



ENVIRONMENTAL AUDITING AND ENVIRONMENTAL PERFORMANCE OF LISTED COMPANIES IN SUB-SAHARAN AFRICAN COUNTRIES

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Abstract

Assurance services are encapsulated in environmental auditing of corporate entity in order to assured or attested to the credibility of environmental compliance of corporate entity to the environmental stakeholders and to authenticate their environmental performance. Thus, the study examined the effect of environmental auditing on the environmental performance of listed companies in Sub-Saharan Africa countries. The study employed longitudinal panel regression technique to dissect the data. Data were extracted from audited financial statements sampled firms. The findings revealed that audit firm quality, audit committee gender diversity and audit committee diligence demonstrated a positive and statistically significant nexus with environmental performance index. While in the order hand, audit committee size showed a negative but insignificant relationship with environmental performance index. The study concluded that fixed effect results revealed that substantive governance mechanisms particularly audit committee gender diversity and diligence played a critical role in improving environmental performance among the listed firms in Sub-Saharan Africa (SSA). Consistent with legitimacy theory, these findings suggest that firms achieve legitimacy not merely through symbolic compliance but through proactive and inclusive governance practices that responds to evolving societal expectations regarding environmental responsibility.

Keywords: assurance services, environmental auditing, environmental performance, legitimacy theory

1. Introduction

Environmental externalities have become a fundamental focus of corporate governance and sustainable business practices across entire globe, which encapsulate to Sustainable Development Goals (SDGs). In the recent decades, the increasing frequency of climate-associated risk, biodiversity loss, industrial pollution, and resource depletion has pushed environmental accountability to the forefront of corporate and regulatory agendas. The outcome of these, companies, particularly publicly listed companies, are expected to demonstrate not only economic success but also responsible environmental stewardship (Akwere, 2023).

Environmental auditing has emerged as one of the most important mechanisms for evaluating, monitoring and improving environmental performance. In the context of Sub-Saharan African (SSA) counties where environmental challenges remain acute and



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regulatory systems often face enforcement limitations the significance of the environmental auditing assumes even greater importance (Hillary, 1998; Lai, 2025).

Practically, environmental auditing refers to as independent scrutiny of financial statement of corporate companies with objective of processing of assessing its environmental practices, compliance with regulations and effectiveness of its environmental management systems. Luciano, et al., (2024) view that environmental auditing helps corporate entities identify weaknesses, reduce environmental risks, and enhance operational efficiency through resource conservation and waste management. For listed companies, environmental audits also serve to reassure stakeholders that environmental risks are being managed responsibly (Ilinitch et al., 1988).

Environmental performance on the other hand, its defined as actual environmental outcomes of a firm's activities, including its carbon emission, waste handling, pollution control, water use efficiency, and adherence to environmental standards or benchmarks. The ultimate goal or desire of environmental auditing is to translate monitoring and evaluation into measurable improvements in environmental performance (Gooall, 1995; Ilinitch et al., 1988).

In sub-Saharan Africa countries, the growing interest in environmental performance is closely tied to the increasing pressure from investors, regulators, international agencies, and civil society for greater transparency in corporate environmental externalities (Duho, 2024; Wachira & Mathuva, 2022). Many countries in the region are richly endowed with natural resources, and key industries such as oil and gas, mining, agriculture and manufacturing have significant negative environmental externalities.

Poor environmental management practices have historically contributed to land degradation, water pollution, air quality deterioration and public health challenges. This situation has heightened calls for listed corporations, which tend to be more visible and financially influential, to adopt comprehensive environmental auditing practices and disclose their environmental performance in a credible and transparent manner (Hichri, 2023; Odely Rodriguez-Saavedra et al., 2021; Saeed & Cek, 2024).

In spite of the critical significance of environmental accountability, environmental auditing and reporting practices in SSA remain inconsistent and fragmented. While some countries like South Africa and Kenya have made notable contributing in promoting corporate sustainability disclosure, many others rely largely on voluntary reporting frameworks (Okeahalam, 2004). As a result, the depth, accuracy, and reliability of environmental information disclosed by companies vary greatly across the region.

In several SSA countries, environmental audits are not mandatory for listed companies, and even when required, enforcement capacity is limited (Lei et al., 2025; Jeroh, 2020; Wachira & Mathuva, 2022). Consequently, some companies may conduct environmental audits primarily to fulfill symbolic requirements rather than to genuinely improve environmental performance. This raises important demands about the extent to which ecological auditing in these countries leads to concrete positive environmental enhancement.

The predicament of stakeholders on the fact that firms align with environmental norms as regard positive externality. Capital users prioritized and legitimized stakeholders' interest, thus, theory of legitimacy is crucial to the study. Legitimacy theory offers a critical



lens for understanding this dynamic (Akhter et al., 2023). Legitimacy philosophy posits that the firms operate within a broader social system and must continually seek to align their activities with social norms, value and expectations in order to maintain their license to operate with its domain (Abdulhussein & Abbas, 2025).

The capital user engaged environmental auditing and the communication of environmental performance are not merely technical compliance exercises, but as a strategic management tool that will enables them to acquired, secured, and maintained their legitimacy within the purview of the stakeholders. Corporate entities, which are under the greater public scrutiny due to their visibility and access to capital markets, may henceforth adopt environmental auditing activities and disclose more information to demonstrate alignment with societal expectations.

In these countries under review, legitimacy pressures are as a result of multiple sources. Such as international investors demanding a credible environmental information before their capital commitment. Environmental activists, civil society, and local communities agitated for better externality (Fikru, 2016; Ning et al., 2026).

Regulatory bodies, are often constrained by scarce resources, are gradually adopting stricter requirements aligned with global sustainability standards. Global frameworks such as the Task Force on Climate-related Financial Disclosures (TCFD), the Sustainable Development Goals (SDGs), and the International Sustainability Standards (Chua, et al., 2022). Board (ISSB) are shaping opportunities for greater accountability. Under such conditions, companies may use environmental audits to signal compliance and responsibility, thereby protecting or enhancing their legitimacy.

But, the mere adoption of environmental audit does not necessarily translate into improved environmental performance. In environmental with weak regulatory enforcement common in the sub-Saharan Africa countries firms may carry out audits for symbolic purposes, producing report that portray a positive environment posture while underlying environmental practices remain unchanged (Yahaya, 2026). This phenomenon linked to symbolic legitimacy, raises concerns about greenwashing, where corporate firms appear environmentally responsible through disclosure without substantive environmental improvements (Ngwakwe, 2023; Yahaya, 2026; Zhou & Chen, 2024).

Additionally, quoted firms in SSA face unique challenges such as scarcity of skilled environmental auditors, inadequate environmental management systems, high costs associated with third-party assurance, and limited financial and technical capacity (Beets & Souther, 1999; Wanyonyi, 2020). Also, there are diversities of regulatory framework across the countries under review. In South Africa, there enforces some of the most advanced corporate sustainability requirements for corporate entities, while other regions have inconsistent or too weak disclosure laws. These disparities influence both the quality and impact of environmental audits. (Beets & Souther, 1999).

Global and regional stress nowadays on sustainable development goals (SDGs), thus the study focuses on examining the nexus between environmental auditing and environmental performance of quoted companies in sub-Saharan countries is timely and crucial (Haque, & Ntim, 2018). Dissecting the relationship contributes to ongoing arguments about whether corporate environmental governance practices in the region reflect substantive performance improvements or strategies aimed primarily at achieving legitimacy theory invoke in the relationship. Hinged on legitimacy theory, policymakers



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and scholars can better understand the motivations behind environmental auditing and the conditions under which these audits enhance or fail to enhance environmental performance.

The paper seeks to evaluate whether environmental auditing function as effective mechanisms for improving environmental performance among quoted companies in this jurisdiction under review. And whether they primarily serve as legitimacy-seeking instruments. Given in this terrain, it known for environmental vulnerabilities and the increasing expectations for corporate transparency, the study has both practical implications and theoretical relevance for investors, regulators and corporate capital users. Insight from this study can support policy development aimed at strengthening environmental auditing frameworks and enhancing the credibility of sustainability disclosure and ultimately promoting more environmentally responsible corporate behavior across sub-Saharan Africa.

The remaining parts of the paper are organized as follows: the next section discusses theoretical underpinning the study and empirical reviews followed by data methods; the empirical results and discussions are then presented followed by the concluding observations.

2. Literature Review and Hypotheses Development

Audit Firm Quality

One of the determinants of audit firm quality is credibility and effectiveness of corporate reporting and assurance services practices. In recent years, this discussion has expanded beyond financial reporting is to include environmental performance, especially as firms face increasing pressure to demonstrate environmental stewardship.

Audit firm quality is commonly proxy by whether a company is audited by a Big4 or NBig4 audit firm. The Big 4 audit firms comprise Deloitte, PwC, EY and KPMG are generally associated with higher audit quality due to their superior technical expertise, global reputation, greater resources and stronger incentives to protect their brand name (Hrazdil et al., 2020; Tien et al., 2019).

Corporate entities audited by Big 4 firms are often regarded to exhibit better transparency, stronger environmental governance compliance, improved environmental performance outcomes compared to firms audited by NBig 4 auditors. This is true because high-quality auditing firms are better positioned to identify challenge weak environmental management practices and environmental risk, and encourage corrective actions (Celestin, 2020; Yousefi Nejad et al., 2025; Kleinman et al., 2014).

On the contrary, NBig 4 audit firms, especially in sub-Saharan Africa countries, which is a developing economy and emerging market may face constraints related to limited expertise in environmental auditing, fewer specialized resources and weaker enforcement capacity (Oranefo et al., 2025 Yousefi Nejad et al., 2025). This may also reduce their effectiveness in influencing firms' environmental practices, potentially leading to lower environmental performance. Nevertheless, some studies argue that the impact of audit firm quality may be context-dependent, as institutional strength, regulatory enforcement, and stakeholder pressured can moderate the role of auditors' play in shaping environmental outcomes (Handoyo & Anas, 2024; Saha & Khan, 2024).

Drawing from legitimacy theory and audit quality literature, audit firm quality is expected to influence environmental performance by enhancing the rigor and credibility of



environmental assurance. Big4 audit firms, due to reputational concerns and higher litigation risk inherent in their services rendered, are more likely to demand improved environmental practices from their clients.

Follows from this theoretical and empirical reasoning, this paper proposes the following hypothesis and the hypotheses are stated in alternative forms:

Listed companies audited by Big4 audit firms exhibit significantly better environmental performance than those audited by NBig 4 audit firms

Audit Committee Size

The audit committee size is a fundamental in corporate governance mechanism responsible to oversee risk management, financial reporting, sustainability and environmental disclosures. Extant literature suggests that the size of the audit committee plays a crucial and fundamental role in determining its effectiveness, particularly in monitoring management behavior and ensuring stewardship (Harjanti & Aryani, 2026; Prayitno & Mahroji, 2026).

When corporate entity has a large audit committee is often associated with a broader pool of expertise, diverse perspectives, and enhanced monitoring capacity, which can strengthen oversight of both non-financial and financial reporting, including environmental performance (Abdullah, 2024; Velte, 2023; Yahaya, 2025).

Several studies in corporate governance argue that audit committee with more members are better positioned to allocate responsibly, scrutinize complex environmental challenges or issues and engage with independent audit firms and sustainability assurance providers (Helikum et al., 2026; Suaidah et al., 2026).

When considering environmental performance measurement involves technical, regulatory, and strategic considerations, a larger audit committee may enhance the firm's ability to understand and construe more about environmental risks, ensure strict compliance with environmental regulations, and demand corrective measures and actions where necessary. Extant literature evident that firms with larger audit committees tend to exhibit higher levels of environmental disclosure, stronger environmental controls, and improved sustainability performance, suggesting a positive governance effect (Bhasin, 2012; Mohammadi et al., 2021).

Nevertheless, some school of thoughts caution that excessively large audit committees may be prone to issues of coordination problems, reduced participation, and slower decision-making, potentially weakening their effectiveness (Ghafran & O'Sullivan, 2013; Komal et al., 2022; Musah et al., 2025). In spite of this concern, the prevailing view in the extant literature is that, particularly, in developing and emerging markets, the benefits of having a larger audit committee such as to improve monitoring and reduced information asymmetry outweigh the potential drawbacks.

In the context of listed companies, audit committees serve as an important internal stakeholder that can influence management's commitment to environmental responsibility. By strengthening oversight of environmental audits, sustainability reporting, and compliance processes, audit committee size is expected to have a significant impact on environmental performance outcomes. Based on the theoretical arguments and empirical evidence reviewed, this study proposes the following hypothesis:

H₁: Audit committee size has a significant positive influence on the environmental performance of listed companies



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In line with legitimacy theory, larger audit committees enhance oversight capacity and stakeholder representation, enabling firms to better align their environmental practices and disclosures with societal expectations and thereby secure organizational legitimacy.

Audit committee diligence

The audit committee plays a pivotal role in corporate governance by overseeing financial reporting, risk management, and compliance processes. In recent years, the scope of audit committees has expanded to include oversight of environmental, social, and governance (ESG) matters, particularly in listed companies where stakeholder scrutiny is high.

Prior research suggests that audit committees with greater diligence and active engagement can enhance organizational accountability, reduce information asymmetry, and ensure that management implements robust environmental management practices (Asri, 2024; Babalola et al., 2025; Peters & Romi, 2014; Salleh et al., 2022).

Audit committee meeting frequency is often used as a proxy for the level of oversight and engagement in corporate governance. Frequent meetings may allow committees to better monitor corporate activities, review environmental disclosures, and ensure compliance with environmental regulations. Empirical studies in developed markets have demonstrated a positive association between the intensity of audit committee oversight and improved environmental reporting and performance (Abdullah, 2024; Hunjra et al., 2025; Mohammadi et al., 2021). For instance, companies with active audit committees are more likely to identify environmental risks early and implement corrective actions, thereby reducing environmental harm and enhancing sustainability outcomes.

In sub-Saharan Africa, the effectiveness of audit committees in influencing environmental performance remains less explored. Existing literature indicates that governance structures, including audit committees, can mitigate agency problems and ensure that management considers stakeholder expectations regarding environmental stewardship (Jeroh, 2020; Wachira & Mathuva, 2022). However, challenges such as weak regulatory enforcement, limited technical expertise, and resource constraints may affect the ability of audit committees to influence environmental outcomes (Ghafran & O'Sullivan, 2013; Peters & Romi, 2014; Salleh et al., 2022).

Based on legitimacy theory, it is hypothesized that increased audit committee meeting frequency enhances environmental oversight and accountability, which, in turn, improves environmental performance. Therefore, this study proposes the following hypothesis:

H₁: There is a positive relationship between audit committee meeting frequency and the environmental performance of listed companies

This hypothesis aligns with legitimacy theory by indicating that more frequent audit committee meetings enhance oversight and responsiveness to environmental concerns, enabling firms to proactively demonstrate accountability and conformity with societal expectations to maintain organizational legitimacy

Audit Committee Gender Diversity

The audit committee, as a critical oversight body, ensures accuracy in financial and non-financial reporting, monitors' compliance with regulations, and manages organizational risk, including environmental risk. Recent studies suggest that female representation on audit committees can significantly influence corporate decision-making



processes and accountability practices. Juliana (2021) opines that female directors are often associated with greater diligence, ethical sensitivity, and risk awareness, which may enhance oversight functions and promote sustainable practices within firms (Jibril et al., 2024; Lewa et al., 2025).

Several empirical evidence indicates that firms with higher female participation on audit committees tend to exhibit stronger compliance with regulations, greater transparency, and better risk management practices (Amara et al., 2025; Al Naim & Alomair, 2025; Ha, 2022). In the context of environmental performance, female members can influence strategic discussions on sustainability, encourage adoption of environmental policies, and advocate for rigorous environmental auditing. For example, studies in developed economies have shown that gender-diverse boards are more likely to disclose environmental information and implement green initiatives compared to male-dominated boards.

In developing regions, including sub-Saharan Africa, research on gender diversity and environmental outcomes is emerging, but findings suggest that female audit committee members may enhance environmental accountability and promote sustainable corporate practices, particularly in sectors with high environmental impact.

Based on these insights, it is plausible to hypothesize that female representation on audit committees positively affects environmental performance of listed companies. Female members are expected to strengthen oversight of environmental reporting, ensure compliance with environmental regulations, and encourage adoption of environmentally sustainable practices. Therefore, the study proposes the following hypothesis:

H₁: audit committee gender diversity has a positive effect on the environmental performance of listed companies in sub-Saharan Africa

This hypothesis aligns with legitimacy theory because gender-diverse audit committees enhance ethical oversight, transparency, and stakeholder responsiveness, enabling firms to align their environmental practices with societal expectations and thereby secure and maintain organizational legitimacy.

Audit Committee Independence

Corporate governance plays a crucial role in shaping environmental performance, and within governance mechanisms, the audit committee has received growing attention for its potential to enhance sustainability outcomes. Murhaban (2025) opines that audit committees are responsible for overseeing financial reporting, risk management, and internal controls, but recent studies suggest that their influence extends to environmental and social disclosures (Ashraf et al., 2024; Council, 2014; Weickgenannt et al., 2021).

Non-executive members of audit committees, due to their independence from management, are considered particularly effective in monitoring corporate practices objectively, reducing managerial opportunism, and ensuring compliance with regulatory and environmental standards (Ghafran & O'Sullivan, 2013; Judijanto & Ummah, 2025).

Empirical studies in both developed and emerging markets indicate that the presence of non-executive audit committee members is positively associated with the quality of corporate disclosures and environmental performance (Akhtaruddin & Haron, 2010; Weickgenannt et al., 2021; Vera-Munoz, 2005). For instance, firms with independent audit committees tend to exhibit higher adherence to environmental regulations, more



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comprehensive sustainability reporting, and stronger implementation of environmental management systems.

In sub-Saharan Africa (SSA), where institutional enforcement mechanisms are often weak, independent audit committee members can play a critical role in bridging governance gaps, enhancing transparency, and ensuring that environmental audits translate into tangible environmental improvements. Chepngetich and Musau (2025) view that their independence allows them to scrutinize management decisions objectively, mitigate environmental risks, and promote accountability to both regulators and stakeholders.

Despite these insights, empirical evidence on the direct effect of non-executive audit committee members on environmental performance in SSA remains limited. Most studies focus on financial reporting quality, with few examining environmental outcomes, creating a knowledge gap for policymakers, investors, and corporate governance scholars in the region (Chepngetich & Musau, 2025; Essien et al., 2024; Essien, 2024; Githaiga, 2025).

Based on stakeholder theory, which posits that firms respond to pressures from various stakeholders to maintain legitimacy, it is hypothesized that independent audit committee members enhance environmental accountability and performance. Accordingly, this study proposes the following hypothesis:

H₁: audit committee independence is positively associated with the environmental performance of listed companies in sub-Saharan Africa

This hypothesis aligns because independent audit committees enhance credible oversight and transparent environmental reporting, thereby helping firms demonstrate conformity with societal and stakeholder expectations to secure and maintain organizational legitimacy. Hence, herein justification for conceptualizing environmental auditing in the study. This study conceptualizes environmental auditing through fundamental corporate governance and audit quality attributes, namely audit firm quality, audit committee size, audit committee diligence, and audit committee gender diversity, to provide a more comprehensive understanding of how internal and external monitoring mechanisms influence environmental performance.

First, audit firm quality is an important proxy for environmental auditing effectiveness because high-quality audit firms are more likely to enforce strict compliance with environmental regulations and reporting standards. Reputable audit firms possess greater expertise, independence, and resources, which enhance the credibility and reliability of environmental disclosures. As a result, firms audited by high-quality auditors are more likely to adopt sound environmental practices and improve their environmental performance (Jarboui & Moalla, 2024; Saway et al., 2025; Yahaya, 2026).

Second, audit committee size plays a significant role in strengthening environmental oversight. Larger audit committees tend to have a broader range of expertise and experience, which enhances their ability to monitor environmental risks and ensure compliance with environmental policies. This diversity of skills contributes to more effective environmental auditing and governance (Ghafran & O'Sullivan, 2013; Yahaya, 2026).

Third, audit committee diligence, often measured by the frequency of meetings, reflects the level of commitment to oversight functions. More diligent audit committees are better positioned to review environmental reports, identify irregularities, and ensure that



environmental auditing processes are properly implemented. This continuous monitoring improves accountability and promotes sustainable environmental practices (Murhaban, 2025; Nyamae, 2024; Rakipi & D'Onza, 2024; Wehrhahn, 2026).

Finally, audit committee gender diversity contributes to improved decision-making and governance quality. Diverse committees bring different perspectives, values, and ethical considerations, which enhance transparency and sensitivity to environmental issues. Empirical studies suggest that gender-diverse boards are more likely to prioritize sustainability and corporate social responsibility initiatives (Kamran et al., 2023; Nyamae, 2024).

In sum, integrating these variables into the conceptualization of environmental auditing provides a multidimensional framework that captures both external audit quality and internal governance mechanisms (Garefalakis et al., 2025). This approach offers a robust basis for analyzing how environmental auditing influences environmental performance, particularly in emerging economies where institutional frameworks are still evolving.

Theoretical Review

Legitimacy Theory

This study is anchored on Legitimacy Theory, which provides a powerful theoretical framework for explaining why listed companies in Sub-Saharan African (SSA) countries engage in environmental audits and disclose information on environmental performance. Legitimacy Theory is premised on the idea that organizations operate within a broader social system and must continually seek approval from society to ensure their survival and continued access to resources. This approval, referred to as legitimacy, is granted when corporate activities are perceived to be congruent with societal values, norms, and expectations.

In the context of Sub-Saharan Africa, environmental issues such as pollution, climate change, resource depletion, and community health concerns have become increasingly prominent. As public awareness grows and stakeholders including governments, investors, communities, and international agencies demand greater corporate accountability, firms face mounting pressure to demonstrate responsible environmental behavior. Environmental auditing and improved environmental performance thus become strategic tools through which companies seek to legitimize their operations.

Legitimacy Theory suggests that firms adopt environmental audits not merely for compliance or efficiency reasons, but also as symbolic and substantive responses to societal expectations. By conducting environmental audits, companies signal their commitment to environmental stewardship, regulatory compliance, and sustainable development. These audits provide independent verification of environmental practices and performance, enhancing the credibility of environmental disclosures. In SSA countries, where regulatory enforcement may be weak or uneven, voluntary environmental audits play an especially important role in reinforcing corporate legitimacy in the eyes of both domestic and international stakeholders.

Environmental performance disclosures, guided by the outcomes of environmental audits, serve as communication mechanisms through which firms attempt to align public perception with their environmental actions. According to Legitimacy Theory, when a firm's operations potentially threaten societal approval such as through pollution-intensive



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activities it may increase the quantity and quality of environmental disclosures to repair, maintain, or gain legitimacy. This is particularly relevant for listed companies whose visibility and scrutiny are higher due to their presence in capital markets.

Furthermore, the theory helps explain cross-country variations in environmental auditing and performance within Sub-Saharan Africa. Countries with stronger environmental advocacy, higher media attention, and greater exposure to international investors tend to exert more legitimacy pressure on firms. As a result, listed companies in such environments are more likely to adopt formal environmental audits and report better environmental performance. Conversely, in jurisdictions with weaker stakeholder pressure, firms may engage in symbolic disclosure without substantial improvements in environmental outcomes.

Legitimacy Theory also recognizes that legitimacy is dynamic rather than static. Firms must continuously adapt their environmental strategies as societal expectations evolve. In recent years, global sustainability agendas, such as climate action and environmental, social, and governance (ESG) reporting, have reshaped legitimacy standards for corporations in SSA.

Environmental audits is a mechanism not only for current legitimacy but also for future legitimacy in increasingly sustainability-conscious global markets. Therefore, viewing the relationship between environmental audit and environmental performance through a Legitimacy Theory lens provides valuable insights into corporate behavior in Sub-Saharan Africa. It explains why listed companies adopt environmental audits, how these audits influence environmental performance, and why firms emphasize environmental disclosure as a means of securing societal approval. The theory underscores that environmental accountability is not solely a technical or regulatory exercise, but a strategic response to the social contract between corporations and the societies in which they operate.

Empirical Review

Sun and Zhu (2026) analyze both financial and environmental performance within a sustainable development framework. Using data from Chinese A-share listed companies between 2013 and 2023, a multi-period Difference-in-Differences model is applied to examine how AI adoption affects corporate sustainability. The results show that AI significantly improves firms' financial results and environmental performance, thereby strengthening overall sustainability. The effect operates through green innovation, efficiency improvement, and better information acquisition. The positive impact is stronger in non-polluting firms, high-tech companies, and those with environmentally experienced executives, particularly under intense market competition.

Li and Bian, (2026) examine how Artificial Intelligence technology (AIT) influences corporate Environmental, Social, and Governance (ESG) performance through Resource Orchestration Theory. Using data from Chinese A-share listed firms between 2013 and 2022 and applying fixed-effects regression analysis, the study finds that AIT improves ESG outcomes by strengthening resource orchestration, promoting green innovation, and reducing agency costs. However, CEO power weakens this relationship, while institutional investor ownership, regional marketization, and media attention strengthen it. The positive effect of AIT on ESG performance is particularly strong in diversified and manufacturing firms. The findings suggest that supportive government



policies such as promoting AI development, encouraging institutional investors, and enhancing market reforms can help firms leverage AI to improve sustainability, reduce emissions, and protect stakeholder interests in the digital economy.

Feng et al. (2026) analyzes the effect of AI adoption on green governance performance. The rapid development of Artificial Intelligence provides new opportunities to strengthen environmental management within firms. Using panel data from Chinese listed companies between 2009 and 2023. The findings indicate that AI significantly improves environmental outcomes, reduces ecological costs, and encourages sustainable innovation. These results remain consistent across several robustness tests and are particularly strong among state-owned firms, financially constrained companies, and organizations certified with ISO 14001. By applying Bartik instrumental variables to address endogeneity concerns, the study further shows that AI enhances green governance through improved asset efficiency, stronger market valuation, and better cash-flow management, supporting long-term corporate sustainability.

Fosso-Wamba et al. (2026) develop a research model that links AI-driven capabilities with environmental and manufacturing performance. Data were gathered from 128 managers working in manufacturing firms in the United States and the United Kingdom. The proposed relationships were examined using Partial Least Squares Structural Equation Modelling. Results provide strong empirical support for the model, demonstrating that AI-enabled capabilities significantly improve both environmental outcomes and manufacturing performance. The analysis also reveals notable differences in the extent of AI adoption and its effects between respondents in the US and the UK, indicating that national context matters in AI implementation. Overall, the study contributes to theory and practice and expands the developing literature on AI and sustainability.

Chen et al. (2026) develop a mathematical model incorporating AI technology to examine how it influences carbon emissions in manufacturing firms, using enterprise-level data from 2011 to 2022 for analysis. The results show that increased AI adoption helps reduce emissions; specifically, a one-unit rise in AI usage leads to an average decrease of about 0.408% in enterprise emissions. This reduction occurs mainly through technological advancement, improved human capital, and variations in carbon emission characteristics among firms. The effect is particularly strong in high-tech, technology-intensive, low-energy-consuming, and less pollution-intensive enterprises. Additionally, AI supports emission reduction by strengthening enterprise networks, shortening inter-firm connections, and enhancing firms' bridging roles, thereby promoting innovation, talent development, and efficient industrial chain management.

Ying and Jiajun (2026) examine the relationship between AI application and Green Total Factor Productivity (GTFP) using data from Chinese listed firms between 2007 and 2023. The findings show a significant inverted U-shaped relationship between AI adoption and GTFP, indicating that initial AI use improves green productivity but excessive application eventually reduces it. Mediation analysis suggests this occurs through changes in green strategic transformation and green technology research efficiency. Additionally, higher regional education levels and stronger corporate governance weaken this inverted U-shaped effect. The relationship is more evident in firms with weaker environmental regulation, lower emissions, and greater financing constraints, highlighting contextual differences in AI's impact on sustainable productivity.



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Sun and Pi (2026) examine how AI development influences corporate green value co-creation and the mechanisms through which it operates. Using panel data from listed manufacturing companies on China's Shanghai Stock Exchange and Shenzhen Stock Exchange between 2015 and 2024, the research applies multiple regression and negative binomial regression models. The findings show that AI development significantly enhances green value co-creation by improving technological spillover capacity and total factor productivity, although financing constraints weaken this effect while corporate influence strengthens it.

3. Methodology

This study adopts a quantitative research and ex post facto design to examine the relationship between environmental auditing and the environmental performance of listed companies in sub-Saharan African (SSA) countries. The study relies on panel data drawn from annual reports, sustainability reports, and audited financial statements of selected listed manufacturing companies for period (2012- 2023). The choice of listed companies is motivated by their higher disclosure obligations and greater exposure to stakeholder pressure.

The dependent variable is Environmental, Social, and Governance Index (EPI), used as a proxy for firms' environmental performance, with emphasis on the environmental component as disclosed in corporate and sustainability reports. EPI scores are sourced from reputable ESG databases or constructed using content analysis based on established disclosure frameworks.

The independent variables capture key environmental auditing attributes. Audit firm quality is measured using a dummy variable distinguishing between Big4 and Non-Big4 audit firms. Audit Committee Size (ACS) is measured by the total number of audit committee members. Audit Committee Diligence (ACD) is proxied by the number of audit committee meetings held annually. Audit Committee Gender Diversity (ACGD) is measured by the proportion of female members on the audit committee, while Audit Committee Independence (ACI) is measured by the proportion of independent non-executive directors on the committee.

Table 1

Measurement of Variables

Variables	Measurement	Justification	Authors
Environmental Performance proxy (Dependent Variable)			
Environmental performance index (EPI)	EPI= (Emission_Scope1)+ Z(Waste_Recycled) +Z(Energy_Usage) +Z(Water_Usage)/4	Z Supports use of emissions-based Environmental Performance Index (EPI).	Clarkson, Peter M. et al. (2008) Cho, Charles H. & Patten, Dennis M. (2007)
Environmental Auditing Proxy (Independent Variables)			
Audit Firm Quality (AFQ)	Audit_Firm (Big 4 = 1, Non-Big 4 = 0)	Big 4 firms are more likely to conduct or demand environmental audit processes	Simnett, Roger, Vanstraelen & Chua (2009) DeFond, Mark L. & Zhang (2014)
Audit Committee Size (ACS)	Numbers of committee	Larger committees enhance environmental oversight	Peters, Gary F. & Romi (2015) Allegrini, Marco & Greco (2013)
Audit Committee Diligence (ACD)	The number of audit committee meetings held annually	Frequent meetings strengthen environmental assurance and monitoring	Peters, Gary F. & Romi (2015) Allegrini, Marco & Greco (2013)
Audit Committee Gender Diversity (ACGD)	The proportion of female members on the audit committee	Gender diversity improves environmental accountability	Ben-Amar, Walid et al. (2017)
Audit Committee Independence (ACI)	The proportion of independent non-executive directors on the committee.	Independence improves environmental assurance quality	Michelon, Giovanna & Parbonetti (2012)

Source: Authors' Compilation (2026)

Data analysis is conducted using panel regression techniques, such as fixed-effects or random-effects models, to control for firm-specific heterogeneity. Diagnostic tests are performed to ensure robustness and reliability of the estimated results.

4. Results and Discussion

Descriptive Statistics

This section presents and discusses the descriptive statistics of the key variables used in examining the relationship between environmental audit and environmental performance of listed companies in Sub-Saharan African (SSA) countries, guided by



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Legitimacy Theory. Descriptive statistics provide an initial understanding of the distributional properties, central tendencies, and variability of the data, which is essential before conducting inferential econometric analyses.

Table 2

Descriptive Result

	N	Mean	SD	Max	Min	Skewness	Kurtosis	CV
EPI	858	.301	0.159	.846	0	.855	3.46	.529
Afq	872	.81	0.393	1	0	-1.577	3.488	.485
Acs	826	4.816	1.327	9	2	.103	2.326	.275
Acgd	826	.758	0.262	1.333	0	-.384	1.802	.346
Acd	872	3.698	1.453	11	0	-.346	5.527	.393
Aci	825	.759	0.261	1.333	0	-.371	1.756	.344

Source: Authors' Computation (2026)

From Table 2, the sample consists of between 825 and 872 firm-year observations, reflecting data availability across variables. Environmental performance, measured using the Environmental performance Index (EPI), has a mean value of 0.301 with a standard deviation of 0.159. This suggests that, on average, listed firms in SSA exhibit relatively low to moderate Environmental performance, with considerable variation across firms.

The minimum value of zero and maximum of 0.846 indicate wide disparities in environmental and sustainability practices among firms. The positive skewness (0.855) implies that a larger proportion of firms' cluster at lower environmental performance levels, while only a few firms demonstrate high ESG engagement, consistent with legitimacy pressures being uneven across the region. The kurtosis value of 3.46 indicates a moderately peaked distribution

Audit Firm Quality (AFQ), a proxy for environmental audit credibility, has a mean of 0.81, suggesting that a substantial proportion of the sampled firms engage high-quality audit firms, often associated with international or Big 4 auditors. The negative skewness (-1.577) indicates that most firms fall into the high audit quality category. This pattern supports the argument of Legitimacy Theory that firms employ reputable auditors to enhance credibility and societal acceptance, particularly in environmentally sensitive contexts

Audit Committee Size (ACS) records a mean of approximately 4.82 members, with values ranging from 2 to 9. This suggests compliance with corporate governance recommendations regarding committee composition. The low skewness (0.103) and moderate variability indicate relative consistency in governance structures across firms.

Audit Committee Gender Diversity (ACGD) has a mean of 0.758, implying increasing female representation on audit committees, which may strengthen monitoring and legitimacy through inclusiveness and ethical oversight.

Audit Committee Diligence (ACD), measured by the number of meetings, shows a mean of 3.70, with notable variability (standard deviation of 1.453). This reflects differences in oversight intensity among firms.

Audit Committee Independence (ACI) has a mean of 0.759, suggesting that most firms maintain a high proportion of independent directors, reinforcing transparency and accountability.

In nutshell, the descriptive statistics reveal substantial heterogeneity in environmental performance and audit-related governance attributes among listed companies in SSA.

From a legitimacy theory perspective, these variations reflect differing levels of exposure to societal, regulatory, and stakeholder pressures, shaping firms' incentives to adopt environmental audits and improve environmental performance.

Correlation Matrix Result

Table 3

Pairwise correlations

Variables	(EPI)	(afq)	(acs)	(acgd)	(acd)	(aci)
(1) EPI	1.000					
(2) afq	0.233*	1.000				
	(0.000)					
(3) acs	-0.264*	-0.134*	1.000			
	(0.000)	(0.000)				
(4) acgd	0.499*	0.223*	-0.569*	1.000		
	(0.000)	(0.000)	(0.000)			
(5) acd	0.357*	0.070*	0.048	0.086*	1.000	
	(0.000)	(0.038)	(0.169)	(0.013)		
(6) aci	0.495*	0.225*	-0.578*	1.000*	0.076*	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.029)	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Authors' Computation (2026)

This Table 3 discusses the pairwise correlation results between environmental performance (EPI) and environmental audit-related variables for listed companies in Sub-Saharan African (SSA) countries, interpreted through the lens of legitimacy theory. Correlation analysis provides preliminary evidence on the direction and strength of associations among variables and helps to assess potential multicollinearity issues prior to regression analysis.

The results show that EPI is positively and significantly correlated with most environmental audit and audit committee attributes, suggesting that stronger audit mechanisms are associated with better environmental performance. Specifically, Audit Firm Quality (AFQ) exhibits a positive and statistically significant correlation with EPI ($r = 0.233$, $p < 0.01$). This implies that firms engaging high-quality auditors tend to report superior environmental performance. From a legitimacy perspective, reputable audit firms enhance the credibility of environmental disclosures, enabling companies to gain societal approval and reinforce stakeholder confidence, especially in regions with heightened environmental scrutiny.

Audit Committee Gender Diversity (ACGD) shows a strong positive correlation with EPI ($r = 0.499$, $p < 0.01$), indicating that firms with greater female representation on audit committees tend to exhibit higher environmental performance. This finding aligns with legitimacy theory, as gender-diverse boards are often associated with stronger ethical orientation, transparency, and sensitivity to stakeholder concerns, all of which contribute to improved legitimacy through enhanced environmental accountability.

Similarly, Audit Committee Independence (ACI) is positively and significantly correlated with EPI ($r = 0.496$, $p < 0.01$). This suggests that independent audit committees play a critical role in strengthening environmental oversight and ensuring credible sustainability practices. Independent directors are better positioned to monitor management behavior objectively, thereby encouraging environmental initiatives that align corporate actions with societal expectations.

Audit Committee Diligence (ACD), measured by meeting frequency, also shows a positive and significant relationship with EPI ($r = 0.357$, $p < 0.01$). This implies that more active audit committees are associated with improved environmental performance, supporting the argument that frequent oversight enhances compliance and responsiveness to environmental legitimacy pressures.

In contrast, Audit Committee Size (ACS) is negatively and significantly correlated with EPI ($r = -0.264$, $p < 0.01$). This suggests that larger committees may suffer from coordination challenges or reduced effectiveness, potentially weakening their role in promoting environmental performance. From a legitimacy standpoint, mere structural compliance without functional effectiveness may not translate into genuine environmental accountability.

Overall, the correlation results provide initial empirical support for the legitimacy-based argument that stronger environmental audit mechanisms and governance structures are associated with improved environmental performance among listed companies in SSA. These findings justify further multivariate regression analysis to establish causal inferences while controlling for firm-specific characteristics and unobserved heterogeneity.

Regression Results

Table 4

Fixed-Random Effects Regression Results

Variables	(fixed effect) epi	(random effect) epi	(fixed effect) epi	(random effect) epi	(fixed effect) epi	(random effect) epi
Afq	0.00158 (0.0173)	0.0203 (0.0159)	0.00261 (0.0166)	0.0211 (0.0151)	0.00725 (0.0164)	0.0264* (0.0147)
Acs	-.0130*** (0.00346)	-.0152*** (0.00338)	-0.00110 (0.00367)	-0.00161 (0.00362)	-0.00254 (0.00364)	-0.00331 (0.00359)
Acgd			0.144*** (0.0187)	0.164*** (0.0185)	0.136*** (0.0187)	0.156*** (0.0185)
Acd					0.0179*** (0.00332)	0.0205*** (0.00328)
o.aci					-	-
Constant	0.368*** (0.0207)	0.361*** (0.0243)	0.201*** (0.0295)	0.171*** (0.0310)	0.140*** (0.0315)	0.101*** (0.0324)
Hausman test	59.83 (0.0000)					
Observations	825	825	825	825	824	824
R-squared	0.019		0.091		0.122	
Number of id	72	72	72	72	72	72

Source: Authors' Computation (2026)

Notes: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$



This section discusses the fixed effects regression results examining the relationship between environmental audits attributes and environmental performance (EPI) of listed companies in Sub-Saharan African (SSA) countries, interpreted through Legitimacy Theory. The fixed effects (FE) model is appropriate as it controls for unobserved, time-invariant firm-specific characteristics such as organizational culture, industry norms, or inherent environmental risk that may influence environmental performance but are difficult to measure directly.

The fixed effects regression is estimated using 824 firm-year observations across 72 listed firms. The model is statistically significant, with an F-statistic of 26.08 ($p < 0.01$), indicating that the explanatory variables jointly explain variations in environmental performance. The within R-squared of 0.1224 suggests that approximately 12.2% of the variation in EPI within firms over time is explained by changes in environmental audit and audit committee characteristics. Although modest, this explanatory power is reasonable in panel studies involving governance and sustainability variables, which are often influenced by broader institutional and macroeconomic factors

Audit Firm Quality (AFQ) exhibits a positive but statistically insignificant coefficient ($\beta = 0.0073$, $p = 0.658$). This indicates that, after controlling for firm-specific effects, changes in audit firm quality do not significantly influence environmental performance within firms over time. From a legitimacy perspective, this suggests that while engaging reputable audit firms may enhance external perceptions, such engagement alone may not lead to substantive improvements in environmental performance once firm-specific characteristics are accounted for. This finding implies that AFQ may function more as a symbolic legitimacy mechanism rather than a driver of real environmental change in the SSA context.

Audit Committee Size (ACS) shows a negative but insignificant relationship with EPI ($\beta = -0.0025$, $p = 0.485$). This suggests that variations in committee size do not meaningfully affect environmental performance within firms. Larger committees may face coordination and free-rider problems, limiting their effectiveness in advancing environmental oversight. In legitimacy terms, merely expanding committee size without enhancing functionality may not strengthen firms' environmental accountability.

In contrast, Audit Committee Gender Diversity (ACGD) has a positive and highly significant effect on EPI ($\beta = 0.1363$, $p < 0.01$). This result indicates that increases in female representation on audit committees significantly improve environmental performance over time. This finding strongly supports Legitimacy Theory, as gender-diverse committees are often associated with heightened ethical awareness, stakeholder sensitivity, and transparency. Firms may leverage gender diversity not only to comply with governance norms but also to substantively respond to societal expectations regarding sustainability and environmental responsibility.

Audit Committee Diligence (ACD), measured by the frequency of committee meetings, also demonstrates a positive and statistically significant relationship with EPI ($\beta = 0.0179$, $p < 0.01$). This suggests that more active audit committees enhance environmental performance through stronger monitoring, oversight, and follow-up on environmental issues. From a legitimacy standpoint, diligent committees enable firms to align their operational practices with societal and regulatory expectations, thereby reinforcing organizational legitimacy.



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Audit Committee Independence (ACI) is omitted from the fixed effects model due to collinearity, implying that independence does not vary sufficiently within firms over time. This suggests that ACI is largely a structural characteristic embedded in firms' governance frameworks rather than a dynamic factor influencing changes in environmental performance.

The significant F-test of individual effects ($F = 14.24$, $p < 0.01$) confirms the presence of firm-specific heterogeneity, justifying the use of the fixed effects model. Furthermore, the Hausman test strongly favors the fixed effects model over the random effects model, indicating that unobserved firm-specific factors are correlated with the explanatory variables.

Overall, the fixed effects results reveal that substantive governance mechanisms particularly audit committee gender diversity and diligence play a critical role in improving environmental performance among listed firms in SSA. Consistent with Legitimacy Theory, these findings suggest that firms achieve legitimacy not merely through symbolic compliance but through active and inclusive governance practices that respond to evolving societal expectations regarding environmental responsibility.

5. Conclusion and Recommendations

This study examined the relationship between environmental audit mechanisms and environmental performance of listed companies in Sub-Saharan African (SSA) countries through the lens of Legitimacy Theory. The empirical results reveal that audit committee gender diversity (ACGD) and audit committee diligence (ACD) exert a positive and statistically significant influence on environmental performance.

Specifically, gender-diverse audit committees and more frequent audit committee meetings are associated with higher ESG performance. In contrast, audit firm quality (AFQ) and audit committee size (ACS) were not statistically significant in the fixed-effects model, while audit committee independence (ACI) was omitted due to collinearity. Overall, the model demonstrates that internal governance mechanisms related to inclusiveness and active oversight play a more critical role in shaping environmental outcomes than structural or symbolic audit attributes.

The findings provide strong support for Legitimacy Theory, which posits that firms adopt governance and accountability mechanisms to align their operations with societal norms and expectations. In the SSA context where regulatory enforcement may be inconsistent and environmental challenges are acute companies appear to rely more on substantive governance actions, such as diverse and diligent audit committees, to enhance legitimacy rather than merely engaging reputable auditors.

Gender-diverse audit committees likely bring broader perspectives, ethical sensitivity, and stakeholder awareness, which translate into improved environmental accountability. Similarly, audit committee diligence reflects active monitoring and responsiveness to environmental risks and stakeholder pressures.

The insignificance of audit firm quality suggests that the presence of high-profile auditors alone may not guarantee improved environmental performance unless supported by effective internal governance. Likewise, audit committee size does not necessarily enhance performance, possibly due to coordination challenges and reduced decision-making efficiency. These results highlight that legitimacy in environmental performance



is achieved more through effective oversight and inclusive governance practices than through formal compliance structures.

The study recommends that listed companies should strengthen audit committee gender diversity, as the empirical results indicate that gender-diverse audit committees significantly enhance environmental performance. Regulators and corporate governance codes in SSA should therefore encourage or mandate minimum female representation on audit committees to improve ethical sensitivity, transparency, and responsiveness to societal environmental expectations.

Again, firms should increase audit committee diligence by holding more frequent and focused meetings on environmental and sustainability issues. The positive and significant influence of audit committee diligence suggests that active oversight plays a critical role in aligning corporate environmental practices with legitimacy demands from stakeholders. Companies should institutionalize environmental risk reviews and sustainability reporting as standing agenda items in audit committee meetings.

Furthermore, policymakers should promote capacity building for audit committees, particularly in environmental auditing and sustainability reporting. Training programs and professional certifications can enhance committee members' competence, enabling them to provide effective oversight and improve the credibility of environmental disclosures. Moreover, regulatory authorities in SSA should strengthen environmental reporting guidelines and enforcement mechanisms. Clear standards for environmental audits and disclosures will reduce symbolic compliance and encourage substantive environmental performance improvements, thereby reinforcing corporate legitimacy.

Investors and other stakeholders should actively incorporate environmental audit quality and governance attributes into their decision-making processes. Such market-based pressure will incentivize firms to adopt robust environmental audit practices, improve environmental performance, and maintain long-term legitimacy within increasingly sustainability-conscious societies.

Policy Implication

The study offers several important policy implications for regulators, corporate managers, and stakeholders in Sub-Saharan Africa. First, regulatory authorities should strengthen corporate governance codes by emphasizing audit committee effectiveness rather than mere composition. Policies encouraging gender diversity on audit committees can enhance environmental oversight and align corporate behavior with societal sustainability expectations.

Second, listed companies should prioritize the functionality of audit committees by ensuring frequent meetings and active engagement with environmental risk management. Firms seeking legitimacy in capital markets and society should view environmental audits and governance mechanisms as strategic tools for sustainable value creation rather than symbolic gestures.

Third, investors and stakeholders should pay closer attention to internal governance attributes, particularly audit committee diligence and diversity, when assessing firms' environmental credibility. ESG ratings and sustainability assessments should incorporate these governance dimensions as indicators of genuine environmental commitment.

Fourth, policymakers across SSA countries should promote harmonized environmental reporting and audit standards that encourage substantive accountability.



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Capacity-building initiatives aimed at strengthening audit committees and integrating environmental expertise into governance structures will further enhance corporate legitimacy and environmental performance.

This study demonstrates that environmental performance in SSA is strongly shaped by internal governance mechanisms that reflect societal expectations. By reinforcing inclusive and diligent audit practices, firms can enhance legitimacy, improve environmental outcomes, and contribute meaningfully to sustainable development in the region.

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