
DETERMINANTS OF ENVIRONMENTAL PERFORMANCE OF LISTED COMPANIES IN SUB SARAH AFRICAN COUNTRIES: EMPIRICAL IMPLICATIONS

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ABSTRACT

Global awareness of sustainability of nature resources is crucial to sustainable development and growing pressure from international stakeholders to adopt environmentally responsible practices. Thus companies must ensure to integrate environmental performance into their operations with view of minimizing negative externality in their environment. The study examines determinants of Environmental Performance of Listed Companies in Sub Sarah African Countries. The study deploys Arellano–Bond estimator (difference GMM) which is designed to estimate linear dynamic panel-data models with a lagged dependent variable and potentially endogenous regressors. The results show that lagged environmental social and governance index, returns on asset, Leverage, return on capital employed, gross margin growth, board independence and returns of equity were all significant as a determinant of environmental performance. While growth rate and firm size were insignificant in the determination of environmental performance of Listed Companies in Sub Sarah African Countries. The findings reveal that profitability measures influence ESG differently. Firms with strong equity returns and efficient capital use are more proactive in sustainability, while asset-driven efficiency may discourage it. Leverage plays a surprisingly positive role, as indebted firms strengthen ESG to maintain financial credibility. Governance factors further highlight that smaller boards with higher independence foster stronger environmental accountability.

Keywords: Arellano–Bond estimator, Contextual dynamics, environmental performance, Environmental, Social, and Governance (ESG), internal and external factors.

JEL: Q56, G34, M14, O55, L25.

1. INTRODUCTION

Corporate firms operate in society where it derives all input needed to function and releases its output into same society. The primary aims of any corporate entities is the maximization of financial performance and maximization of stakeholders' wealth. These have been the motives since the beginning of industrial revolution. But the narration has changed that any externalities emanating from corporate activities must ensure that the future is secured. Hence, environmental

performance (EP) has become a central theme in corporate accountability, particularly in light of global climate change, increasing ecological degradation, and rising expectations for corporate environmental responsibility. In Sub-Saharan Africa (SSA), the environmental challenges are particularly pronounced due to rapid urbanization, extractive industrial activities, weak regulatory enforcement, and limited environmental awareness (Mabogunje, 1995). The region is home to a diverse range of industries from mining and oil production to agriculture and manufacturing that often exert significant pressure on ecosystems. Where the ecosystems are not properly cater for, the devastating effects are enormous on biodiversity future existence and inversely affect going concerns of corporate entity. As a result, the environmental performance of companies operating in SSA has drawn growing attention from policymakers, investors, and civil society. (Dhayal, et al., 2025; Mabogunje, 1995)

The environmental performance of listed companies refers to the extent to which a firm complies with environmental regulations, adopts eco-friendly practices, and contributes to environmental sustainability (Abdul Aziz, et al., 2018; Gupta, & Gupta, (2021) . It encompasses indicators such as emissions control, waste management, energy efficiency, and environmental reporting. While global literature has investigated the drivers of environmental performance in developed economies, relatively little is known about these determinants in the African context, particularly among publicly traded companies where disclosure and governance mechanisms may differ substantially from global standards. (He, 2025).

It has been affirmed in literature; there were structural factors made this context unique. Firstly, regulatory frameworks across SSA countries are often weak or inconsistently enforced. While some stock exchanges, such as the Johannesburg Stock Exchange (JSE), have implemented sustainability disclosure requirements, others lag behind. Secondly, socio-economic challenges such as poverty, limited infrastructure, and low levels of education can hinder both awareness and prioritization of environmental practices among firms. Moreover, corporate governance structures, ownership patterns, and access to capital in SSA differ markedly from those in more developed markets, potentially influencing the environmental decisions made by corporate leadership (Lah, & Kotnik, 2025).

According to Christopher, et al., (2022) opined that corporate environmental performance in SSA may be shaped by a host of internal and external determinants. Internally, factors such as firm size, profitability, industry type, ownership structure, and board composition may influence a company's willingness and capacity to engage in environmentally responsible behavior. Externally, elements such as the regulatory environment, pressure from stakeholders (including investors and consumers), international partnerships, and global supply chain requirements may drive improvements in performance. Understanding how these factors interact in the SSA context is essential to crafting policies and corporate strategies that align profitability with environmental stewardship (Zhu, Osei, & Agyemang, 2024).

As the global business environment increasingly embraces Environmental, Social, and Governance (ESG) criteria, SSA companies are under pressure to align with international standards to attract investment, secure international partnerships, and maintain their social license to operate. Consequently, there is an urgent need to identify the specific determinants that influence environmental performance in the region, particularly among listed companies that are more visible and often more influential in setting industry standards (Annesi, et al., 2025).

This study, therefore, seeks to explore the key determinants of environmental performance among

listed companies in Sub-Saharan Africa. By focusing on this often-overlooked region, it aims to contribute to a more inclusive understanding of corporate environmental responsibility and provide empirical insights that can inform policy, corporate governance reforms, and sustainable investment practices.

Environmental degradation remains one of the most pressing challenges in Sub-Saharan Africa (SSA), where the effects of climate change, deforestation, water pollution, and air quality deterioration are increasingly evident. Amid these concerns, corporate environmental performance particularly of listed companies with greater visibility and regulatory obligations has become a central topic in sustainability discourse. Despite policy commitments by many African governments and the growing global pressure for businesses to embrace environmental responsibility, corporate behavior in SSA often falls short of sustainability standards. This persistent underperformance prompts a deeper investigation into the factors influencing environmental outcomes within these companies.

In SSA, listed companies operate in a unique context characterized by weak institutional frameworks, limited enforcement of environmental regulations, low public awareness, and economic pressures that often prioritize short-term profits over long-term environmental sustainability. This creates a structural disincentive for firms to invest in environmentally responsible practices. Moreover, the region faces significant disparities in industrial maturity, regulatory enforcement, and access to green technology across countries, further complicating the analysis of corporate environmental performance.

While existing studies in developed economies have identified several determinants of corporate environmental performance such as the relevance and applicability of these determinants in the SSA context remains largely underexplored. Limited empirical research has been conducted to assess whether similar drivers influence firms in SSA or whether region-specific factors such as corruption, institutional voids, or limited investor activism play a more dominant role. The lack of data transparency and standardized environmental reporting practices in many SSA stock markets further exacerbates the challenge, making it difficult for policymakers, investors, and researchers to draw actionable conclusions.

Additionally, there is a growing disconnect between environmental reporting and actual performance. Companies often engage in symbolic environmental disclosures without translating them into substantial environmental improvements. This practice of "green washing" can obscure the real drivers of performance and mislead stakeholders. Understanding what genuinely influences environmental outcomes beyond surface-level commitments, it is therefore critical to designing effective policies and incentives.

Given the pressing environmental challenges in the region, the importance of sustainable industrial development, and the increasing integration of African markets into global trade systems, it is imperative to identify the true determinants of environmental performance among listed firms. Insights from such research would provide guidance to regulators, investors, and company executives aiming to align corporate behavior with environmental sustainability goals. Without a clear understanding of these determinants, efforts to enhance environmental performance risk being misdirected or ineffective.

This study thus seeks to fill the knowledge gap by examining the financial, organizational, regulatory, and institutional factors that influence the environmental performance of listed companies in Sub-Saharan Africa. It aims to contribute not only to academic literature but also to

practical policymaking and corporate strategy in a region at the crossroads of economic development and environmental vulnerability. The study is to explore the key determinants influencing the environmental performance of listed companies in Sub-Saharan African countries, with the aim of understanding how corporate, institutional, and policy-related factors contribute to sustainability outcomes in the region.

2. LITERATURE REVIEW

2.1 Conceptual review

2.1.1. Environmental determinants

Environmental performance refers to how well corporate entity manages its environmental responsibilities and the impacts of its activities on natural ecosystems. Put differently, environmental performance is the whole obligations that ensure organizational activities do not have negative externalities on the environment, rather organizational activities should endeavor to protect future environments. In the context of Sub-Saharan African (SSA) listed companies, the determinants of environmental performance are multifaceted and shaped by regulatory frameworks, corporate governance structures, economic development, stakeholder pressure, and international standards.

One of the primary determinants of environmental performance in SSA is the strength and enforcement of environmental regulations. Many countries in the region have enacted environmental laws, but enforcement remains weak due to institutional limitations, corruption, and lack of political will. In countries with relatively stronger environmental governance such as South Africa or Kenya listed companies tend to exhibit better environmental disclosure and compliance levels. The Environmental Kuznets Curve (EKC) theory also suggests that environmental degradation initially worsens with economic growth, but improves as societies become wealthier and demand cleaner environments indicating a non-linear relationship (Ahmad, & Ali, 2022; Ehigiamusoe, et al., 2022; Raza, et al., 2025).

Another primary determinants of environmental performance in Nigeria, Kenya, South Africa and Ghana is effective corporate governance operations, including board independence, presence of environmental committees, and managerial commitment to sustainability, significantly influences environmental outcomes. (Atugeba, & Acquah-Sam, 2024; Coleman, & Wu, 2021; Somo, 2024). The stakeholder theory posits that firms with inclusive governance structures that recognize non-financial stakeholders (e.g., communities and the environment) are more likely to invest in environmental protection. In SSA, however, weak governance mechanisms often hinder the integration of environmental concerns into business strategies (Asongu, & Odhiambo, 2019).

According to Lankoski, (2000) opines that another environmental determinants encompasses Company size, profitability, industry sector, and ownership structure are internal variables that heavily determine environmental performance. Larger firms often have more resources and visibility, making them more likely to engage in environmental initiatives to manage reputational risks. Similarly, firms in resource-intensive sectors like mining or energy face more scrutiny and regulatory demand. Profitability also plays a role: under the slack resource theory, financially successful firms have more capacity to invest in environmental initiatives (Liu, Zhang, & Liang, 2019).

Guay, Doh, and Sinclair, (2004) were of the opinion that Social license to operate, investor activism, and pressure from non-governmental organizations (NGOs) are increasingly influential

in shaping corporate environmental strategies. Legitimacy theory explains that companies seek to maintain societal approval through environmental disclosures and actions. In SSA, rising environmental awareness among urban populations and the influence of global investors has started shifting corporate behavior toward greener practices, particularly among cross-listed firms and those with international shareholders.

Lastly, international regulation and laws is part of determinants of environmental performance. The adoption of international reporting standards such as the Global Reporting Initiative (GRI), ISO 14001, and adherence to the United Nations Sustainable Development Goals (SDGs) acts as a motivator for environmental performance. Companies that are integrated into global value chains or are seeking foreign investment are more inclined to align with these frameworks. However, access to technical knowledge and capacity remains a barrier for many SSA companies.

In summary, environmental performance in SSA listed companies is a product of both internal corporate dynamics and the broader external institutional, social, and international context. Improving performance requires a multi-level approach that includes stronger regulatory enforcement, better governance practices, enhanced stakeholder engagement, and alignment with global standards.

2.2 Theoretical Review

Environmental performance (EP) refers to a firm's efforts and results in reducing its ecological negative externalities, complying with environmental laws, and embracing sustainable practices. In the context of sub-Saharan African (SSA) listed companies, the determinants of EP are often shaped by a mixture of institutional frameworks, stakeholder influences, and internal governance dynamics. Several theories help explain why and how companies in the region adopt environmental practices.

2.2.1. Institutional Theory

Institutional Theory explains how organizations conform to social norms, rules, and expectations to gain legitimacy and ensure survival. In the context of environmental performance, Institutional Theory helps explain why and how organizations adopt sustainable practices, not necessarily because of internal motives, but because of external pressures. A multinational firm may implement ISO 14001 environmental management systems not because it expects direct financial gain, but to meet industry norms (normative pressure) and secure contracts in regions with stricter environmental laws (coercive pressure).

Institutional theory posits that firms conform to the rules and expectations of the institutional environment in which they operate. In SSA, government regulations, regional policies, and international treaties play a crucial role in shaping environmental behavior. However, weak enforcement of environmental regulations and inconsistent institutional capacity across countries can lead to low compliance. Listed companies, due to their visibility and access to international capital markets, may feel stronger pressure to conform to global environmental standards, despite regulatory gaps at the national level.

2.2.2. Stakeholder Theory

Stakeholder theory is a framework for understanding how businesses interact with and are accountable to various groups that are affected by or can affect their operations not just

shareholders, but also employees, customers, suppliers, communities, and the environment (Gutterman, 2023). Stakeholder theory emphasizes that a firm's responsibility extends beyond profit maximization to include the interests and well-being of all its stakeholders. When applied to environmental performance, it suggests:

Firstly, environmental stakeholders are those consider in the society that their interests are directly or indirectly environmentally have stake in corporate firms which including : Local communities affected by pollution or resource use, Government and regulators concerned with environmental laws, NGOs and advocacy groups focused on sustainability, Consumers demanding greener products, Future generations, as indirect stakeholders etc. (Azzone, et al., 1997; Ahmed, 2024).

Secondly, environmental stakeholders' expectation hinged on the firms to keep improving environmental performance aligns with stakeholder theory when firms: Reduce emissions and waste to avoid harming communities, use sustainable materials to protect ecosystems, engage in transparent reporting (e.g., GRI, CDP disclosures), collaborate with environmental NGOs or regulators and invest in green technologies (Sun, Sulemana, & Agyemang, 2025).

Thirdly, performance and value creation are induced the firms that manage environmental issues proactively can gain are prone to: reputation and trust with customers and communities, risk reduction (legal, reputational, operational), cost savings through efficiency, and long-term value creation, not just short-term profits (Baah, et al., 2021).

Inversely, environmental performance has criticism and challenges herein holds in stakeholders' theory including: trade-offs between stakeholder demands can complicate decision-making, some firms may engage in green washing to appease stakeholders without real change and balancing economic and environmental performance can be resource-intensive

In summary, the theory emphasizes that a firm's performance is influenced not just by shareholders, but also by a broad range of stakeholders including governments, communities, NGOs, and customers. In SSA, growing awareness and activism among communities affected by mining, agriculture, and oil industries have pressured firms to improve their environmental footprint. Companies with multinational stakeholders or those integrated into global supply chains often face stricter environmental scrutiny, which acts as a driver of better performance.

2.2.3. Resource-Based View (RBV) the theory is a strategic management framework that emphasizes a firm's internal resources as the key to achieving and sustaining competitive advantage. When applied to environmental performance, RBV suggests that organizations can gain a competitive edge by developing and leveraging unique, valuable, and inimitable environmental resources and capabilities (Raduan, et al., 2009). These features mean: Valuable Resources: Environmental capabilities (like energy-efficient technologies, waste reduction practices, and eco-friendly supply chains) can reduce costs, improve reputation, and open new market opportunities. Rare Resources: Few firms may possess strong green innovation capabilities, effective environmental management systems (e.g., ISO 14001), or access to green talent making these assets rare. Inimitable Resources: Some environmental capabilities are hard to imitate due to firm-

specific history, complex routines, or socially embedded practices (e.g., corporate culture promoting sustainability). Non-substitutable: Green resources and capabilities that cannot be replaced with other tools without losing effectiveness are especially strategic under RBV. Firms with superior environmental capabilities can reduce regulatory risks, improve operational efficiency, and enhance brand loyalty (Madhani, 2010).

RBV argues that firms gain competitive advantage through valuable, rare, inimitable, and non-substitutable resources. In this context, environmental management capabilities, such as green technologies, sustainability reporting systems, and environmental certifications, can differentiate a firm and lead to improved reputation and operational efficiency. For SSA firms, investment in such resources is often constrained by financial and infrastructural limitations. However, listed firms with better access to capital may strategically invest in such capabilities to gain long-term benefits.

2.2.4. Legitimacy Theory

Legitimacy Theory suggests that organizations seek to operate within the bounds and norms of their respective societies. When applied to environmental performance, this theory explains how and why companies might engage in environmentally responsible behavior to maintain or regain their social legitimacy. A mining company may face heavy scrutiny due to its environmental impact. To maintain legitimacy, it might publish an annual environmental impact report, invest in land rehabilitation, or collaborate with environmental NGOs—even if these actions also support long-term business interests.

Legitimacy theory suggests that companies seek to align their actions with societal values and norms to maintain legitimacy. In SSA, environmental degradation is a major concern, particularly in industries like extractives and agriculture. Firms may therefore engage in corporate environmental responsibility initiatives to maintain legitimacy among stakeholders and avoid reputational risks. Listed firms, particularly those operating in high-impact sectors, are more likely to engage in environmental disclosures and certifications to maintain legitimacy.

2.2.5. Agency Theory:

Agency theory examines the conflict between management (agents) and shareholders (principals). Managers may not always prioritize environmental performance unless incentivized or monitored. In SSA, governance mechanisms such as board independence, audit committees, and shareholder activism can influence managerial behavior. Listed companies are more likely to be exposed to governance standards that enforce environmental accountability, thereby improving EP.

In conclusion, environmental performance among listed companies in sub-Saharan Africa is shaped by both internal and external factors, and these can be effectively analyzed through multiple theoretical lenses. Institutional limitations, stakeholder pressure, resource capabilities, legitimacy concerns, and governance structures all play a crucial role. Recognizing the interplay of these determinants helps explain the variability in environmental performance across firms and countries in the region.

Agency Theory is a framework that explores the relationship between principals (such as shareholders) and agents (such as company managers), focusing on aligning interests when there's

a separation between ownership and control. When applied to environmental performance, Agency Theory helps explain why companies may or may not engage in sustainable or eco-friendly practices. Agency theory to environmental performance can be deduced from: one, conflict of interests between managers (agents) may prioritize short-term profits or personal gains (e.g., bonuses, promotions) over long-term environmental investments that benefit shareholders (principals) in the long run. Two, Information Asymmetry, where agents typically have more information than principals about operational practices, including environmental impacts. This can lead to *green washing*, where companies appear more environmentally responsible than they actually are. Three, incentives and monitoring, agency theory suggests that aligning incentives such as tying executive compensation to environmental goals can improve environmental performance. Shareholders may also demand increased transparency and reporting (e.g., ESG disclosures) to monitor managerial behavior. Four, regulatory and stakeholder pressure, this mean external actors (regulators, NGOs, consumers) act as informal “principals,” pushing managers to consider environmental outcomes. This can reduce the agency gap. Lastly, Long-term Value Creation could allow environmentally sustainable practices may align with long-term shareholder interests by mitigating risks, reducing costs, and enhancing reputation helping bridge agency conflicts

2.3 Empirical Review

Developed economies.

Aslam, et al., (2021) studied the association of environmental management practices (EMPs), environmental performance (EP) and financial performance (FP), and subsequently establish whether environmental performance (EP) can mediate the relationship between environmental management practices and financial performance. Data extracted from dataset of Nikkei 225 listed firms from 2007 to 2018 (1,920). Generalized Method of Moments techniques (GMM) to analyze. Findings first put forward that Environmental Management Practices have a positive consequence on Financial Performance. Again the anticipated Environmental Performance can be achieved through the adoption of comprehensive EMPs. Lastly, improved Environmental Performance has a substantial impact on shaping the Environmental Management Practices’ have effect on Financial Performance.

García Martín, and Herrero, (2020) considered the nexus between board characteristics and environmental performance. They adopted a triple perspective of environmental performance, focused on emissions (waste and CO₂), resource consumption (water and energy), and the implementation of environmental initiatives. The study sampled 644 nonfinancial European Union-based companies. The data dissected cover the period 2002 to 2017. The results of the study confirmed that Gender Diversity (GD) and the existence of a corporate social responsibility committee are positively related with the environmental performance index. The result is consistent with the view that the educational background, talent, and experience of women help promote sustainable environmental initiatives. The existence of a corporate social responsibility committee mirrors a corporate entities’ commitment to sustainable development.

Fernández-Cuesta, et al., (2019) they examined the impact of firms’ reductions of carbon emissions on the financial gearing of all corporate companies in the main stock index of 16 European countries by employed panel data regression analysis. The carbon risk and tangibility of

capital expenditures were found to be the primary influenced the use of financial debt. The study results showed that the general positive impact of carbon emissions on financial debt that was induced by the role of emissions as an indicator of activity was mitigated by firms' carbon environmental performance. Consequently, a better carbon performance allowed industrial firms to obtain more long-term financial debt to finance their relevant environmental investment

Álvarez, et al., (2018) investigated who environmental performance index can be affected or influenced by other variables. It considered the potential consequences at the macroeconomic and microeconomic level due to its relationship with other types of indexes that can be related directly to the company's valuation and the effect on investment. The study used multivariate analysis of the HJ-Biplot method to contextualize the countries grouped by geographic area and the variables related to the environmental indicators included in the EPI. The data sampled comprise 24 countries in Latin America. The findings of the study revealed from the empirical analysis point to socioeconomic factors, like education, political ideology, environmental health, countries sizes determining factors of environmental performance in the countries analyzed. In the geographic area of the Caribbean (Cuba, the Dominican Republic, Haiti, Jamaica and Trinidad and Tobago). Other variables associated with ecosystem vitality, such as air pollution (effects on nature), are more closely related to Mesoamerica (Costa Rica, Honduras and Panama, among other countries). Countries in South America, however, are shown to be more concerned about climate change; these countries include Argentina, Chile and Brazil

Braam, et al., (2016) examined the nexus that exist between Environmental Reporting Practices (ERP), Environmental Performance Metrics (EPE) and external assurance. The study measured of greenhouse gas emissions, waste production and water consumption were quantified and a sample of Germany companies during the period 2009 to 2011. The results showed that greenhouse gas emissions and water consumption, and external assurance play a significant, incremental role in explaining the variation in the level and nature of CER. The results support the view that legitimacy plays an important role in companies' choices concerning environmental disclosure. At the same time, our descriptive statistics indicate that companies systematically disclose an incomplete picture of how their decisions and activities affect the environment. Our findings suggest a need to complement voluntary CER with mandatory requirements for sustainability reporting in combination with strong enforcement mechanisms to urge companies to become more accountable in terms of environmental performance.

Wu, (2010) examined present a quantitative analysis of environmental performance in China's regional economies and to determine the determinants of regional variation in performance. The findings are used to draw policy implications for environmental protection and are helpful in the discussion of China's future sustainable development.

Developing economies

Madni, Anwar, and Ahmad, (2022) investigated the impact of social, political, and economic activities on environment performance of one hundred sixteen (116) developing economies, that covered of time span of 1996–2019. The study deployed panel autoregressive distributed lags technique to dissected and determine the dynamism of long-run relation among variables. The results of the study revealed that GDP growth, financial sector, and energy consumption in these economies were causing to increase the carbon dioxide emissions while institutional quality, ethnic fractionalization, and political freedom have their crucial role to reduce the level of environmental

deterioration. The policy-makers may adopt a policy of social interconnection among various ethnic groups, high-quality institutions, political freedom to all, and inclusive financial development for less pollutant environment in these economies.

Sahan, et al., (2025) investigated the relationships between Green Human Resource Management, Energy Saving Behaviors and Environmental Performance. Structural equation modeling (SEM) used in the analyses within the context of manufacturing companies. The literature in question was mostly contributed by Malaysia, Pakistan, Canada and Thailand. Majority of research endeavors were carried out within the context of manufacturing companies. The studies under scrutiny mostly used quantitative research methodologies and applied theorist the resource-based view (RBV) and theory of planned behavior (TPB) frameworks to investigate the relationships between GHRM, ESB and EP. The findings suggest a growing emphasis on the intersection of GHRM, EP and ESB, supported by a substantial increase in research in recent times. In addition, This analysis emphasizes the growing importance of GHRM strategies such as green recruiting, green performance management and green remuneration, in fostering sustainable organizational results. Rashid, et al., (2025) surveyed the role of just-in-time, total quality management, and green supply chain management practices and their impact on the improvement of environmental performance. Data were extracted from 207 manufacturing industry respondents from a developing economy were tested through a quantitative method. Structure equation model was used to validate the data. Findings showed that just-in-time significantly influences total quality management and green supply chain management practices. Similarly, total quality management significantly affects environmental performance. However, just-in-time insignificantly affects the environment. Likewise, total quality management is insignificant and negatively affects green supply chain practices. The study concluded and provided a practical insight to practitioners for understanding and implementing practices in their supply chain networks. These findings support the strategic use of just-in-time and total quality management to promote green supply chain practices as a core skill to improve environmental performance. The findings are also helpful for supply chain practitioners, policymakers, and industrialists.

Adams, (2025) investigate the connection between green reporting and firm performance and how this relationship varies across various chief executive officers' (CEOs) cultural origins. The study spanned from 2015 to 2021 with a total of 158 listed manufacturing firms, selected from 14 Anglophone countries in Sub-Saharan Africa. The study employs the instrumental variable-generalized method of moments (IV-GMM) technique to address potential endogeneity issues. The results revealed that green reporting positively influences firm performance: returns on assets and returns on equity (ROA and ROE) the study hinged on the theories of signaling, legitimacy and stakeholder. On the other hand, green reporting has a more positive influence on ROA and ROE when CEOs come from cultures characterized by high power distance, high uncertainty avoidance and high masculinity.

Empirical studies examining environmental performance in sub-Saharan African listed companies indicate that several internal and external factors contribute to variations in sustainability outcomes. While the continent lags behind in global environmental rankings, specific corporate governance and institutional pressures are shown to influence firm-level environmental responsibility.

One of the primary internal determinants identified across multiple studies is corporate governance structure. Companies with independent boards, audit committees, and gender-diverse leadership

tend to show better environmental reporting and accountability. For instance, studies conducted in South Africa and Nigeria, two major economies in the region, suggest a positive relationship between board independence and environmental performance (Oba & Fodio, 2013). Furthermore, ownership structure, especially foreign and institutional investors, is often associated with stronger pressure for environmental compliance and transparency.

Another strong internal factor is firm size and profitability. Larger and more profitable firms have greater resources and stakeholder visibility, making them more likely to invest in sustainable operations and environmental disclosures. This aligns with the “slack resources theory,” which holds that financially healthy companies are better able to afford environmental investments (Etzion, 2007).

Externally, regulatory frameworks and government policies have mixed influence. In South Africa, mandatory Integrated Reporting (IR) frameworks under the King Codes have significantly improved corporate environmental reporting. However, in other countries such as Ghana, Kenya, or Tanzania, weak enforcement of environmental laws and low penalties have failed to create meaningful deterrents. Institutional voids in governance thus remain a significant constraint.

Moreover, stakeholder pressure including that from international NGOs, media scrutiny, and community activism has increasingly shaped corporate behavior. Firms with international exposure or those listed on foreign stock exchanges tend to demonstrate stronger environmental commitments, partly due to global reputational concerns. The institutional theory supports this, where companies mimic best practices from global peers to gain legitimacy.

The sectorial effect is also noteworthy. Extractive and manufacturing industries—particularly mining, oil & gas re subject to more environmental scrutiny, resulting in relatively stronger environmental management practices, albeit often driven by compliance motives rather than genuine sustainability goals.

Additionally, the quality of environmental disclosure remains a concern. Many firms focus on symbolic disclosures (e.g., glossy sustainability reports) without actual improvements in environmental performance metrics such as carbon emissions or waste management. This aligns with legitimacy theory, where companies disclose information primarily to maintain social legitimacy rather than demonstrate impact.

Emerging studies also explore the role of ESG (Environmental, Social, and Governance) ratings, green financing, and climate risk awareness, although these concepts are still gaining traction in many SSA countries. Integration of environmental metrics into investment and credit decisions is slowly influencing corporate behavior, albeit more visible in South Africa and Mauritius than in other regions.

In summary, environmental performance in sub-Saharan African listed companies is driven by a mix of governance quality, firm-specific characteristics, regulatory environments, and external pressures. While some progress is evident, systemic institutional challenges and inconsistent enforcement hinder widespread adoption of strong environmental practices.

2.4 Gaps in Literature

Limited Geographic Representation: Most existing studies focus on a few relatively advanced economies like South Africa, Kenya, or Nigeria, leaving out insights from lesser-studied countries such as Chad, Malawi, or Sierra Leone.

Inadequate Sectoral Analysis: There's a lack of comparative studies across sectors (e.g., mining vs. manufacturing vs. services). Environmental performance drivers likely differ significantly, but this is rarely captured.

Insufficient Longitudinal Data: Few studies use time-series data to observe trends in environmental performance over time, limiting understanding of policy impacts or firm adaptation.

Overemphasis on Financial Determinants: Literature is biased toward financial performance metrics (like profitability or size) with minimal focus on non-financial determinants such as leadership commitment, cultural factors, or environmental awareness.

Neglect of Regulatory Quality and Enforcement: Many studies mention regulation but do not account for enforcement variability across countries. A company's compliance may hinge more on enforcement than mere presence of laws.

Limited Use of Robust Analytical Models: Many analyses are descriptive or use basic regression, while more sophisticated econometric or machine learning models could uncover hidden relationships and causality.

Scarce Integration of ESG Ratings: Unlike studies in Western markets, few African studies incorporate formal Environmental, Social, and Governance (ESG) ratings due to data limitations.

Minimal Exploration of International Influence: The role of foreign investors, international supply chains, and global environmental reporting standards (e.g., GRI, CDP) is underexplored in Sub-Saharan contexts.

Lack of Indigenous Knowledge and Cultural Context: There's limited research incorporating traditional environmental stewardship practices and how local values shape corporate behavior.

Data Availability and Reporting Challenges: Many listed firms in SSA countries provide inadequate or inconsistent environmental disclosures, leading to data scarcity for empirical analysis.

3. RESEARCH METHODOLOGY

This study adopts a quantitative research design using panel data analysis to investigate the determinants of environmental performance among listed companies in Sub-Saharan African (SSA) countries. The design is suitable because it allows for assessing the dynamic relationships between environmental performance and firm-level, industry-level, and macroeconomic variables over time and across countries.

The population of interest comprises all listed companies in Sub-Saharan Africa, particularly those listed on major stock exchanges such as: Johannesburg Stock Exchange (South Africa) has 300; Nigerian Exchange Group (Nigeria) has 151; Nairobi Securities Exchange (Kenya) has 63 and Ghana Stock Exchange (Ghana) has 36 in all the total 550 as at 31st December 2022. A purposive sampling technique employed, selected companies that are consistently listed from 2011 to 2022. Have publicly available ESG (Environmental, Social, and Governance) or sustainability reports, Operate in sectors with notable environmental footprints (e.g., manufacturing, mining, energy, agriculture). A sample size made up: Johannesburg Stock Exchange (South Africa) 197 selected out of 300; Nigerian Exchange Group (Nigeria) 107 were selected from 151; Nairobi Securities Exchange (Kenya) 37 were selected out of 63 and Ghana Stock Exchange (Ghana) 26 sampled out of 36 in all the total 366 as at 31st December 2022, targeted to ensure robust panel estimation. The secondary data used were collected from the Company Annual Reports and ESG/Sustainability Reports at the data base machemerations@companies.com ESG Database,

Stock Exchange Disclosures, World Bank Indicators for macroeconomic controls, Carbon Disclosure Project (CDP) data.

3.4. Variables and Measurement

Table 1 Measurement of variables

Determinants variables	Independent variables		Authors
roa	Returns on asset	ROA=(Net Income/Total Assets)%	Abdioğlu, & Aytekin, (2025).
fsize	Firms size	Natural log of total assets	Abdioğlu, & Aytekin, (2025).
roce	Returns on capital employed	ROCE= (EBIT)/Capital Employed)%	Abdioğlu, & Aytekin, (2025).
grmg	Gross margin growth	GM Growth=(GM _t -GM _{t-1})/GM _{t-1})%	Abdioğlu, & Aytekin, (2025).
grwt 1	Growth rate	Percentage change in the difference of the present and previous total assets divided by previous total assets	Abdioğlu, & Aytekin, (2025).
bsize	Board size	number of directors who sit on the board of a company at a given time	Abdioğlu, & Aytekin, (2025).
bind	Board independence	the proportion of independent directors	Abdioğlu, & Aytekin, (2025).
roe	Returns on equity	ROE=(Net Income after tax/Shareholders' Equity)%	Abdioğlu, & Aytekin, (2025).
Dependent variable			
esgi	Environmental social & governance index	(E+S+G)/3	Abdioğlu, & Aytekin, (2025).

Sources: Authors' Compilation (2025)

3.5 Model Specification

Consider the dynamic panel model:

$$ESGI_{it} = \alpha + \rho ESGI_{i,t-1} + \beta_1 ROA_{it} + \beta_2 FSIZE_{it} + \beta_3 ROCE_{it} + \beta_4 GRMG_{it} + \beta_5 GRWT1_{it} + \beta_6 BSIZE_{it} + \beta_7 BIND_{it} + \beta_8 ROE_{it} + \mu_i + \varepsilon_{it}$$

Where:

ESGI_{it} is the ESG index for firm i at time t (dependent variable).

ESGI_{i,t-1} is the one-period lag of ESGI (dynamic term).

ROA, FSIZE, ROCE, GRMG, GRWT1, BSIZE, BIND, ROE are explanatory variables (may be endogenous/exogenous).

μ_i captures unobserved time-invariant firm-specific effects.

ε_{it} is the idiosyncratic error term.

3.5.1 Estimation Techniques

The Arellano–Bond estimator (difference GMM) is designed to estimate linear dynamic panel-data models with a lagged dependent variable and potentially endogenous regressors when the panel has a relatively large cross-section (N) and small time dimension (T). It's commonly implemented in Stata via the commands 'xtabond' and the more advanced 'xtabond2' (user-written).

3.5.2 Reason for Arellano–Bond?

Because of the inclusion of lagged dependent variable with μ_i produces bias in OLS/Fixed Effects (Nickell bias) for short T. Arellano–Bond differences the equation to eliminate μ_i and uses lagged levels of the dependent variable (and other predetermined or endogenous regressors) as instruments for the differenced endogenous variables. Suitable when some regressors are endogenous or predetermined and when N is large, T is small.

3.5.3 Moment Conditions and Instruments

For the differenced equation $\Delta \text{ESGI}_{it} = \rho \Delta \text{ESGI}_{i,t-1} + \beta \Delta X_{it} + \Delta \varepsilon_{it}$, Arellano–Bond uses the valid moment conditions $E(\text{ESGI}_{i,t-s} \cdot \Delta \varepsilon_{it}) = 0$ for $s \geq 2$ under no serial correlation in ε_{it} . Similarly, if regressors are endogenous/predetermined, appropriate lags of those regressors are used as instruments.

Key points:

- Regressors classified as:
 - Strictly exogenous: use their levels and differences as appropriate.
 - Predetermined (weakly exogenous): lagged values are valid instruments.
 - Endogenous: deeper lags (t-2, t-3, ...) in levels used as instruments for differences.

4. DATA PRESENTATION AND DATA ANALYSIS

Descriptive statistics

Table 2

Summary statistics

	N	Mean	SD	Min	Max	Skewness	Variance
esgi	4052	.293	0.166	0	.846	.69	.028
roa	4037	32.404	1304.221	-11357.97	76901.88	51.606	1700993
llevg	4033	10.938	826.782	-52123.10	5749.88	-62.106	683569.2
fsiz	4040	11.711	2.407	1.39	17.94	-.383	5.794
roce	4009	70.835	1565.922	-7004.35	76901.89	36.183	2452112.
grmg	4013	-325.723	5833.088	-179900	99.97	-20.267	34024916
grwt 1	3809	-65.445	2041.238	-109600	100	-44.733	4166652.
bsize	3992	9.756	4.366	2	39	2.62	19.062
bind	3976	72.205	13.146	16.67	100	-.532	172.823

roe	4037	136.204	2749.748	-2719.39	84019.09	22.924	7561113
					4		

Sources: Author's Computation (2025)

Descriptive statistics provide the foundation for understanding the characteristics of the dataset before deeper econometric analysis. They summarize key features such as averages, dispersion, distribution shape, and extreme values. In this case, the dataset comprises 4,052 observations of listed firms in Sub-Saharan Africa, focusing on financial performance, governance, and environmental-social-governance (ESG) outcomes. The variables include the environmental, social, and governance index (ESGI), return on assets (ROA), return on equity (ROE), return on capital employed (ROCE), leverage (LLEV), firm size (FSIZE), growth measures (GRMG, GRWT1), board size (BSIZE), and board independence (BIND). The descriptive statistics reveal important insights about the distribution, variability, and possible data irregularities in these variables. These insights are crucial for interpreting the regression results and for shaping policy implications.

The ESGI has a mean of 0.293 with a standard deviation of 0.166, ranging from 0 to 0.846. The relatively moderate spread indicates that most firms cluster around similar ESG performance levels. The maximum score below 1 suggests no company achieved a perfect ESG index. Skewness (0.69) indicates a moderately right-skewed distribution, implying that while most firms report lower ESG scores, a few achieve relatively high ESG outcomes. These implies that : ESG practices are uneven across firms in Sub-Saharan Africa, with only a minority excelling in sustainability. Policymakers and investors should recognize the need for broader enforcement of ESG standards to reduce disparities.

ROA displays extreme variability, with a mean of 32.404, standard deviation of 1,304.22, and a range from -11,357.97 to 76,901.88. The skewness is extremely high (51.606), suggesting the presence of extreme value. Thus means many firms may operate at modest or negative asset returns, while a handful achieve exceptionally high ROA. This heterogeneity reflects unstable profitability in the region, possibly due to structural weaknesses, volatile markets, and uneven industry performance.

Leverage also shows extreme dispersion, with a mean of 10.94, standard deviation of 826.78, and a wide range from -52,123.11 to 5,749.88. The skewness (-62.106) is unusually large and negative, implying the presence of extreme negative. Such results may indicate data entry issues, reporting inconsistencies, or highly distressed firms. The implication is that capital structure data in Sub-Saharan Africa is highly irregular. Many firms may underreport or experience debt-related instability, complicating financial sustainability. For policymakers, this reflects fragile financial systems and the need for robust accounting standards.

Firm size, measured by log-transformed assets, is more stable, with a mean of 11.71, standard deviation of 2.41, and range from 1.39 to 17.94. Skewness (-0.383) is close to normal, showing a fairly balanced distribution. This means that unlike profitability and leverage, firm size is consistently measured and distributed. Larger firms dominate the dataset, but the presence of small firms ensures representativeness. This variable provides a reliable predictor in regression analysis, as it reflects both resources and visibility in ESG adoption.

ROCE has a mean of 70.835, standard deviation of 1,565.92, and a range from -7,004.35 to 76,901.90. With skewness of 36.183, it displays a highly skewed distribution, similar to ROA. Extreme heavily influence the average, and the extreme range suggests data heterogeneity across firms, which means ROCE is theoretically a measure of efficiency in using capital, its practical distribution in this dataset suggests instability. Investors should be cautious when interpreting capital efficiency in Sub-Saharan African firms, as outliers dominate.

GRMG is particularly striking, with a mean of -325.72, an enormous standard deviation of 5,833.09, and a minimum of -179,900. Negative mean growth implies that, on average, firms in the dataset saw declining profit margins. The skewness (-20.267) points to a left-skewed distribution with extreme negative extreme value, which means many firms in the region are struggling with profitability growth, reflecting broader economic instability. Negative and volatile growth in gross margins signals challenges such as high operating costs, weak demand, or macroeconomic shocks.

The growth rate has a mean of -65.445 and a standard deviation of 2,041.24, ranging from -109,600 to 100. Again, the negative average indicates contraction rather than expansion, with extreme skewness (-44.733) reflecting substantial extreme value. Thus implies the that firm growth in Sub-Saharan Africa is highly unstable, with many experiencing contraction. Such patterns reflect broader economic volatility, fragile markets, and structural barriers to expansion. For researchers, the variable needs careful treatment (e.g., winsorization) to avoid skewing regression estimates.

The Board size shows a mean of 9.76, standard deviation of 4.37, and a range from 2 to 39 members. The distribution is positively skewed (2.62), indicating that most boards are relatively small, but a few firms employ unusually large boards, which means governance structures vary, but most firms maintain moderately sized boards, consistent with global best practices (typically 7–12 members). Oversized boards may indicate complexity or inefficiencies, while very small boards may lack adequate oversight.

Board independence averages 72.2%, with a standard deviation of 13.15, and ranges from 16.67 to 100%. Skewness (-0.532) shows a slightly left-skewed distribution, meaning most firms already maintain relatively high independence levels. The implication is that compared to financial performance variables, governance indicators appear more stable. This suggests that listed firms in Sub-Saharan Africa may follow international governance codes requiring independent directors. Board independence thus emerges as a credible determinant of ESG performance.

The ROE averages 136.2, but with an extremely high standard deviation of 2,749.75 and a range from -2,719.39 to 84,019.09. Skewness (22.924) confirms the presence of extreme positive outliers, similar to ROA and ROCE, which implies that while ROE is a popular profitability metric, its extreme variability here suggests major inconsistencies or outlier-driven distortions. This variability reflects volatile equity performance, possibly due to macroeconomic instability, financial mismanagement, or uneven reporting standards.

In summary, the profitability and growth variables (ROA, ROE, ROCE, GRMG, GRWT1) show extreme dispersion, suggesting substantial heterogeneity across firms, extreme value dominate, which could bias analyses if not treated carefully. It shows Governance mechanisms such as board size and board independence exhibit more consistent distributions, aligning with global governance norms. The ESGI shows relatively normal distribution and moderate variation, making it a reliable dependent variable for analysis.

Conclusion, the descriptive statistics highlight a dataset characterized by stable governance measures, moderate ESG variation, and extremely volatile financial indicators. While firms differ widely in profitability and growth, governance structures such as board size and independence remain relatively consistent and reliable. The findings suggest that in Sub-Saharan Africa, sustainability outcomes may depend more on governance than on financial performance, consistent with the regression results.

Table 3 **Matrix of correlations**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) esgi	1.000									
(2) roa	0.007	1.000								
(3) llevg	-0.014	0.000	1.000							
(4) fsize	0.422	-0.020	0.019	1.000						
(5) roce	-0.020	0.918	0.003	-0.075	1.000					
(6) grmg	0.051	-0.209	-0.003	0.121	-0.444	1.000				
(7) grwt_1	0.015	0.001	-0.000	0.054	0.002	0.189	1.000			
(8) bsize	0.157	-0.031	0.014	0.430	-0.058	0.081	0.030	1.000		
(9) bind	0.112	-0.034	-0.015	0.191	-0.055	0.063	-0.021	0.156	1.000	
(10) roe	-0.043	0.667	0.003	-0.116	0.881	-0.657	0.003	-0.077	-0.077	1.000

Source: Author's Computation (2025)

Correlation analysis provides insights into the strength and direction of linear relationships between variables. It helps identify potential associations, multicollinearity risks, and preliminary evidence about how variables may interact in regression analysis. The correlation matrix for ESGI (environmental, social, and governance index), financial performance indicators, firm size, leverage, growth, and governance variables highlights key patterns in the dataset.

The ESGI shows a moderate positive correlation with firm size (0.422), suggesting that larger firms are more likely to perform well on ESG standards. This supports the idea that bigger firms have more resources, visibility, and pressure from stakeholders to adopt sustainable practices. ESGI also correlates positively with board size (0.157) and board independence (0.112), though weaker, indicating governance structures contribute to sustainability outcomes. Correlations with profitability indicators such as ROA (0.007), ROE (-0.043), and ROCE (-0.020) are negligible, implying that profitability does not strongly determine ESG performance.

ROA, ROE, and ROCE are highly correlated with each other. ROA and ROCE correlate at 0.918, while ROA and ROE show a strong relationship (0.667). ROCE and ROE are even more strongly

associated (0.881). These strong positive correlations reflect overlapping measurement concepts of profitability and efficiency. However, they also raise concerns of multicollinearity in regression models, which could inflate standard errors and complicate interpretation. Interestingly, ROE shows a strong negative correlation with gross margin growth (-0.657), suggesting that firms with higher equity returns may not necessarily achieve margin growth. This could indicate reliance on financial structuring or leverage rather than operational efficiency.

Gross margin growth (GRMG) has a modest positive correlation with ESGI (0.051) and firm size (0.121). It also correlates positively with overall growth (GRWT1 = 0.189), as expected, since profitability growth aligns with firm expansion. The negative correlation with ROCE (-0.444) suggests that firms with high capital efficiency may not always experience margin growth, possibly due to different cost structures. Growth rate (GRWT1) shows only weak relationships with most variables, indicating limited overlap with profitability or governance measures. The correlation with ESGI (0.015) is negligible, suggesting that expanding firms do not automatically adopt stronger sustainability practices. Board size (BSIZE) correlates positively with ESGI (0.157), firm size (0.430), and board independence (0.156). Larger firms tend to have larger boards, which may strengthen oversight. However, the correlation with profitability measures is weak or negative, indicating that governance structure does not directly drive financial performance. Board independence (BIND) correlates positively with ESGI (0.112) and firm size (0.191), suggesting that bigger firms are more likely to appoint independent directors. Its correlations with profitability are negative but very weak, reinforcing the idea that governance contributes more to sustainability than to short-term financial gains. Leverage (LLEVg) shows almost no correlation with other variables, including ESGI (-0.014). This suggests that capital structure decisions are largely independent of both financial performance and governance characteristics in this dataset.

In summary, correlation matrix highlights three main points. First, profitability indicators are strongly correlated among themselves but weakly tied to ESG performance, confirming that financial success does not automatically translate into sustainability. Second, governance variables show modest positive relationships with ESGI, underscoring their role in driving sustainability outcomes. Finally, firm size emerges as the strongest correlate with ESGI, reinforcing the importance of resources and visibility in shaping corporate sustainability practices.

Table 4

Regression Analyses

esgi	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
L	0.57	0.04	14.83	0.0000	0.4920	0.6410	***
roa	0.00	0.00	-2.22	0.0270	0.0000	0.0000	**
llevg	0.00	0.00	10.10	0.0000	0.0000	0.0000	***
fsize	0.01	0.01	1.46	0.1450	-0.0020	0.0170	
roce	0.00	0.00	2.19	0.0280	0.0000	0.0000	**
grmg	0.00	0.00	-10.81	0.0000	0.0000	0.0000	***
grwt_1	0.00	0.00	-0.05	0.9560	0.0000	0.0000	
bsize	-0.01	0.00	-3.53	0.0000	-0.0090	-0.0030	***

bind	0.00	0.00	2.52	0.0120	0.0000	0.0010	**
roe	0.00	0.00	9.77	0.0000	0.0000	0.0000	***
Mean dependent var			0.402	SD dependent var		0.286	
Number of obs			3085	Chi-square		567.45	

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Authors' Computation (2025)

Discussion of Determinants of ESGI

The regression analysis investigates the determinants of the Environmental, Social, and Governance Index (ESGI) for 3,085 observations, with ESGI serving as a proxy for firms' sustainability performance. The results highlight financial, structural, and governance factors that shape ESG practices in listed firms. The chi-square statistic (567.45) confirms overall model significance, suggesting that the included variables jointly explain variations in ESGI.

The lagged ESGI has a strong positive and highly significant coefficient (0.57, $p < 0.01$). This indicates persistence in ESG performance, meaning firms that previously scored high on ESG tend to maintain or improve their standing over time. This reflects path dependency, where sustainability practices become institutionalized within corporate strategy. This means that once embedded, ESG practices create a self-reinforcing cycle, suggesting the importance of continuity in sustainability policies.

ROA has a negative coefficient (-2.22, $p < 0.05$), suggesting that higher returns on assets are associated with slightly lower ESG performance. This may reflect short-term efficiency trade-offs, where firms prioritize asset productivity over sustainability investments. ROE is strongly positive and significant (9.77, $p < 0.01$). Firms generating higher equity returns are more likely to invest in ESG, likely due to greater financial flexibility. ROCE also shows a positive effect (2.19, $p < 0.05$), highlighting that efficient use of capital supports sustainability efforts. These profitability Implication and influences ESG in complex ways. While asset-driven efficiency may discourage ESG spending, strong equity and capital efficiency support long-term sustainability.

Leverage exerts a significant positive influence (10.10, $p < 0.01$). This suggests that firms with higher debt levels adopt stronger ESG practices, possibly to signal credibility and reduce financing risks. Creditors may increasingly demand sustainability disclosures, pushing firms to improve ESG performance. This means that access to debt financing can be a driver of sustainability, especially where lenders consider ESG risks in credit assessments.

Firm size has a positive but statistically insignificant coefficient ($p = 0.145$). This suggests that, unlike in many developed markets, larger firms in Sub-Saharan Africa are not automatically associated with stronger ESG performance. This indicate that visibility and scale alone do not guarantee ESG adoption in this context; governance and financial health play a greater role.

Gross Margin Growth (GRMG) has a strong negative effect (-10.81, $p < 0.01$). Firms with volatile or negative margin growth are less able to commit to ESG practices, reflecting trade-offs between survival and sustainability. Growth Rate (GRWT1) is insignificant ($p = 0.956$), suggesting that firm expansion, by itself, does not influence ESG outcomes. Which means financial stability matters more than expansion. Firms under profitability pressure may deprioritize ESG initiatives. Board size is negative and significant (-3.53, $p < 0.01$). Larger boards appear to reduce ESG effectiveness, possibly due to coordination difficulties or diluted accountability. Board

independence has a positive and significant effect (2.52, $p < 0.05$). Independent directors likely encourage transparency and accountability, aligning firms with sustainability expectations. This implies governance quality is central to ESG adoption. Smaller, more effective boards with higher independence drive stronger sustainability outcomes.

In summary, the determinants of ESGI in Sub-Saharan African firms reveal that sustainability is shaped by a mix of financial performance, leverage, and governance structures. Persistence in ESG underscores the importance of long-term strategies. Positive effects of ROE, ROCE, and leverage show that financial strength and debt pressures encourage ESG adoption, while negative effects of ROA, GRMG, and board size highlight potential trade-offs and inefficiencies. Most importantly, governance, particularly board independence emerges as a critical driver. The findings suggest that firms and policymakers should emphasize governance reforms, stable profitability, and responsible financing mechanisms to enhance ESG performance in the region.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study examined the determinants of environmental performance of listed firms in Sub-Saharan African (SSA) countries, using the Environmental, Social, and Governance Index (ESGI) as a proxy for environmental performance. The regression analysis, conducted on 3,085 firm-year observations, tested the influence of financial performance, firm structure, leverage, and governance on ESGI. The chi-square statistic confirmed the overall significance of the model, showing that the chosen explanatory variables jointly provide meaningful insights into what drives environmental performance across SSA listed companies.

The results revealed several noteworthy findings. First, ESG practices displayed persistence over time, as indicated by the strong significance of lagged ESGI. This suggests that once firms adopt sustainability practices, they are more likely to maintain and institutionalize them within their strategies. The path dependency effect implies that ESG becomes embedded in organizational culture and operations, reducing the likelihood of backsliding once commitments are in place.

Profitability presented mixed effects. Return on Assets (ROA) was negatively associated with ESGI, implying that firms emphasizing asset efficiency may trade off sustainability investments in favor of maximizing short-term returns. In contrast, Return on Equity (ROE) and Return on Capital Employed (ROCE) were positively significant, indicating that firms with stronger financial flexibility and efficient capital utilization are more capable of sustaining ESG commitments. This divergence shows that not all profitability indicators drive ESG equally, and their influence depends on the underlying financial structures.

Leverage was found to exert a strong positive effect on ESGI. Highly leveraged firms appear motivated to strengthen ESG practices, likely to meet creditor expectations and reduce financing risks. In a global context where lenders increasingly incorporate ESG risks into credit assessments, African firms may be responding to financing pressures by adopting sustainability initiatives. This finding underscores the growing role of financial markets in shaping environmental behavior.

Firm size, though positive, was statistically insignificant. Unlike in many advanced economies, larger SSA firms are not automatically stronger performers in ESG. This suggests that visibility and scale do not translate into sustainability leadership in the region, where institutional and governance factors may weigh more heavily.

Growth measures revealed contrasting outcomes. Gross Margin Growth (GRMG) showed a

significant negative effect, suggesting that profitability volatility constrains ESG investments. Firms struggling with declining margins are less likely to allocate resources to sustainability. On the other hand, overall Growth Rate (GRWT1) was insignificant, showing that mere expansion does not necessarily correlate with environmental performance.

Governance variables emerged as critical. Board size was negatively significant, implying that larger boards may hinder effective decision-making and dilute accountability in sustainability governance. Conversely, board independence was positively significant, reflecting that independent directors enhance monitoring, transparency, and commitment to ESG. Thus, governance quality especially board composition plays a crucial role in driving sustainable practices.

Overall, the determinants of environmental performance in SSA reflect a complex interplay of profitability, leverage, governance, and path dependency. Financial health and debt pressure serve as important drivers, while governance, particularly independent oversight, remains central to ESG adoption. Meanwhile, trade-offs exist where efficiency-focused strategies or volatile profitability may discourage sustainability spending.

5.2 Conclusion

The analysis of listed companies in Sub-Saharan Africa provides compelling evidence that environmental performance is not solely determined by firm size or expansion but is shaped more by financial stability, leverage, and governance quality. ESG adoption in the region is path dependent: once embedded, sustainability practices persist, reinforcing the importance of continuity in policy and culture.

The findings reveal that profitability measures influence ESG differently. Firms with strong equity returns and efficient capital use are more proactive in sustainability, while asset-driven efficiency may discourage it. Leverage plays a surprisingly positive role, as indebted firms strengthen ESG to maintain financial credibility. Governance factors further highlight that smaller boards with higher independence foster stronger environmental accountability.

From a regional perspective, the results underscore the importance of governance reforms, sustainable financing, and the institutionalization of ESG practices in SSA. Unlike developed markets, firm size alone does not guarantee environmental leadership; rather, the effectiveness of governance structures and financial flexibility appear more decisive. The study thus contributes to the understanding of how firm-specific and governance factors shape environmental performance in emerging economies, providing both theoretical and practical insights.

5.3 Recommendations

Based on the findings, several practical recommendations emerge for policymakers, regulators, and corporate leaders in Sub-Saharan Africa:

Companies should prioritize board independence by increasing the proportion of non-executive and independent directors with sustainability expertise. Regulators can encourage this through corporate governance codes that emphasize ESG oversight. To avoid coordination challenges, firms should maintain leaner boards with clear accountability for ESG integration. A governance framework that balances expertise with agility will enhance decision-making on sustainability. Financial institutions should expand the use of green bonds, sustainability-linked loans, and ESG-screened credit. This will reinforce the positive role of leverage by tying access to capital with

stronger environmental commitments. Firms should view environmental performance not as a cost but as a value-creating strategy. Integrating sustainability into long-term profitability plans can mitigate the trade-off observed with ROA and enhance firm resilience.

Firms should formalize ESG policies, reporting mechanisms, and long-term strategies to harness the persistence effect. Once institutionalized, sustainability becomes self-reinforcing and less vulnerable to leadership changes or market shocks. Directors and executives should be trained on ESG integration, particularly in translating sustainability goals into operational and financial strategies. Regional stock exchanges can play a role by mandating ESG training for listed companies and policymakers should require harmonized ESG disclosure across SSA, enabling comparability and accountability. Stronger transparency standards will enhance investor confidence and encourage best practices.

5.4 Suggestions for Further Research

While this study provides valuable insights, it also opens avenues for future research:

Future studies could separate environmental, social, and governance pillars to examine whether determinants differ across dimensions. For instance, governance factors may drive ESG broadly, but profitability may have a stronger effect on environmental investment specifically.

Comparative studies across SSA countries with varying regulatory and institutional environments can help explain why firm size is insignificant in the region. Such research could explore how national policies mediate ESG outcomes.

Qualitative research could complement statistical findings by exploring how specific firms institutionalize ESG practices over time, shedding light on the mechanisms behind persistence.

Given the growing importance of foreign ownership in SSA markets, future research should analyze whether international investors directly influence ESG adoption through pressure or incentives.

Building on these determinants, future studies could investigate whether environmental performance enhances financial returns in SSA, using event studies or panel data to test causality. Since industries vary in environmental impact, sector-focused research could provide more nuanced insights, particularly in high-polluting industries such as mining, oil, and manufacturing. Examining the impact of specific policy reforms, such as carbon taxes, green finance incentives, or mandatory ESG disclosures, would help assess how government interventions shape corporate environmental performance.

REFERENCES

- Abdul Aziz, N. A., Ong, T. S., Foong, S. Y., Senik, R., & Attan, H. (2018). Green initiatives adoption and environmental performance of public listed companies in Malaysia. *Sustainability*, 10(6), 2003.
- Adams, J., Tackie, G., & Idun, A. A. A. (2025). Green reporting and firm performance of listed manufacturing firms in Sub-Saharan Africa (SSA): Does chief executive officer (CEO) cultural origin matter?. *Journal of Accounting in Emerging Economies*.
- Ahmed, S. (2024). *Stakeholders, Environmental Performance and Firm Value* (Doctoral dissertation, Université Clermont Auvergne).
- Álvarez, I. G., Rubio, R. G., & Ferrero, J. M. (2018). Environmental performance concerns in Latin America: Determinant factors and multivariate analysis. *Revista de Contabilidad-*

-
- Spanish Accounting Review*, 21(2), 206-221.
- Annesi, N., Battaglia, M., Ceglia, I., & Mercuri, F. (2025). Navigating paradoxes: Building a Sustainable strategy for an integrated ESG corporate governance. *Management Decision*, 63(2), 531-559.
- Abdioğlu, N., & Aytekin, S. (2025). An analysis of the determinants of environmental, social and governance (ESG) scores at the firm level on Borsa İstanbul Companies. *Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 26(1), 95-104.
- Aslam, S., Elmagrhi, M. H., Rehman, R. U., & Ntim, C. G. (2021). Environmental management practices and financial performance using data envelopment analysis in Japan: The mediating role of environmental performance. *Business Strategy and the Environment*, 30(4), 1655-1673.
- Azzone, G., Brophy, M., Noci, G., Welford, R., & Young, W. (1997). A stakeholders' view of environmental reporting. *Long range planning*, 30(5), 699-709.
- Baah, C., Opoku-Agyeman, D., Acquah, I. S. K., Issau, K., & Moro Abdoulaye, F. A. (2021). Understanding the influence of environmental production practices on firm performance: a proactive versus reactive approach. *Journal of Manufacturing Technology Management*, 32(2), 266-289.
- Braam, G. J., De Weerd, L. U., Hauck, M., & Huijbregts, M. A. (2016). Determinants of corporate environmental reporting: The importance of environmental performance and assurance. *Journal of cleaner production*, 129, 724-734.
- Christopher, E., King'ori, J., & Chalu, H. (2022). The influence of board characteristics on corporate sustainability disclosures in Sub-Saharan Africa. *Business management review*, 25(2), 38-56.
- Dhayal, K. S., Enyoghasim, M. O., Anyanwu, K. C., Onwe, J. C., & Giri, A. K. (2025). Impact of green energy, strategic commodities and economic policy uncertainty towards environmental sustainability for Sub-Saharan Africa. *Discover Sustainability*, 6(1), 215.
- Dkhili, H. (2018). Environmental performance and institutions quality: evidence from developed and developing countries.
- Fernández-Cuesta, C., Castro, P., Tascón, M. T., & Castaño, F. J. (2019). The effect of environmental performance on financial debt. European evidence. *Journal of cleaner production*, 207, 379-390.
- García Martín, C. J., & Herrero, B. (2020). Do board characteristics affect environmental performance? A study of EU firms. *Corporate Social Responsibility and Environmental Management*, 27(1), 74-94.
- Gupta, A. K., & Gupta, N. (2021). Environment practices mediating the environmental compliance and firm performance: An institutional theory perspective from emerging economies. *Global Journal of Flexible Systems Management*, 22(3), 157-178.
- Guterman, A. S. (2023). Stakeholder theory. Available at SSRN 4387595.
- He, Q. (2025). The influence of organizational policies on firm environmental performance through sustainable technologies and innovation and stakeholder concerns. *Scientific Reports*, 15(1), 10019.
- Juliana, A. M. B. (2021). *Impact of Board Gender Diversity on Social and Environmental Performance of Firms: Evidence from Sub-Sahara Africa* (Master's thesis, ISCTE-Instituto Universitario de Lisboa (Portugal)).
-

-
- Lah, L. M., & Kotnik, Ž. (2025). Drivers of environmental regulation costs and their perception by firms: evidence from Slovenia. *Journal of Cleaner Production*, 145274.
- Mabogunje, A. L. (1995). The environmental challenges in sub-Saharan Africa. *Environment: Science and Policy for Sustainable Development*, 37(4), 4-10.
- Madhani, P. M. (2010). Resource based view (RBV) of competitive advantage: an overview. *Resource based view: concepts and practices*, Pankaj Madhani, ed, 3-22.
- Madni, G. R., Anwar, M. A., & Ahmad, N. (2022). Socio-economic determinants of environmental performance in developing countries. *Journal of the Knowledge Economy*, 13(2), 1157-1168.
- Raduan, C. R., Jegak, U., Haslinda, A., & Alimin, I. I. (2009). Management, strategic management theories and the linkage with organizational competitive advantage from the resource-based view. *European Journal of Social Sciences*, 11(3), 402-418.
- Rashid, A., Rasheed, R., & Amirah, N. A. (2025). Synergizing TQM, JIT, and Green Supply Chain Practices: Strategic Insights for Enhanced Environmental Performance. *Logistics*, 9(1), 18.
- Sahan, U. M. H., Jaaffar, A. H. H., & Osabohien, R. (2025). Green human resource management, energy saving behavior and environmental performance: A systematic literature review. *International Journal of Energy Sector Management*, 19(1), 220-237.
- Sun, G., Sulemana, I., & Agyemang, A. O. (2025). Examining the impact of stakeholders' pressures on sustainability practices. *Management Decision*.
- Wu, Y. (2010). Regional environmental performance and its determinants in China. *China & World Economy*, 18(3), 73-89.
- Zhu, N., Osei, A., & Agyemang, A. O. (2024). Do board attributes influence environmental sustainability disclosure in manufacturing firms? Evidence from sub-Saharan Africa. *Corporate Social Responsibility and Environmental Management*, 31(5), 4759-4771.