cost indicators for industrial enterprises in the Republic of Kazakhstan are examined by type of conservation activity, region and type of economic activity. The costs are found to have increased substantially over the last 10 years. Regulatory documentation of the Republic of Kazakhstan in the field of environmental accounting and auditing is studied, in particular the Ecological Code of the Republic of Kazakhstan (2021). The third stage involved refining the theoretical and practical conclusions and summarizing and systematizing the findings.

3 | RESULTS AND DISCUSSION

In Kazakhstan, the initiation and progress of environmental accounting are still in their early stages, whereas in advanced nations such as Germany, the United Kingdom, and the United States, they have reached a mature stage of development. The activities of industrial enterprises on the territory of the country should be carried out in accordance with the Ecological Code of the Republic of Kazakhstan (2021). It provides for comprehensive information on the environmental condition of all those who wish to obtain such information, the economic regulation of environmental protection and other aspects. The country has developed a 'Concept for the Transition of the Republic of Kazakhstan to a Green Economy' (Decree of the..., 2013) to promote a healthy environment and maintain ecology. The Concept is planned to be implemented in three stages:

- the first stage (2013–2020) – increasing the efficiency of resource use, nature conservation, and the formation of 'green' infrastructure;
- the second stage (2020–2030) – rationalization of the use of natural resources through innovative technologies, including renewable energy;
- the third stage (2030–2050) – transformation of the economy in the Republic of Kazakhstan in accordance with the principles of the 'third industrial revolution', when resources are used with the possibility of their renewal.

Consequently, environmental accounting in the industrial enterprises of the Republic of Kazakhstan is necessary. The main shortcoming of this regulatory documentation is the lack of definitions and ways of organizing environmental accounting. At the national level, the system of environmental and economic indicators of the Republic of Kazakhstan is recorded in the 'Methodology for the formation of primary indicators necessary to build an environmental account in the System of National Accounts' (Order of the ..., 2016). This methodology is designed according to international recommendations and defines the central basis of the environmental–economic accounting system as a multipurpose conceptual framework that shows the link between the economy and the environment, and the availability and dynamics of environmental resources. Total environment protection costs consist of the following: investment in fixed capital and current expenditure. Expenditures are classified by type of economic activity. Primary information is obtained from statistical surveys of enterprises, which are recorded based on primary records of actual expenditures on environmental protection. The total costs of enterprises in the Republic of Kazakhstan for environmental protection in dynamics are presented in Table 1.

The data in Table 1 indicate that expenditures on environmental protection measures have tended to increase since 2015, as in 2015 they were 574.29 million dollars, and in 2020 they are already 856.35 million dollars, that is, they have increased by 282.05 million dollars, or 49%. At the same time in 2020 there was a decrease in costs from



937.46 million dollars in 2019 to 856.35 million dollars in 2020, that is, by 81.12 million dollars or 8%. In terms of structure, most of the funds are spent on current environmental expenditures. In 2020, 469.18 million dollars or 55% was spent on current costs, and 45% or 387.17 million dollars on capital investments into environmental measures. The largest financial expenditures are on atmospheric protection, wastewater treatment, and waste management.

According to Environmental Spending Fell in Kazakhstan (2021), environmental protection costs are extremely unevenly distributed across the regions of the Republic of Kazakhstan. Thus, the leading region in terms of costs is Akmola region –0.14 billion dollars, with Atyrau region in second place with 0.098 billion dollars, and Pavlodar region in third place with 0.090 billion dollars. The lowest expenditures on environmental protection were incurred in Almaty region at –0.0054 billion dollars. The costs of environmental protection by type of economic activity are presented in Table 2.

The data in Table 2 demonstrate that the vast majority of expenditures on environmental protection in the Republic of Kazakhstan are incurred in industry, accounting for 0.78 billion dollars in 2020, while only 0.076 billion dollars was spent on other types of economic activity. The largest expenditure is on electricity, gas, steam, hot water, and air conditioning, with 0.28 billion dollars in 2020, followed by manufacturing industry with 0.25 billion dollars and mining and quarrying with 0.22 billion dollars. These types of economic activity account for the vast majority of environmental protection costs, which is primarily related to the specific nature of these enterprises. Since the costs are substantial, the issue of environmental accounting is extremely relevant, especially for enterprises in environmentally costly spheres of economic activity. Environmental accounting is now a separate branch of accounting. In addition, environmental financial and management accounting, along with environmental indicators, should be introduced into companies' reporting to increase their efficiency in the field of nature protection (Anatoliy, 2021; Yerdavletova, 2016). Kazakh businesses wishing to receive capital investment from Western investors should realize that if the company's financial statements do not include information on its environmental liabilities, the level of investor confidence in the company will be reduced. As a result, investors who are aware that a company may have

TABLE 1 Total costs on environmental protection, million \$.

	2015	2016	2017	2018	2019	2020
Total	574.29	437.39	585.16	585.16	937.46	856.35
Including						
Current expenditures on environmental protection	389.47	339.42	391.24	425.96	494.32	469.18
Investments aimed at environmental protection	184.83	97.98	193.92	247.89	443.15	387.17
By type of cost of environmental protection activities						
Atmospheric air protection and climate change problems	168.47	133.25	159.84	156.07	190.42	197.30
Wastewater treatment	136.93	121.08	119.99	129.58	131.15	149.36
Waste management	147.21	112.77	125.69	149.40	168.03	163.34
Protection and rehabilitation of soil. Ground and surface waters	47.83	45.63	49.96	44.19	50.19	36.08
Reduction of noise and vibration impact	0.069	0.089	0.087	0.13	0.12	0.087
Conservation of biodiversity and landscapes	3.55	2.99	2.35	9.35	13.98	13.47
Radiation safety	2.93	2.68	2.71	2.86	2.02	2.13
Research and development in the field of environmental protection	7.29	8.82	9.29	11.34	9.40	10.04
Other areas of environmental protection activity	60.02	10.10	115.25	170.93	372.15	284.54

Source: Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics (2021).

**TABLE 2** Environmental protection expenditures by type of economic activity, billion dollars.

	2020	2019	Change, %
Total	0.86	0.94	−9.3
Including			
Industry	0.78	0.85	−9
Mining and quarrying	0.22	0.23	−4.55
Manufacturing industry	0.25	0.31	−24
Supply of electricity, gas, steam, hot water, and air conditioning	0.28	0.28	−0
Water supply; waste collection, treatment and disposal, pollution abatement activities	0.023	0.024	−4.35
Other types of economic activity	0.076	0.091	−19.74

Source: Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National statistics (2021).

environmental liabilities, but do not see full information about them, will add to the cost of capital through a risk premium. Environmental information needs to be clearly present in the reporting of the enterprise (Abdrachmanova et al., 2019; Getman et al., 2019).

International Financial Reporting Standards (IFRS) continue to be widely adopted globally. Therefore, national companies in Kazakhstan should also use this system when preparing their financial statements. The process of transition of the Kazakh accounting system to IFRS started in 1995, and in 2006, all enterprises switched to IFRS (Abdrachmanova et al., 2019). The future costs of environmental damage are treated as estimated liabilities, which must be created in accordance with the requirements of IFRS. In particular, International Financial Reporting Standard (IAS) 37 ‘Estimated Liabilities, Contingent Liabilities and Contingent Assets’ (2015) addresses the issues of recognizing estimated liabilities, so-called provisions, in the financial statements. A provision is recognized only if the enterprise has a present legal or constructive obligation as a consequence of a past event; the enterprise's economic resources are likely to be required to settle the obligation; the liability can be measured reliably in financial terms. A provision can only be recognized if all these conditions are met.

If a company extracts minerals, a legal obligation must necessarily be recognized in its financial statements requiring the remediation of environmental damage caused by preparatory work and mining operations. This obligation is recognized as a decommissioning provision. An enterprise is required to restore the land to its pre-production condition after the end of its mining operations. As a result, depreciation of fixed assets will take place over the remaining useful life. In respect of the decommissioning provision, the provision will increase by the percentage of the discounted value of the liability. Therefore, if the discounting period is reduced, the value of the liability will increase until the liability is settled. The presented methodology for determining environmental damage liability is now applied in practice. However, there is a need for professional accountants who, when recognizing assets or liabilities in connection with the production process, have sufficient experience and knowledge of the necessary standards, and of the specifics of the legislation in the country where the company operates (Abdrachmanova et al., 2019; Vovk & Yurkevych, 2022).

Modern principles of sustainable development require the accountant to be aware of the ecological impact of the operations of businesses on the environment. It is clear that professionals with this level of qualification are more competitive in the accountancy market (Korchynskiy & Shchadylo, 2022; Zamula & Lipova, 2014). Environmental audits are carried out based on environmental accounting. Environmental auditing is a relatively new activity for the Republic of Kazakhstan. At the same time, both the state and industrial enterprises are interested in this activity. Environmental audits involve a study to assess the activities of enterprises related to environmental protection and rational use of natural resources, and their compliance with the national legislation of Kazakhstan. Environmental audit is performed with the following objectives (Ecological Code of ..., 2021): to establish the presence of environmental problems – past, existing, and future – and to develop recommendations to address problems and improve the efficiency of enterprises in the field of environmental protection and rational use of natural resources.



It is also necessary to clearly set the goals and objectives of the enterprise to determine which type of environmental audit it needs. Governmental environmental protection agencies may require the investigation of a certain set of enterprise performance indicators. However, their management, depending on the company's environmental policy, may be interested in a more detailed investigation of all aspects of the enterprise's activities at different levels of its management. An environmental audit involves a procedure to assess the compliance of the audited object with established criteria. It is conducted by independent persons (environmental auditors) and auditing organizations on the basis of a contract. The Central Executive Body of the Republic of Kazakhstan in the field of environmental protection approves the certification of environmental auditors and the establishment of a special qualification commission. The same body approves the report form on the necessity of the environmental audit (Balginova et al., 2019).

A positive effect on the organization and development of environmental audits in the Republic of Kazakhstan has been the creation of a regulatory framework. This has been a factor affecting the activities of enterprises in the field of nature protection, compliance with principles and regulations, as previously it was difficult to prove the facts of violations. Environmental audits were virtually nonexistent in the country before the enactment of the Ecological Code of the Republic of Kazakhstan (2021). After the successful implementation of the Ecological Code of the Republic of Kazakhstan (2021), environmental audits began to develop well, and the main types of audits were identified: voluntary and mandatory. Nowadays, dozens of organizations carry out environmental audits annually. Compliance with the environmental audit requirements and regulations of the Republic of Kazakhstan enables the following problems to be solved: improving the quality of audit; increasing the efficiency of environmental audit organizations; enhancing the qualifications of environmental auditors; forming a register of audit activities. The Republic of Kazakhstan has established a Chamber of Environmental Auditors, where interested parties can see the results of environmental audits. The Chamber of Environmental Auditors cooperates with the Committee of Environmental Regulation and Control. Therefore, it has the opportunity to recommend and participate in the development and implementation of documents regulating the activities of environmental protection organizations. The Chamber of Environmental Auditors has developed a model plan and procedure for environmental audit and other documents (Bakhtygeriy & Shakharova, 2019).

The existence of mandatory requirements for environmental audits necessitates changes in the management systems of enterprises. There are many studies on the efficiency of environmental management from an economic perspective, but not enough attention has been paid to the environmental efficiency of audits. Studies of existing methods for assessing the results of environmental protection activities also suggest that there are no clear methodological recommendations for enterprises to make a reliable assessment of their activities. The lack of evaluation of environmental protection activities reduces the efficiency and rationality of environmental protection decisions, which can lead to ecological problems. There is an objective need to develop methodologies for auditing the environmental and economic performance of nature conservation activities (Balginova et al., 2019). Nevertheless, the environmental audit acts as a significant factor in the economic development of the Republic of Kazakhstan. The Ecological Code of the Republic of Kazakhstan (2021) has contributed to the continuous development of environmental audits in the country. In general, the system of environmental audit does not stop developing. This demonstrates the interest of the state in environmental protection and the future well-being of the country's population (Bakhtygeriy & Shakharova, 2019; Karnitis et al., 2022). The problem with environmental accounting and auditing is that there is still insufficient understanding of how environmental information should be recorded in business accounting. It is necessary to consider the following features of conservation activities when developing environmental accounting and auditing systems in the Republic of Kazakhstan (Rakaeva et al., 2019): increased government regulation; stricter control of costs; new economic opportunities; management and control of conservation activities; environmental risks; mandatory reporting; taking protective measures; respecting the public interest; and moral responsibility (Stankevičius et al., 2020).

Environmental accounting can more accurately determine true costs by specifying the environmental impacts caused by the acquisition and processing of materials, as well as the production, sale, distribution, use, maintenance,



and disposal of goods (Magara et al., 2015). Ecological issues can affect the further strategic development of a company. Furthermore, the specific culture of a particular state affects the specific organization of accounting and management within certain aspects of sustainable development. Environmental information is necessary in business reporting and is useful for users, but its reliability may be questioned. Therefore, like any other information about a company's business operations, environmental information should be subject to analysis by the auditor, especially when the events associated with it may significantly affect the current and future activities of the company (Eremeeva, 2020; Uliutina, 2022).

Thus, environmental accounting and auditing in the Republic of Kazakhstan is currently in a state of development. Kazakhstan's model of environmental accounting and auditing is in its formative stages. Naturally, environmental accounting issues have a direct impact on the performance of industrial enterprises, as they relate to expenditures on conservation measures, taxes, etc. The same applies to the environmental audit, as its results show weaknesses in the ecological activities of the enterprise, and may cause additional costs. However, it should also be noted that the presence of an environmental component in a company's financial statements and the transparency of its environmental obligations are among the most important factors for investors when making investment decisions. The results of environmental accounting and auditing of industrial enterprises not only show the companies' expenditure on conservation measures, but also demonstrate the social responsibility of businesses and their pursuit of sustainable development (Lakomý & Alvarez-Galvez, 2022).

The model of environmental accounting and auditing can significantly contribute to the improvement of the management decision-making process at industrial enterprises in Kazakhstan. By implementing this model, several potential consequences and benefits can be realized for sustainable development and environmental protection in the country. Firstly, environmental accounting and auditing provide crucial information on the costs and benefits associated with environmental measures. This information enables industrial enterprises to make informed decisions regarding resource allocation, investment in sustainable practices, and the development of environmentally friendly technologies. It facilitates a comprehensive understanding of the financial implications of environmental actions, allowing for more effective management decision-making. Secondly, the implementation of environmental accounting and auditing fosters accountability and transparency. It ensures that industrial enterprises take responsibility for their environmental impacts and comply with regulatory requirements. By monitoring and reporting on environmental activities, enterprises can demonstrate their commitment to sustainable practices, which can enhance their reputation and improve stakeholder relationships. Thirdly, the adoption of an environmental accounting and auditing model supports the achievement of sustainable development goals. It allows for the effective evaluation of environmental performance, identification of areas for improvement, and the measurement of progress toward sustainability targets. This promotes a culture of continuous improvement and facilitates the integration of environmental considerations into the overall business strategy.

However, there are several challenges and limitations that industrial enterprises may face when implementing environmental accounting and auditing practices in Kazakhstan. These include the need for a supportive legal and regulatory framework, adequate resources and expertise, and the development of standardized methodologies and guidelines. Industrial enterprises may also encounter difficulties in accurately measuring and quantifying environmental impacts, especially in complex and diverse sectors. Furthermore, cultural and behavioral factors may pose challenges to the adoption of environmental accounting and auditing practices. Resistance to change, lack of awareness or understanding, and limited stakeholder engagement can hinder the effective implementation of these systems. In summary, the model of environmental accounting and auditing has the potential to enhance the management decision-making process at industrial enterprises in Kazakhstan. Its implementation can lead to improved environmental performance, sustainable development, and enhanced stakeholder trust. However, addressing the associated challenges and limitations is crucial to ensuring successful adoption and implementation across industrial sectors in the country.



4 | CONCLUSIONS

Nowadays, when most countries of the world community have adopted the sustainable development goals of the United Nations, the social responsibility of business is becoming increasingly important in its economic activities. This also applies to its ecological responsibility and commitment. Enterprises that act contrary to the public interest are unlikely to receive long-term capital investments, as such a strategy would make long-term company development impossible. The same applies to the company's environmental activities. However, conservation measures always involve costs. Therefore, environmental accounting and auditing information is important not only for investors, but also for the enterprise itself and the public authorities, especially those involved in the development of environmental protection activities. The users of environmental accounting and auditing information also include public environmental authorities, tax authorities, etc. This is primarily related to the fact that the government, which strives for sustainable development, is trying to ensure conditions for the widespread application of environmental management and protection principles by businesses. The state can stimulate the development of environmental protection activities by using direct and indirect methods of state regulation, including through fiscal and monetary policy, and therefore needs environmental accounting and auditing information.

Conservation measures impose a number of costs on them, which will certainly reduce the financial result in the short term. However, the state can use various methods to partially offset these costs through the tax and budget systems, thereby stimulating the development of environmental activities in the country. However, justifying the costs of environmental management and conservation measures is a daunting task that must be addressed through environmental accounting and auditing systems. Environmental reporting is crucial for various stakeholders. The enterprise must fulfill environmental protection obligations. Investors require information on a company's environmental obligations. The government aims to ensure effective conservation activities. Despite the cost and potential financial impact, an effective environmental accounting and auditing system helps businesses address environmental concerns positively. Further research on the topic should focus on exploring the implementation and effectiveness of environmental accounting and auditing systems in different industries and regions. Additionally, investigating the role of technological advancements, such as digital platforms and automation, in enhancing environmental reporting and accountability would be beneficial.

ORCID

Beibit Korabayev  <https://orcid.org/0009-0004-9091-9260>

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