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THE ROLE OF ENVIRONMENTAL ACCOUNTING AND PUBLIC AUDITING IN ENSURING SUSTAINABLE DEVELOPMENT: THE EXPERIENCE OF CHINA

Abstract. Under the context of global sustainable development, this study investigates the influence mechanism of public auditing on environmental accounting and its role in promoting sustainability. Employing a methodological approach that combines grounded theory coding, case analysis, and international comparison, the study constructs a three-layer influence mechanism-policy foundation, audit intervention, and governance feedback-based on four representative policy documents in China. This framework elucidates how public auditing enhances the compliance, effectiveness, and information reliability of environmental activities. Furthermore, through an in-depth analysis of ecological and environmental audits in the Yangtze River Economic Belt, the proposed mechanism is empirically validated. A comparative analysis with Kazakhstan's institutional framework highlights the distinctiveness of the Chinese approach, which includes the establishment of medium-term audit planning systems and the integration of audit results into rectification and performance evaluation systems. These findings offer practical insights for other countries, particularly developing nations, on how to leverage public auditing to influence environmental accounting and advance sustainable development.

Keywords: Public auditing, Environmental accounting, Policy analysis, Cross-national comparison, Sustainable development.

INTRODUCTION

Globally, unsustainable resource utilization and environmental degradation pose serious challenges to ecosystem stability and long-term economic development. In response, sustainable development has become a widely recognized international consensus. In 2015, the United Nations adopted the «2030 Agenda for Sustainable Development», which established 17 Sustainable Development Goals (SDGs), while the signing of the «Paris Agreement» in the same year further reinforced the global climate governance framework. Governments around the world are placing increasing emphasis on environmental issues. Under these circumstances, environmental accounting, as a vital tool for measuring and recognizing environmental assets and liabilities, as well as quantifying and disclosing environmental costs and benefits, has been attracting increasing attention. However, this field still faces several challenges, including inadequate disclosure, lack of transparency, and concerns about data authenticity.

As a statutory and mandatory external oversight mechanism, public auditing is playing an increasingly prominent role in sustainable development governance. In recent years, the function of public auditing has extended beyond traditional financial and performance audits to include ecological protection, encompassing areas such as natural resource management, pollution control, and green development policies. Especially against the backdrop of growing concerns about the authenticity and compliance of environmental activities, the potential of public auditing in enhancing the quality of environmental accounting has increasingly become a critical issue in environmental governance.

Therefore, the research objective of this study is to examine how public auditing can support sustainable development governance by enhancing the effectiveness of environmental accounting. To achieve this objective, this study takes China as a case study, combining policy document

analysis with practical case studies, while comparing with Kazakhstan's environmental auditing policy to evaluate its reference value for other developing countries.

This study demonstrates independent contribution in two key aspects: First, it establishes the connection between public auditing and environmental accounting to investigate their intrinsic influence mechanisms, addressing the limitation of previous literature that examined national auditing or environmental accounting in isolation. Second, methodologically, it employs Nvivo 11 software to analyze both policy texts and practical cases, moving beyond theoretical analysis to provide empirical evidence from real-world cases.

LITERATURE REVIEW

In recent years, research in the field of environmental accounting has largely focused on environmental information disclosure, examining its impact on corporate financial performance, firm value [1], sustainable development [2], and the cost of equity [3]. Some scholars have approached the topic from a methodological perspective, exploring how natural resources can be incorporated into accounting systems and measured accordingly [4]. In addition, other studies have concentrated on the technical aspects of environmental information, such as the development of digital environmental information systems and the application of big data techniques in the collection and analysis of environmental data [5], reflecting the evolution of environmental accounting in the context of digital transformation.

In the area of public auditing, existing literature has addressed multiple functional dimensions. Some studies explore the relationship between public auditing and employee efficiency [6], its guiding role in promoting green development and innovation activities [7] and so on. Other scholars have examined institutional aspects, such as audit process reengineering [8], and the challenges to audit independence under an administratively dominant structure [9]. With technological advancement, a growing body of research has also focused on the application of emerging technologies-such as cloud computing-in public auditing practices [10].

Although existing studies have established solid theoretical foundations in both environmental accounting and public auditing, there is still a lack of research that integrates the two and explores their institutional linkages. Thus, investigating how public auditing influences environmental accounting holds both theoretical and practical significance.

RESEARCH METHOD

This paper mainly adopts qualitative research methods. First, grounded theory coding was applied using NVivo 11 software to analyze four core Chinese policy documents and extract the influence mechanism through which public auditing influences environmental accounting. Second, a case study was conducted on the Yangtze River Economic Belt environmental audit to validate the mechanism's practical functioning. Finally, a cross-national comparison was carried out through the analysis of Kazakhstan's key policy documents, allowing for the identification of institutional differences and transferable lessons from the Chinese experience.

MAIN PART

To explore how public auditing influences the development of environmental accounting, this paper selects four representative and functionally complementary Chinese policy and regulatory documents. Based on grounded theory, a two-level coding process was conducted using NVivo 11 software. To avoid excessive fragmentation of results, the coding was controlled such that most textual segments contained no more than two nodes. Table 1 presents the four core policy documents:

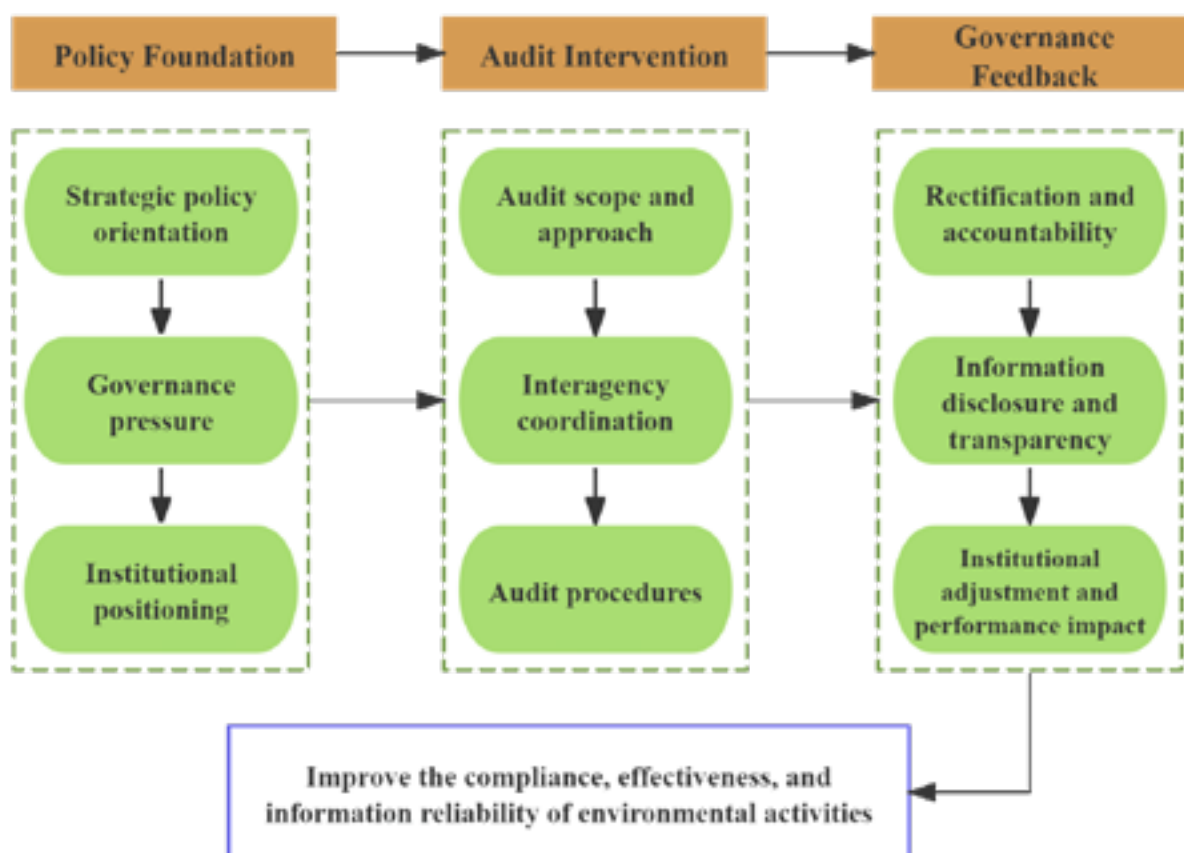
Table 1. Basic information of China's four policy documents

No.	Name	Description
1	«Guiding Opinions on Building a Modern Environmental Governance System»	As a macro-level institutional framework, it establishes a modern environmental governance system with the following features: centralized leadership, government coordination, enterprise responsibility, public participation, and legal safeguards.
2	«The 14th Five-Year Plan for National Audit Development»	This document serves as a strategic blueprint for the development of public auditing over a five-year period.
3	«National Audit Standards of China»	This technical guideline standardizes key aspects of audit practice, including audit planning, procedural execution, and quality control.
4	«Regulations on the Audit of Natural Resource Asset Departure of Leading Cadres»	This document focuses on evaluating the performance of government officials in managing natural resources and protecting the ecological environment, reflecting the extension of audit oversight into the domain of ecological governance responsibilities.

Note: compiled by the author based on resource [11-14]

Based on the analysis of these four policy documents, Figure 1 presents a coding structure consisting of three primary nodes (the orange part) and nine secondary nodes (the green part). Drawing from these results, this study constructs an influence mechanism of public auditing on environmental accounting, structured around three dimensions: policy foundation, audit intervention, and governance feedback.

Figure 1. Three-layer influence mechanism chart



Note: compiled by the author based on the encoding results

This paper will introduce three layers of influence mechanism:

1) The first layer-Policy Foundation-reveals the fundamental rationale for public auditing's involvement in the environmental accounting, answering the question of why audit?

First, in terms of strategic policy orientation, China has consistently emphasized high-quality development under macro-level strategies such as ecological civilization, the dual carbon goals, and green development. For example, the «Guiding Opinions on Building a Modern Environmental Governance System» calls for the full implementation of ecological civilization thought and adherence to the central government's overall environmental protection directives. This reflects the elevation of environmental issues to the core of national development strategy and provides a clear policy basis for public auditing to engage with environmental accounting.

Second, regarding governance pressure, China's environmental governance system continues to face institutional weaknesses and implementation challenges. «The 14th Five-Year Plan for National Audit Development» identifies key issues in the current audit system, such as the need to improve the quality and scope of audit coverage, the mismatch between heavy audit workloads and limited personnel, and the insufficient development of audit digitalization and organizational structures. These institutional challenges serve as underlying drivers for public auditing to further engage in environmental governance.

Finally, in terms of institutional positioning, policy documents repeatedly emphasize the supervisory role of public auditing in ecological governance. «The 14th Five-Year Plan for National Audit Development» explicitly calls for law-based and comprehensive performance of audit oversight responsibilities and the establishment of a centralized, unified, fully covered, authoritative and efficient audit supervision system. These statements further define the statutory duties and Institutional Positioning within the environmental governance framework.

2) The second layer-Audit Intervention-answers the question of how to audit in environmental accounting by the public auditing and promotes the transformation of institutional motivations into audit practices.

First, in terms of audit scope and approach, China's five-year audit planning framework outlines eight thematic areas, including audits of state-owned enterprises, public finance, and rural development, with environmental and resource audits also explicitly included. Documents such as the «Regulations on the Audit of Natural Resource Asset Departure of Leading Cadres» call for speaking with facts and data and emphasize compliance with laws and regulations related to natural resource management and environmental protection, thereby standardizing audit methods and technical pathways in this domain.

Second, regarding interagency coordination, public auditing is no longer an isolated actor but operates within a collaborative governance framework involving environmental, fiscal, and natural resource departments. The «Guiding Opinions on Building a Modern Environmental Governance System» emphasize multi-party co-governance and clarify the responsibilities of government, enterprises, and the public. This reflects the critical role of audit institutions in facilitating coordinated environmental governance.

Finally, in terms of audit procedures, the «National Audit Standards of China» provide a systematic framework for the audit process, covering personnel assignment, audit planning, implementation, reporting, and quality control. This framework establishes a closed-loop supervisory logic that spans from information collection and problem identification to reporting, corrective action, and follow-up review.

3) The third layer-Governance Feedback-focuses on the impact of public auditing after its intervention in environmental accounting, highlighting its role in achieving governance outcomes.

First, in terms of rectification and accountability, audit results serve as a key basis for urging local governments and relevant enterprises to fulfill their environmental responsibilities. For example, «The 14th Five-Year Plan for National Audit Development» includes expressions such

as strengthening the implementation of audit-based rectification responsibilities and improving mechanisms for audit rectification.

Second, in terms of information disclosure and transparency, public auditing enhances public access to environmental information by publishing reports, disclosing audit results, and releasing problem lists, thereby improving information transparency and enabling social oversight. Both «The 14th Five-Year Plan for National Audit Development» and the «National Audit Standards of China» include statements such as producing problem lists based on audit results and issuing audit reports.

Finally, regarding institutional adjustment and performance impact, audit results are used to inform government performance evaluations and credit rating systems. «The 14th Five-Year Plan for National Audit Development» calls for improving audit evaluation standards and indicator systems, while the «Guiding Opinions on Building a Modern Environmental Governance System» emphasizes carrying out target-based performance assessments and strengthening government and enterprise credit systems.

Thus, the three-layer influence mechanism of public auditing-policy foundation, audit intervention, and governance feedback-illustrates its rationale, process, and impact on environmental accounting. This mechanism helps enhance the compliance, effectiveness, and information reliability of environmental activities

To further verify the influence mechanism of public auditing on environmental accounting, this study selects «Audit Results on Ecological and Environmental Protection in the Yangtze River Economic Belt» (No. 3, 2018) [15] as a case for analysis. It represents a typical case of public auditing intervention in environmental governance in China. The analysis results are as follows:

1) Policy foundation

The report emphasizes the need to promote the implementation of central government directives on the development of the Yangtze River Economic Belt and the State Council's ecological and environmental protection plans, reflecting the state's strategic orientation toward environmental priorities. Second, the report reveals governance constraints-for example, 159,900 government officials have been appointed as river and lake chiefs-indicating the substantial burden on local governments in managing environmental responsibilities. Finally, regarding institutional Positioning, the report states that audit efforts aim to leverage audit functions to safeguard the ecological environment of the Yangtze River Economic Belt, which further clarifies the role of public auditing in environmental governance.

2) Audit Intervention

The National Audit Office of China conducted a special audit across 11 provinces, focusing on the implementation of ecological and environmental protection policies and the management of related funds. This clarified the audit scope and key areas of supervision. Second, in terms of interagency coordination, the audit work was jointly advanced with departments such as finance and environmental protection, resulting in cross-departmental cooperation mechanisms-for example, connecting monitoring equipment to environmental authorities. Finally, regarding audit procedures, the audit office issued formal reports in accordance with the law, provided recommendations, required local governments to implement corrective actions within a specified period, and mandated the public disclosure of rectification results. Follow-up reviews were also conducted to ensure problem resolution.

3) Governance feedback

The report indicates that 97,800 violations were investigated, 4,147 cases and 2,635 individuals were transferred to judicial authorities, and 2,486 enterprises were shut down, demonstrating the audit's role in enforcing accountability and facilitating substantive corrective action. Second, in terms of information disclosure, the report publicly listed identified problems, environmental improvement outcomes, and entities subject to rectification, thereby enhancing the transparency of the audit process. Finally, regarding institutional adjustment and performance impact, the

report notes that local governments formulated or revised 293 related regulations, and several development zones adjusted their plans based on audit findings, illustrating how audit results contributed to institutional refinement and improved environmental governance performance.

This case study demonstrates that the involvement of public auditing, through a three-layer influence mechanism, effectively promotes compliance, effectiveness, and information reliability of environmental activities in the Yangtze River Economic Belt. The following will select five core policy documents of Kazakhstan (Table 2) to further compare the differences in the practices of national audits in environmental accounting between the two countries.

Table 2. Basic information of Kazakhstan's five policy documents

No.	Name	Description
1	«On the Concept of the Republic of Kazakhstan's transition to a green economy»	It references multiple Sustainable Development Goals (SDGs), including Clean Water and Sanitation (SDG 6), Affordable and Clean Energy (SDG 7), Climate Action (SDG 13), and Life on Land (SDG 15).
2	«On approval of the National Development Plan of the Republic of Kazakhstan until 2029»	Its medium-term national development strategy includes a dedicated section (Section 4.3) that outlines the goal of enhancing environmental sustainability.
3	«Environmental Code of the Republic of Kazakhstan»	It serves as the core legal document for environmental governance covers multiple aspects including environmental legislation, environmental assessment, and environmental control.
4	«On governmental audit and financial control»	It related to public auditing define the content, procedures, evidence, reporting and quality control of public auditing.
5	«Law on Auditing Activity»	Standardize audit practices outside the public auditing institutions, such as stipulating the qualifications, business scope, and reporting obligations of accounting firms and certified auditors.

Note: compiled by the author based on resource [16-20]

1) Policy foundation

Kazakhstan places great emphasis on green transition and sustainable development. «On Concept of the Republic of Kazakhstan's Transition to a Green Economy » responds to multiple goals under The United Nations 2030 Agenda for Sustainable Development (Table 2). «On National Development Plan of the Republic of Kazakhstan until 2029» includes a dedicated section (Section 4.3) on improving environmental sustainability, identifying current challenges such as climate change, air pollution, water scarcity, declining drinking water quality, loss of biodiversity, inadequate waste management, and increasing greenhouse gas emissions, and explicitly incorporates ecological issues into national development objectives. The «Environmental Code of the Republic of Kazakhstan» (revised in 2021) serves as the country's core legal document on environmental governance. Chapter 9 specifically regulates environmental auditing, clarifying its legal status, classification (Proactive and mandatory), audit procedures, reporting requirements, and the rights and responsibilities of implementing bodies, reflecting Kazakhstan's institutional commitment to environmental protection and governance.

2) Audit intervention

«On Governmental Audit and Financial Control» clarifies the responsibilities, procedures, evidence, reports and quality control of public auditing, and provides a methodology for national auditing to intervene in environmental governance, providing a methodological basis for public auditing to engage in environmental accounting. «Law on Auditing Activity» regulates audit practices outside the public auditing, setting requirements for audit firms and certified auditors in terms of qualifications, scope of services, and reporting obligations.

3) Governance feedback

Chapter 9 of the «Environmental Code of the Republic of Kazakhstan» states that environmental audits can be classified into mandatory audits and Proactive environmental. Mandatory environmental audits apply to high-risk scenarios such as pollution exceeding standards, and their reports must be submitted to the environmental protection authorities and the heads of the audited units. Proactive audits are voluntarily implemented by enterprises or other entities, and the disclosure of reports is decided by the audited party. The law does not require disclosure. This classification management method reflects the flexibility of the audit information disclosure system to a certain extent, but its social supervision effectiveness is weaker than the mandatory disclosure system.

A comparison of policy foundation from the two countries shows that both China and Kazakhstan attach great importance to environmental governance, incorporate ecological issues into national development goals, and have enacted multiple related laws and regulations, reflecting the strategic importance of environmental protection. However, there are clear differences in medium term audit planning. China has formulated «The 14th Five-Year Plan for National Audit Development», which outlines audit priorities for the coming five years, including specific tasks such as the audit of natural resource asset departure by leading cadres, audits of special environmental funds, and audits on the implementation of ecological civilization policies. In contrast, although Kazakhstan has established an environmental audit system in the «Environmental Code of the Republic of Kazakhstan», it has not yet defined key audit priorities for the next five years or developed a clear national audit development plan.

In terms of audit institutions, both China and Kazakhstan demonstrate a government-led approach in the field of public environmental auditing, with legally mandated oversight authority. In China, the «National Audit Standards of China» explicitly authorizes the National Audit Office to conduct environmental audits. In Kazakhstan, the supreme audit institution carries out financial, performance, and compliance audits in accordance with the Law «on Governmental Audit and Financial Control». Notably, Article 12 of this law, specifically states in Clause 13 (Article 12.1.13) that the Supreme Audit Chamber is authorized to conduct efficiency audits in the field of environmental protection. This provision effectively establishes public environmental auditing as one of the responsibilities of the national audit institution, highlighting a degree of institutional similarity between the two countries.

In terms of governance feedback, China incorporates audit results into the performance evaluation of government officials and enforces accountability under the leadership responsibility system for ecological civilization. In contrast, environmental audit results in Kazakhstan are primarily used for administrative management purposes and have not yet been widely integrated into performance evaluation mechanisms. Relevant systems for information disclosure and accountability are still under gradual development.

CONCLUSION

Achieving the Sustainable Development Goals relies on high-quality environmental accounting and effective public auditing. This study shows how China's public auditing practice sheds light on three key questions: why the public audits environmental accounting, how audits are conducted, and what governance outcomes they generate. Based on this, a three-layer mechanism is proposed-policy foundation, audit intervention, and governance feedback-to explain the role of public audits in environmental governance.

A comparison with Kazakhstan shows that both countries emphasize environmental issues at the institutional and practical levels. While China's system is distinct, its experiences can still provide useful references. Notably, the formulation of five-year environmental audit plans, the setting of clear audit priorities and phased goals, and the integration of audit results into follow-up rectification and performance evaluations have significantly strengthened accountability. These practices may be valuable for other countries, particularly those with

more centralized power structures or where governments lead public environmental auditing initiatives.

This mechanism, however, also has certain limitations. First, it requires strong state capacity, including substantial resource input and professional expertise, which are often lacking at the local level. Second, its effectiveness relies on the independence of audit institutions-the more independent the institution, the stronger the accountability effects. Third, limited public disclosure of audit results and follow-up actions weakens external oversight and reduces governance pressure.

Despite this, the study contributes by linking public auditing with environmental accounting, and by applying NVivo-based analysis of policies and cases to support insights. Due to limited disclosure of national audit information, the number of usable cases in this study is constrained. This may affect the comprehensiveness and representativeness of the findings.

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ТҰРАҚТЫ ДАМУДЫ ҚАМТАМАСЫЗ ЕТУДЕГІ ЭКОЛОГИЯЛЫҚ ЕСЕП ЖӘНЕ МЕМЛЕКЕТТІК АУДИТТІҢ РӨЛІ: ҚЫТАЙ ТӘЖІРИБЕСІ

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Аңдатпа. Жаһандық тұрақты даму контекстінде бұл жұмыс мемлекеттік аудиттің экологиялық есепке әсер ету механизмдерін және оның тұрақтылықты ілгерілетудегі рөлін зерттейді. Негізделген теорияны кодтау, жағдайды талдау және халықаралық салыстыруды біріктіретін әдіснамалық тәсілді қолдана отырып, зерттеу Қытайдағы төрт өкілетті саяси құжатқа негізделген үш деңгейлі әсер ету жолын-саясат негізін, аудитке араласуды және басқару кері байланысын құрады. Бұл құрылым мемлекеттік аудиттің қоршаған ортаны қорғау қызметінің сәйкестігін, тиімділігін және ақпарат сенімділігін қалай арттыратынын түсіндіреді. Сонымен қатар, Янцзы өзенінің экономикалық белдеуіндегі экологиялық және табиғатты қорғау аудиттерін терең талдау арқылы ұсынылған механизм эмпирикалық түрде расталды. Қазақстанның институционалдық құрылымымен салыстырмалы талдау аудитті жоспарлаудың орта мерзімді жүйелерін құруды және аудит нәтижелерін түзету және тиімділікті бағалау жүйелеріне біріктіруді қамтитын қытайлық тәсілдің ерекшелігін көрсетеді. Бұл тұжырымдар басқа елдерге, әсіресе дамушы елдерге экологиялық есепке әсер ету және тұрақты дамуды ілгерілету үшін мемлекеттік аудитті қалай қолдану керектігі туралы практикалық түсініктер береді.

Түйін сөздер: мемлекеттік аудит, экологиялық есеп, саясатты талдау, мемлекетаралық салыстыру, тұрақты даму.

РОЛЬ ЭКОЛОГИЧЕСКОГО УЧЕТА И ГОСУДАРСТВЕННОГО АУДИТА В ОБЕСПЕЧЕНИИ УСТОЙЧИВОГО РАЗВИТИЯ: ОПЫТ КНР

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Аннотация: В контексте глобального устойчивого развития в данной статье исследуются механизмы воздействия государственного аудита на экологический учет и его роль в содействии устойчивости. Используя методологический подход, который объединяет обоснованное теоретическое кодирование, анализ случаев и международное сравнение, исследование выстраивает трехуровневый путь воздействия-политический фундамент, аудиторское вмешательство и обратную связь по управлению на основе четырех репрезентативных политических документов в Китае. Эта структура разъясняет, как государственный аудит повышает соответствие, эффективность и надежность информации об экологической деятельности. Кроме того, посредством углубленного анализа экологического и природоохранного аудита в экономическом поясе реки Янцзы предлагаемый механизм эмпирически подтвержден. Сравнительный анализ с институциональной структурой Казахстана подчеркивает отличительные особенности китайского подхода, который включает создание систем среднесрочного планирования аудита и интеграцию результатов аудита в системы исправления и оценки эффективности. Эти результаты предлагают практические идеи для других стран, особенно развивающихся, о том, как использовать государственный аудит для влияния на экологический учет и продвижения устойчивого развития.

Ключевые слова: государственный аудит, экологический учет, анализ государственной политики, сравнительный анализ между странами, устойчивое развитие.