

ЕКОЛОГІЯ

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ENVIRONMENTAL AUDIT AS A TOOL FOR SUSTAINABLE DEVELOPMENT
(INTERNATIONAL AND DOMESTIC EXPERIENCE)

Berezovskyi O. I.

V.N. Karazin Kharkiv National University

Abstract: The article examines the role of environmental auditing as an effective tool for ensuring sustainable development at both national and international levels. It analyzes key approaches and methodologies for conducting environmental audits and presents examples of international experience alongside domestic practices. The advantages and challenges of implementing environmental auditing in Ukraine are identified. The author concludes on the necessity to improve the regulatory framework and to intensify practical measures to enhance environmental safety and sustainable use of natural resources.

Keywords: environmental audit, sustainable development, environmental protection, international experience, regulatory framework, Ukraine.

Introduction

Environmental audit is an integral component of the modern system of natural resource management and environmental protection. Its methodological foundations and legal norms are studied by both domestic and foreign researchers, reflecting the importance of this tool for ensuring sustainable development and enhancing the environmental responsibility of enterprises. In the context of globalization and increasing environmental challenges, environmental audit becomes a key mechanism for assessing compliance with legislation and international standards, as well as promoting the implementation of innovative approaches in environmental management. The analysis of regulatory frameworks and practices of leading countries allows identifying current trends and prospects for the development of environmental auditing in Ukraine.

Literature Review

The methodological foundations of environmental auditing have been the subject of comprehensive research by both domestic and international scholars, including economists, ecologists, legal experts, and specialists in natural resource management. Within the Ukrainian scientific community, significant contributions to the study of the legal framework and methodology of environmental auditing have been made by researchers such as Maksymiv, Navrotskyi, Potravnyi, Sakhno, and Serov. They thoroughly examined the legal basis for the functioning of environmental auditing in Ukraine, emphasizing the necessity of clear regulation of this process to ensure its effectiveness and transparency [1].

Special attention has been given by Ukrainian scientists to the specifics of environmental auditing in various sectors, particularly in the privatization of enterprises, environmental risk insurance, and investment in environmentally safe projects [2].

Their works consider environmental auditing as an important mechanism for assessing the ecological aspects of economic activity, which is crucial for managerial decision-making, especially in the context of the transition to sustainable development.

In the international scientific community, the methodology of environmental auditing is also a central topic. John Elkington is well known for his works on the concept of sustainable development and the "triple bottom line," where environmental auditing is a key tool for balancing economic, environmental, and social aspects of business activities [3].

The standards and methods for conducting environmental audits, especially within the framework of international environmental management systems such as ISO 14001, are extensively discussed in the works of Williams and Whitney, who emphasize the importance of a systematic approach that includes the evaluation not only of regulatory compliance but also of the overall environmental impact of enterprises [4].

Research by Greenfield and Steelman highlights the role of environmental auditing in corporate social responsibility and enhancing companies' competitiveness [5].

Current trends in the development of environmental auditing are associated with the integration of information technologies, particularly

geographic information systems (GIS), which improve the accuracy and timeliness of audits [6].

Furthermore, increasing attention is being paid to the implementation of principles of the "green" and circular economy, which expand the scope of environmental auditing and stimulate environmentally innovative practices, as demonstrated in the works of Brown and Hall [7].

Purpose and Objectives

The purpose of this article is to review and analyze international experience in the field of environmental auditing with the aim of identifying opportunities for adapting best practices to the conditions of Ukraine. To achieve this purpose, the following objectives have been set. First, to study modern approaches and methodologies for conducting environmental audits in leading countries worldwide. Second, to analyze the regulatory and legal framework governing environmental auditing at the international level.

Third, to identify key trends and innovations in the field of environmental auditing that can be applied in the Ukrainian context. Finally, to propose recommendations for improving the national environmental auditing system, taking into account international experience.

The implementation of these objectives will contribute to enhancing the effectiveness of environmental auditing in Ukraine, strengthening environmental security, and supporting sustainable development at the national level.

Presentation of the Main Material

The legal framework for conducting environmental audits in Ukraine is defined by the Law of Ukraine "On Environmental Audit". According to Article 1 of this Law, "environmental audit is a documented, systematic, and independent process of evaluating the object of the environmental audit, which includes the collection and objective assessment of evidence to establish compliance of certain types of activities, measures, conditions, environmental management systems, and information on these matters with the requirements of Ukrainian environmental protection legislation and other environmental audit criteria" [8].

This definition can be conditionally divided into three components: the substantive essence of the term "environmental audit" as an evaluation process involving evidence collection and assessment; the qualitative characteristics of this process – "documented, systematic, independent"; and the clarification of the audit's purpose

– to establish compliance of activities and management systems with legislation and audit criteria.

A critical analysis of the normative legal acts of other countries reveals similarities in approaches to defining environmental audit. For example, in the Statement of the United States Environmental Protection Agency [9], environmental audit is defined as "a systematic, documented, periodic, and objective assessment of facilities owned or operated by business entities for compliance with environmental requirements" of audit functions.

Similarly, Makarov and Agarova [10] define environmental audit as "an extradepartmental, independent, qualified assessment, analysis, and development of recommendations based on actual results of any environmentally significant activity" [10], thus expanding the audit function to include analytical and consultative roles.

In the context of the international ISO 14000 standards, representatives of the State Scientific and Technical Center "Ecoresource", Broide Z.S. et al. [11], describe environmental audit as "a systematic and documented process of analysis aimed at obtaining or clarifying information that confirms the compliance of environmentally oriented activities, management systems, and results with established audit criteria and environmental safety" [12].

Recent studies highlight the integration of environmental auditing with the concepts of sustainable development and corporate social responsibility (CSR). In particular, Brown and Hull [7] emphasize the importance of audits as a tool to stimulate environmental innovations and the transition to a circular economy [6]. Modern methodologies also include the use of digital technologies such as Geographic Information Systems (GIS) to enhance the accuracy and timeliness of audits [12].

Thus, the legal foundations of environmental auditing in Ukraine and worldwide form the basis for a systematic, comprehensive approach to assessing environmental activities by combining regulatory frameworks, methodological tools, and modern technological solutions.

Environmental auditing in the United States of America is one of the most developed and important tools of environmental management. Its development was driven by the urgent need to control industrial impacts on the environment and the desire to ensure enterprises' compliance with environmental regulations and standards. The American experience combines both mandatory and voluntary approaches to environ-

mental auditing. Historically, environmental auditing in the US began to develop in the 1970s alongside the adoption of key environmental laws such as the Clean Water Act [13] and the Clean Air Act [14]. The Environmental Protection Agency (EPA) [9] played a crucial role in promoting environmental audits by actively encouraging voluntary audit programs since the 1980s.

The EPA developed various guidelines and standards that define the procedures for conducting environmental audits. One of the key regulatory documents is the “Environmental Audit Policy” [9], which provides incentives and reduces penalties for companies that voluntarily conduct audits and disclose violations.

Within this policy, environmental auditing is a systematic review of compliance with legislation and internal environmental standards. Auditors check resource use, pollutant emission levels, waste management, and other parameters. In the US, there is a clear distinction between voluntary and mandatory audits. Voluntary audits are primarily used to improve companies’ environmental performance and reduce risks. They help identify problem areas before they cause significant damage or legal violations. Mandatory audits are conducted for enterprises operating in high environmental risk sectors – such as oil extraction, chemical industry, and heavy machinery manufacturing. For such enterprises, environmental audits are part of state control and are mandatory within set deadlines.

American companies often integrate environmental audits with quality management systems (ISO 9001) and environmental management systems (ISO 14001). This approach allows for the most efficient use of resources, simplifies documentation, and enhances management effectiveness.

One distinctive feature of American practice is the widespread use of modern technologies: information systems, monitoring sensors, and satellite imagery. This enables rapid collection and analysis of environmental data, timely detection of violations, and development of corrective measures. Professional environmental auditors in the US are certified and must adhere to ethical standards. They work not only as inspectors but also as consultants helping companies develop and implement environmentally safe technologies and procedures.

Environmental auditing in European Union (EU) countries is a vital component of sustainable development and environmental protection policies. It is applied at both the governmental

and corporate levels, aimed at ensuring compliance with legislation and improving enterprises’ environmental efficiency. The basis of environmental auditing in the EU is Directive 2014/52/EU, which amends Directive 2011/92/EU on the assessment of the environmental impact of certain public and private projects [15].

This directive sets requirements for environmental impact assessment, including public participation and competent authorities’ involvement in decision-making processes.

Moreover, the EU actively supports the implementation of the international standard ISO 14001, which establishes requirements for environmental management systems, including conducting environmental audits to evaluate and improve organizations’ environmental performance [16].

In EU countries, environmental auditing is often integrated with other management systems such as quality and risk management systems. This promotes a comprehensive approach to increasing environmental responsibility and business process efficiency.

European legislation encourages active public participation in environmental control processes. The public has the right to access information about the environment and participate in decision-making on environmental issues [17].

Germany, in particular, actively implements ISO 14001 standards, focusing on strict compliance with environmental regulations in industry, energy, and the chemical sector [18].

France. According to the new requirements of the Corporate Sustainability Reporting Directive (CSRD), large companies are required to include sustainability reports in their management reports, covering environmental, social, and governance aspects [19].

Sweden. The country is known for its innovative approach to environmental auditing, closely linked to the green economy. Sweden introduced the world’s first carbon tax back in 1991 and actively uses environmental auditing to optimize resource use and reduce the carbon footprint [20].

In EU countries, modern information technologies are widely applied for environmental auditing, including Geographic Information Systems (GIS), automated data collection systems, and analytical software packages.

This enhances the accuracy and timeliness of audits and helps better predict environmental risks.

The main legislative act regulating environmental audit in Canada is the Canadian Environmental Protection Act, 1999 [21].

This law aims to prevent pollution and protect the environment and human health from risks related to toxic substances. CEPA grants the federal government authority to set regulations to limit and manage toxic substances and provides for conducting environmental audits to assess enterprise compliance with environmental requirements.

In Canada, environmental audits are conducted both voluntarily and mandatorily. They may be performed by internal company specialists or external consultants. Audits help identify compliance issues, weaknesses in management systems, and potential risks. The Canadian government encourages these audits, recognizing them as an effective tool for environmental management for both companies and public institutions.

At the provincial level, there are also specific laws and programs regulating environmental audit. For example, in British Columbia, the Environmental Assessment Act establishes requirements for environmental impact assessments for large projects. Provincial authorities conduct audits to verify compliance with environmental legislation and standards.

At the federal level, environmental audit in Australia is regulated by the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

This law mandates environmental audits to assess the impact of activities on the environment and ensure compliance with environmental standards. In 2024, amendments were proposed to the EPBC Act aimed at strengthening auditing powers, introducing environmental protection

orders, and increasing criminal and civil penalties for serious violations.

Each Australian state has its own legislation regulating environmental audit. For example, in New South Wales, the Protection of the Environment Operations Act 1997 defines environmental audit as a documented assessment of activities to ensure compliance with legal requirements and improve environmental management. The law also mandates compulsory environmental audits for certain licensed activities.

Despite having developed legislation, Australia faces several challenges in environmental auditing. For example, an audit of 20 biodiversity sites revealed that a third of them are in worse condition than before, raising concerns about the effectiveness of the current nature protection system. This highlights the need for reforms and enhanced enforcement of environmental requirements.

Within this study, we analyzed the experience of implementing environmental audit in various countries worldwide – particularly in the European Union, the USA, Canada, and Australia. Each of these systems has its own features, advantages, and tools that contribute to effective monitoring of environmental legislation compliance, increasing business environmental awareness, and minimizing environmental impact.

Now, let us consider which of these practices can be adapted and used in Ukraine, taking into account our conditions, challenges, and needs – especially in the context of post-war recovery and balanced natural resource management. The table (1) below summarizes the key advantages of each model and proposes opportunities for Ukraine with specific examples.

Table 1. Global Experience of Environmental Auditing and Opportunities for Ukraine [18–21]

Country / Region	Key Advantages of Environmental Auditing	Opportunities for Ukraine (with Examples)
1	2	3
European Union	<ul style="list-style-type: none"> • Enhancing corporate environmental responsibility • Improving investment climate through transparency • Reducing negative environmental impact • Stimulating innovation in green technologies 	<ul style="list-style-type: none"> • Implementing independent audits at enterprises – increasing transparency for European investors • Developing eco-technologies through participation in Horizon Europe and LIFE programs • Harmonizing standards with EU Directives (e.g., EMAS)
USA	<ul style="list-style-type: none"> • Reducing violations and environmental accidents • Increasing trust of investors and consumers • Saving resources through energy efficiency • Improving companies' image • Lowering risk of fines and lawsuits 	<ul style="list-style-type: none"> • Introducing voluntary audits as a form of self-control • Using EPA standards as examples when forming national methodologies • Motivating enterprises through tax incentives based on positive audit results

Continuation of the table 1

1	2	3
Canada	<ul style="list-style-type: none"> • Strong legislative framework (CEPA) • Support for audits at federal and provincial levels • Possibility of voluntary audits • Improving management and risk reduction 	<ul style="list-style-type: none"> • Adapting the CEPA model in the context of decentralization in Ukraine – e.g., environmental audits for territorial communities • Training local audit bodies on Canadian methodologies • Creating a database of audit reports for open access
Australia	<ul style="list-style-type: none"> • Comprehensive environmental legislation (EPBC Act) • Regulation at the state level • Mandatory audits for high-risk facilities • Continuous updating of standards and control 	<ul style="list-style-type: none"> • Introducing mandatory audits for environmentally hazardous enterprises (e.g., chemical plants or agro-enterprises with large waste) • Modernizing national legislation following the EPBC Act example • Conducting independent audits in conflict zones and areas of technogenic pressure (e.g., Kharkiv or Donetsk regions)

Thus, environmental auditing is a systematic and documented process that provides a comprehensive assessment of enterprises' compliance with environmental requirements and promotes the implementation of sustainable development principles and corporate social responsibility.

The domestic regulatory framework, in particular the Law of Ukraine "On Environmental Audit", creates a solid foundation for the effective conduct of audits, aligning with international standards and practices.

The experience of leading countries, especially the USA and European Union member states, confirms the importance of integrating environmental auditing with quality management systems, as well as the use of modern information technologies, which increase transparency and economic incentives to reduce environmental risks.

Conclusion

Ukraine has all the necessary prerequisites to adapt global experience, taking into account its own environmental and regional specificities. Particularly promising are the directions of implementing environmental auditing at the level of territorial communities, applying audits in the processes of post-war reconstruction of affected territories, and developing eco-technologies through international partnerships.

For example, within projects supported by international organizations, comprehensive environmental audits are being carried out that contribute to the sustainable restoration of infrastructure and the enhancement of environmental safety in territories liberated from hostilities [21].

Thus, the further development of environmental auditing in Ukraine should be based on the adaptation of global trends and strengthening

regulatory frameworks considering national conditions, which will contribute to increasing environmental safety and sustainable economic development of the country.

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Oleksandr Ivanovych Berezovskyi, PhD student at the Department of Ecology and Environmental Management, tel. +380 50 617 72 14 oleksandr.berezovskyi@student.karazin.ua, V. N. Karazin Kharkiv National University Svobody Square, 4, Kharkiv, 61022, Ukraine, ORCID iD: 0009-0009-5277-8467

Екологічний аудит як інструмент сталого розвитку (міжнародний та вітчизняний досвід)

Проблема. Сталий розвиток потребує ефективних інструментів екологічного управління, серед яких ключову роль відіграє екологічний аудит. Проте розбіжності в законодавчій базі, методології та практичному впровадженні між країнами створюють труднощі в гармонізації та оптимізації екологічного аудиту для досягнення сталих результатів. **Мета.** Метою дослідження – аналіз ролі екологічного аудиту як інструменту сталого розвитку способом порівняння міжнародної практики з вітчизняним українським досвідом, а також виявлення переваг і недоліків та можливостей для вдосконалення. **Методологія.** Дослідження базується на порівняльному аналізі міжнародних стандартів і практик екологічного аудиту, зокрема ISO 14001 і керівних принципів EPA, а також українського законодавства та прикладів з практики. Застосовано аналіз документів і синтез нормативно-правових актів, наукових публікацій та звітів установ. **Результати.** У дослідженні встановлено, що міжнародний досвід демонструє комплексні підходи до інтеграції екологічного аудиту в корпоративну соціальну відповідальність і "зелені" інновації, тоді як вітчизняна практика в Україні стикається з проблемами, такими як законодавчі прогалини, обмежене використання технологій і відсутність системного моніторингу. Запровадження міжнародних стандартів може підвищити ефективність і прозорість екологічного аудиту в Україні. **Наукова новизна.** Дослідження сприяє подоланню розриву між міжнародною кращою практикою та національним законодавством, надаючи детальне порівняння та практичні рекомендації щодо вдосконалення системи екологічного аудиту як чинника сталого розвитку України. **Практичне значення.** Досягнуті результати можуть бути корисними для розробників політики, екологічних менеджерів і аудиторів з метою впровадження кращих практик для підвищення екологічної ефективності, забезпечення відповідності вимогам та сприяння сталому використанню ресурсів, що сприятиме як екологічному, так і соціально-економічному розвитку.

Ключові слова: екологічний аудит, сталий розвиток, міжнародні стандарти, законодавство України, ISO 14001, екологічне управління.

Березовський Олександр Іванович, аспірант кафедри екології та менеджменту довкілля, oleksandr.berezovskyi@student.karazin.ua, +380 50 617 72 14

Харківський національний університет імені В. Н. Каразіна, пл. Свободи, 4, Харків, 61022, Україна, ORCID iD: 0009-0009-5277-8467