

AI For Environmentally Responsible Growth: Advancing Green Corporate Governance In Africa Under SDG 12

Mufaro Dzingirai¹, Herbert Masukume², Kudakwashe Zvitambo³, Anantha Raj A. Arokiasamy^{4,5*}, Khine Zar Zar Thet⁶

¹Harold Pupkewitz Graduate School of Business, Namibia University of Science and Technology & Research Fellow, INTI International University

^{2,3}Department of Management Sciences, Midlands State University, Zimbabwe

^{4,5,6}Faculty of Business and Communications, INTI International University, International Institute of Management and Business, Minsk, Belarus

ABSTRACT

The multidisciplinary application of Artificial Intelligence (AI) has increasingly become attractive in the academic community in which researchers and scholars are interested in the intersectionality of green corporate governance and AI. There is a myriad of calls for integrating AI into green governance processes and systems in order to address deeply-seated environmental concerns in the corporate world. Although issues of responsible production (SDG 12) in green governance are currently advocated for by business scholars and professionals, the transformative power of AI is under-researched. Therefore, this paper aims to comprehensively synthesize the role of AI in green corporate governance in Africa. Notably, systematic literature review methodology has been applied to extract data sources from Scopus database, organizational databases, and Google Scholar. Data extracted with the aid of content analysis was subjected to thematic analysis as the themes were emerging from secondary sources. Despite the availability of deeply-seated ethical concerns, the findings showed that AI plays a supporting role in green corporate governance as it streamlines green corporate governance processes, automates ESG performance indicators, allows efficient monitoring of supply chain compliance, fosters algorithmic environmental risk prediction modeling, supports real-time internal audit, and ensures intelligent-powered ESG transparency and disclosure. It is concluded that AI plays a supporting role in green corporate governance in Africa. Therefore, African governments are recommended to embrace AI to address the deeply seated environmental concerns of the stakeholders in line with responsible production.

Keywords: Responsible Production, Green Corporate Governance, Green Artificial Intelligence, Sustainable Growth, Africa.

1. INTRODUCTION

In recent years, there has been a growing interest in the interaction between Artificial Intelligence (AI) and green corporate governance. This is mainly linked to the strategic objective of greening the boardroom at a time when Environmental, Social, and Governance (ESG) and Sustainable Development Goals (SDGs) are at the center of boardroom discussions (Dzingirai et al., 2025; Mukonzo & Dzingirai, 2025; Mutanda et al., 2025). As such, the transformative power of AI in the green corporate governance scholarship can not be underrated. The incorporation of AI into remarkable sustainable corporate governance transformation has emerged as a powerful catalyst, altering traditional governance frameworks and methodologies via improved decision-making, transparency, and risk management abilities (Yousaf et al., 2021). As progressive companies across the world progressively incorporate AI into their key functions, business scholars and practitioners are advocating for AI in an attempt to enhance the efficacy and productivity of environmentally responsible corporate governance in a multiplicity of ways (Zou et al., 2023). Going forward, the notable capability of AI in terms of analyzing large volumes of data and producing insights instantly has enabled corporate boards and executives to make better-informed decisions, which is in tandem with augmenting green corporate governance. A study conducted by Wang (2019) revealed that firms implementing AI in governance experienced a 22% boost in decision-making efficiency, as AI-driven systems offered precise data analyses, enabling boards to concentrate on strategic matters instead of being hindered by mundane tasks.

With increasing pressure for accountability whereby companies must not violate environmental laws (Dzingirai & Mhlanga, 2025), it is not surprising to mention that the implementation of AI has been demonstrated to greatly influence risk management strategies. In this respect, proactive corporate boards are heavily investing in AI technologies, including predictive analytics and machine learning models with

the sole purpose of identifying, assessing, and mitigating possible environmental risks in an efficient manner (Qiu et al., 2020). For example, a study by PwC revealed that 63% of companies employing AI in governance experienced enhanced risk detection, allowing them to better manage financial, legal, and operational risks (Tang et al., 2020). Through the examination of past data and prediction of upcoming trends, AI helps in formulating proactive risk management approaches, minimizing the chances of unexpected crises (Zhang & Li, 2023). This improvement in risk management leads to better governance by making sure that companies are more equipped to handle complex and unpredictable business landscapes (Singh et al., 2020).

Moving forward, besides decision-making and risk management aspects of green corporate governance, the board of directors as a governing body must lead by example when it comes to success stories related to the adoption of AI given that advanced technologies like machine learning improve adherence to regulatory frameworks (Ma & Zhu, 2022). It is well-documented that AI systems can be developed to track regulatory updates in real time. This can permit companies to open avenues of opportunities when it comes to adherence to local, regional, continental, and global regulations which lessen the burden of heavy workloads of compliance risks. This state of affairs in the corporate world is cemented by Leng et al.'s (2021) study that AI systems can augment compliance by 30% whereby issues of company's compliance are evaluated at a faster rate than the manual approach. This ability has proven to be especially advantageous in areas with swiftly changing regulatory landscapes, like the European Union, where data privacy regulations such as the General Data Protection Regulation (GDPR) necessitate ongoing supervision (Oppong & Pattanayak, 2019).

With the increasing stakeholder expectation of sustainability reporting, the power of green corporations cannot be underestimated. Keeping this in mind, the incorporation of AI into environmentally conscious corporate governance principles can inculcate a corporate culture associated with ethical leadership cemented by more responsible business and governance frameworks, practices, processes, and procedures. It is an open secret that numerous researchers and organizations contend that the implementation of AI greatly enhances governance results, including decision-making, transparency, risk management, and compliance (Caglar & Askin, 2023). Nonetheless, obstacles persist, including the necessity of deploying AI systems ethically and avoiding the amplification of existing biases within governance frameworks (Karimi et al., 2021).

Despite the importance of AI in green corporate governance narratives and discourses, it has been observed with great concern that the existing literature is limited and fragmented which substantiates the exigent need to comprehensively and critically analyze the intersectionality of AI and green corporate governance. Nonetheless, some studies suggest that the adoption of AI has minimal to no notable impact on green corporate governance (Buerkle et al., 2023). These studies assert that the anticipated enhancements might not come to fruition because of obstacles such as technological intricacy, regulatory challenges, or resistance within organizations. Given the existence of ongoing debate on how AI can transform green corporate governance, this study adds value by comprehensively analyzing the role of AI in green corporate governance.

2. LITERATURE REVIEW

2.1 Conceptualisation of AI

AI is a trending concept that has been defined in a multiplicity of ways from numerous and different disciplines. This concept of AI has been applied in economics, law, accounting, marketing, production, finance, development, mathematics, and computers as well as health. Of late, it is now being imported into corporate governance discourse at a time when the green governance issue is a topical issue in the corporate world. According to Yan et al. (2020), AI is a set of computerized technologies that learn from data which helps in analyzing structured and unstructured data. With this definition in mind, computers and other machines can now reason, learn, and behave in ways that mimic human intelligence or store and analyze large datasets. Operationally speaking, AI is a group of technologies that are mostly focused on machine learning and deep learning (Ge et al., 2020). These technologies are used for a variety of tasks, including data analysis, forecasting and prediction, object classification, natural language processing, recommendation-making, and intelligent data retrieval (Zhou et al., 2020). Algorithms, which are sets of rules or guidelines that guide the AI's assessment and decisions, are commonly used in this instructional process (Wang et al., 2020).

In the context of green corporate governance, the aspect of green AI plays a vital role in greening the boardroom. The board of directors and its sub-committees can promote the adoption of AI in an attempt to ensure effective compliance and to avoid violations of environmental laws. Machine learning and deep learning can promote algorithmic analysis of green governance in adherence to sustainability reporting (Senior et al., 2020; Randhawa et al., 2020). It is imperative to document that green AI is at the epicenter of green corporate governance whereby eco-algorithmic governance issues are discussed in the board room (Tironi & Lisboa, 2023; Yigitcanlar et al., 2021). Specifically, Yigitcanlar et al. (2021) documented that green AI supports efficient and effective green governance across sectors. To this end, green AI addressed some of the green governance aspects of contemporary corporate governance issues in such a way that environmental degradation is reduced at an exponential rate (Debbarma & Choi, 2022).

2.2 Interaction between AI and Green Corporate Governance

It has been noted that there is limited literature on the interaction between AI and green corporate governance although the concept of sustainability reporting is being advocated for in green governance. Harnessing AI in ecological governance can allow companies to adhere to environmental issues, fostering a sustainable future. It is within this context that Aboelmaged and Hashem (2019) argued that corporate culture and leadership often had a more significant impact on the interaction between AI and green governance. However, Fang et al. (2020) suggested that the effectiveness of integrating AI into green governance heavily depends on addressing green corporate governance concerns like transparency, fairness, trust, and accountability which are closely linked to human choices and ethical factors (He, 2020). This implies that it is the duty and responsibility of the governing body of the company to make strategic choices related to adopting AI across business functions so as to disclose material information related to green corporate governance. As such, the board of directors may face challenges like company size, culture, expertise, technological cost, and organizational culture which can hamper the effectiveness of green governance initiatives.

Practically, Xu et al. (2023) revealed that firms employing AI for environmentally friendly corporate governance saw a 22% enhancement in decision-making efficiency. This suggests that AI augments the capabilities and competencies to swiftly assess extensive datasets, enabling company leaders to largely concentrate on strategic governance issues. Similarly, PwC discovered that 63% of firms that efficiently and effectively employ robust AI technologies in their well-designed governance frameworks enjoyed strategic benefits of enhanced risk management owing to harnessing the predictive power of AI. This can go a long way in improving transparency and disclosure as well as ethical behavior when governing a company (Hao et al., 2022).

Moving forward, according to IBM (2022), companies are increasingly utilizing AI-driven compliance tools and then experiencing a 28% decrease in compliance breaches which indicates the importance of algorithmic regulatory updates. Accenture (2021) stated that implementing AI in governance resulted in a 35% rise in productivity and governance efficiency, mainly due to AI systems minimizing human errors and enhancing resource distribution. In these investigations, AI was discovered to optimize green corporate governance by automating repetitive tasks, enhancing decision-making via data analysis, and strengthening risk management by offering early identification of risks. This ultimately results in governance systems that are more resilient and transparent (Pan et al, 2019).

Despite the benefits of AI in green governance, Liu et al. (2020) contended that integrating AI into corporate governance did not significantly affect the quality of decision-making in companies with decentralized governance, since local managerial discretion was a more influential element for enhancing green corporate governance. Moreover, Dixon et al. (2021) concluded that utilizing AI in medium-sized companies can not have a direct effect on risk management and compliance since do not have adequate advanced technology infrastructure as compared to large firms. In a similar vein, Kim et al. (2021) showed that although large companies might gain advantages from AI in compliance oversight, for the majority of small and medium enterprises (SMEs), the expenses associated with adopting AI systems exceeded the advantages, restricting AI's influence on sustainable corporate governance.

3. CRITICAL SUCCESS FACTORS FOR GREEN CORPORATE GOVERNANCE

3.1 Strong Regulatory Framework

In line with sustainability reporting, companies are trying to transform corporate governance narratives by incorporating green governance issues. To achieve this, it is apparent that a strong regulatory

framework is required as a critical success factor for a paradigm shift to green corporate governance (Grau et al., 2021). This suggests that companies will be expected to adhere to such regulatory frameworks journeying towards green corporate governance as part of compliance. It is an open secret that regulatory frameworks demand both small and large companies shift towards green governance so as to minimize environmental degradation. In this context, a regulatory framework is a collection of guidelines, practices, and procedures that institutions are required to follow when investing in sustainable initiatives and addressing green corporate governance (Caglar, 2023). Contemporary compliance approaches merge regulatory frameworks with risk management to tackle practical challenges and advance beyond mere checklists (Yan et al, 2020). The primary role of regulatory frameworks is to defend the rights of individuals and entities through the implementation of codes of conduct that guarantee fairness and legal safeguards (Wang et al, 2020).

3.2 Stakeholder Engagement

It has become quite evident that a multi-stakeholder approach to green corporate governance has been hailed for fostering a sustainable future in the corporate world (Dong et al, 2021). This implies that it is the responsibility of the governing body of the company to strike a balance of interests whereby the voices of various stakeholders are heard when drafting strategic plans (Faber, 2020). There is doubt that stakeholder engagement improves green corporate governance through improved communication, partnership collaboration as well as access to resources (Dzingirai & Dzapasi, 2025; Gan et al., 2023). Stakeholder engagement is one of the critical success factors for effective green corporate governance initiatives, policies, and procedures as well as practices. It requires recognizing, comprehending, and engaging individuals who have an interest in the result of the plan (Acemoglu & Restrepo, 2020). Successful stakeholder engagement management necessitates a holistic strategy that encompasses continuous communication, active listening, and green corporate governance (Metsky et al, 2020).

3.3 A Cultural Shift Towards Sustainability

To make sure that green corporate governance principles are observed, it is worthwhile to note that a cultural shift towards sustainability is the need of the hour whereby aspects of green governance are embedded in organizational culture. As such, cultural shift is another important aspect of green corporate governance through the notion that it allows the inclusion of people from different cultural backgrounds, ethnicity, religion, and beliefs and ensures that their views are included in decision-making (Fang et al., 2020). Sustainability in cultural shifts also promotes green corporate governance by coming up with programs that are aimed at promoting awareness of governance practices (Aboelmaged & Hashem, 2019). Culture embodies a creative pursuit that boosts human abilities to overcome obstacles, manage green corporate governance, and imagine what lies ahead.

Additionally, there are cultural initiatives focused on sustainable development guided by openness in communication, and transparency, and dynamically include the cultural aspect as much as the pillars related to green corporate governance and economic growth (Kim et al., 2021). Sustainable development cannot be regarded as legitimate without acknowledging the crucial role of green corporate governance and critical processes rooted in culture within social, economic, and political domains (Dixon et al., 2021). Culture provides the essential components for survival and tackles the facets of human behavior recognized by social scientists as the origins and expressions of creativity and promoting green corporate governance (Liu et al, 2020).

3.4 Capacity Building

Capacity building is also an essential part of factors for green corporate governance so as to enhance the capabilities of nations, especially developing ones, to adequately address green corporate governance (Pan et al, 2019). Capacity building is not solely focused on a non-profit's current capability; it encompasses green corporate governance potential to fulfill its mission efficiently in both the present and the future (Hao et al., 2022). Capacity building is an investment in the efficiency and long-term viability of a non-profit organization. Capacity-building is directed by principles of country ownership and needs-focused strategies, ensuring that nations can execute climate policies and meet their obligations for green corporate governance (Caglar & Askin, 2023). Though frequently disregarded, capacity building creates the essential infrastructure that nurtures and molds charitable non-profits into powerful entities for green corporate governance. Capacity building allows non-profit organizations and their leaders to cultivate skills and competencies that enhance their effectiveness and sustainability, thereby boosting the capacity

of charitable non-profits to improve lives and address green corporate governance (Karimi Takalo et al, 2021).

3.5 Risks Associated with AI Integration into Green Corporate Governance

Although there are some benefits linked to integration into green corporate governance, there are risks associated with the integration of AI into green corporate governance. These challenges are discussed below:

3.6 Data Privacy And Protection

Data privacy as well as protection may be a risk of adopting AI in green corporate governance through the fact that some information may not be allowed to be shared hence impacting operations (Oppong & Pattanayak, 2019). Data needs to be protected by all means as it can be compromised when there is a data breach affecting green corporate governance. Data privacy determines who can access data, whereas data protection implements tools and affects green corporate governance (Ma & Zhu, 2022). Regulations for compliance aid in making sure that companies fulfill user privacy requests, and these companies must take steps to safeguard private user information. Safeguarding personal data demands maneuvering through a complicated digital environment remaining alert to privacy and affecting green corporate governance (Singh et al., 2020). Data privacy is crucial for protecting against identity theft, fraud, and personal risks like harassment or stalking. One instance of data privacy is making sure that sensitive information, including financial data or medical records, is accessed solely by authorized individuals. This can be accomplished via access control methods, including usernames and passwords, or biometric verification (Zhang & Li, 2023).

3.7 Implementation Costs

Another risk of adopting AI in green corporate governance is related to implementation costs. These are costs that are related to sources of AI resources that may include information communication technology infrastructure (Tang et al., 2020). Implementation costs denote the expenditures associated with the introduction of a new system, process, or policy for green corporate governance (Qiu et al., 2020). These expenditures may encompass hardware and software costs, training fees, and the time allocated for the implementation of green corporate governance (Wang, 2019). Grasping these expenses is essential for any company contemplating a new project or investment. Establish standard costs for materials, labor, and overhead using historical information, supplier estimates, and affecting green corporate governance.

3.8 Over-Reliance On Technology

Over-dependence on technology signifies an undue reliance on digital tools and devices for education, interaction, and impacting green corporate governance (Zou et al., 2023). This occurrence may result in weakened critical thinking abilities, fewer in-person interactions, and a decrease in participation in conventional learning approaches (Yousaf et al., 2022). In this role, it offers us unmatched convenience, and efficiency, affecting green corporate governance.

4. RESEARCH METHODOLOGY

This study adopted a systematic literature review methodology guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Framework (PRISMA). The study synthesizes existing academic and grey literature on how AI supports, influences, or transforms green corporate governance practices across Africa. To ensure a diverse representation across geographic regions and levels of technological development, the review focuses on eight African countries. The study selected South Africa and Namibia from Southern Africa, because of their leading ESG regulation and AI. In addition, from East Africa, the research selected Kenya and Rwanda as emerging digital and infrastructure, and AI policies. Furthermore, the study selected Nigeria and Ghana from West Africa because of their large economies with active corporate governance debates. Lastly, the researchers selected Egypt and Morocco from North Africa since they have a government-driven digital transformation agenda.

The researchers conducted searches across academic databases and grey literature repositories, including Scopus, Web of Science, Google Scholar, ScienceDirect, JSTOR, and SpringerLink. The study included grey literature and regional sources, namely, African Journals Online (AJOL), UN ECA Reports, African Development Bank publications, government reports, and national AI strategies and NGO and think tank publications (e.g., Afrobarometer, ISS Africa). The study analyzed articles from 2013 to 2025 written in English covering the nexus of AI and green corporate governance in Africa. The researchers developed a data form to capture title and author(s), year of publication, country, sector, type of AI application, and

ESD domain. The study assessed each article using a modified CASP checklist. The study presented the findings using themes derived from the articles' analyses.

5. RESULTS AND DISCUSSION

The study presented the results under the themes derived from the analysis of the selected literature. The themes include streamlining green corporate governance processes, automating ESG performance indicators, efficient monitoring of sustainable supply chain compliance, algorithmic environmental risk prediction, real-time internal audit, intelligent-powered ESG transparency and disclosure, and digital readiness for green governance.

5.1 Streamline Green Corporate Governance Processes

The study reveals that AI facilitates the continuous monitoring of environmental impacts, enabling companies to track emissions, resource usage, and waste management in real time in Africa (Tinonetsana et al., 2024; Wakunuma et al., 2022). For instance, Rwanda leveraged AI to enhance corporate governance through real-time financial monitoring, improving reporting accuracy and compliance rates (Munana, 2025). The approach not only ensures transparency but also aligns corporate activities with sustainability goals. Furthermore, artificial AI-driven predictive analytics assist businesses in forecasting environmental risks and opportunities, allowing for proactive decision-making. Analysis of vast datasets indicates that AI identifies trends and patterns that inform strategies for resource optimization and waste reduction, thereby promoting green initiatives (Mhlanga & Shao, 2025).

Similarly, the integration of AI into governance frameworks enhances transparency by providing stakeholders with accessible and accurate information on corporate environmental performance. This fosters accountability and builds trust among consumers, investors, and regulatory bodies, encouraging companies to adhere to sustainable practices (Mhlanga & Shao, 2025). AI tools assist companies in navigating complex environmental regulations by automating compliance processes and ensuring adherence to legal standards. This reduces the risk of violations and promotes a culture of responsibility within corporate structures.

The data showed that Rwanda's adoption of AI in corporate governance led to significant improvements in real-time financial monitoring and reporting accuracy (Celestin & Gidisu, 2023). This has enhanced compliance rates and aligned corporate practices with global sustainability standards. In addition, Ghana's 10-year National Artificial Intelligence Strategy emphasizes innovation, talent development, and addressing AI-related risks through ethical and regulatory frameworks (Kwarkye, 2025). This strategy integrates ethical dimensions to provide a test case for others on the continent. In addition, Kenya enacted its Data Protection Act (2019), aligning its policies with global AI privacy standards. Additionally, the establishment of the Kenya Advanced Institute of Science and Technology (KAIST) and the Blockchain and AI Task Force demonstrates the country's commitment to integrating AI into public service delivery and governance.

5.2 Automate ESG Performance Indicators

The study established that automating Environmental, Social, and Governance (ESG) performance indicators in Africa presents a transformative opportunity to enhance sustainability practices across the continent. Similarly, leveraging AI for ESG reporting addresses data fragmentation, regulatory challenges, and greenwashing risks, thereby promoting transparency and accountability in corporate governance. The results showed that AI-powered tools can aggregate data from diverse sources such as satellite imagery, Internet of Things (IoT) sensors, and government databases. For instance, in West Africa's energy sector, AI has been utilized to monitor environmental impacts, detect anomalies, and ensure consistency in ESG reporting (Adebiyi, 2024). Predictive models identify potential ESG-related issues, allowing firms to implement mitigation strategies in advance. Furthermore, the results revealed that Natural Language Processing (NLP) algorithms analyze local and international regulatory texts, helping companies align their ESG reports with relevant frameworks. The data revealed the benefits for firms operating across multiple jurisdictions with varying ESG regulations.

Furthermore, the results indicated that AI detects discrepancies between reported ESG metrics and actual performance by analyzing patterns and inconsistencies in data. It helps in identifying and preventing greenwashing, thereby enhancing the credibility of ESG disclosures. The Johannesburg Stock Exchange (JSE) partnered with Risk Insights to provide AI-powered ESG rating tools for listed companies (Morais et al., 2024). This collaboration aims to enhance ESG reporting by offering data analytics and insights,

promoting transparency and informed decision-making among investors and stakeholders. Nigeria utilized AI to improve ESG reporting in the energy sector (Nelson et al., 2025). AI tools aggregate data from various sources, validate information, and ensure compliance with regulatory standards, enhancing the accuracy and reliability of ESG disclosures (Nelson et al., 2025).

5.3 Efficient Monitoring of Sustainable Supply Chain Compliance

The results established that AI was increasingly pivotal in enhancing the efficiency and transparency of sustainable supply chains across Africa, thereby bolstering green corporate governance. By integrating AI technologies, African businesses monitor compliance with environmental, social, and governance (ESG) standards more effectively, promoting sustainability and ethical practices (Kogi et al., 2025). The results showed that AI enables dynamic environmental impact assessments by analyzing real-time data from various sources, including satellite imagery and Internet of Things (IoT) sensors. This capability allows companies to adjust production schedules and logistics to minimize ecological harm (Adebisi, 2024). Data showed that AI tools reroute logistics to avoid environmentally sensitive areas or recommend production adjustments during periods of high environmental stress, integrating sustainability into everyday operations.

The results showed that TradeDepot in Nigeria utilizes AI-driven demand forecasting systems to revolutionize inventory management, reducing overproduction and minimizing excess inventory (Izukanne, 2024). This approach directly cuts down on waste, aligning production more closely with actual demand. AI also enhances recycling and waste management processes within the supply chain, identifying patterns and inefficiencies to decrease environmental impact and increase operational efficiency. In Cameroon, Olam Cocoa implemented a digital initiative in partnership with the Fair Labor Association and local cocoa farming cooperatives to monitor child labor in its supply chain (Cocoa Post, 2020). The initiative includes the digital registration of nearly 7,000 farmer suppliers, introducing traceability and reporting systems, and setting up dedicated child labor monitoring and remediation systems. This comprehensive approach aims to eradicate children (Cocoa Post, 2020).

5.4 Algorithmic Environmental Risk Prediction

The results revealed that Algorithmic environmental risk prediction emerges as a pivotal tool in advancing green corporate governance across Africa. By harnessing AI, businesses proactively identify and mitigate environmental risks, aligning with sustainable development goals and enhancing transparency in their operations (Kwarkye, 2025). The research showed that AI-driven models assist in forecasting climate-related risks such as droughts, floods, and extreme weather events. These predictive capabilities enable companies to anticipate environmental challenges and implement adaptive strategies, bolstering climate resilience. AI analyzes historical climate data to predict future trends, allowing businesses to adjust their operations accordingly.

Nevertheless, algorithmic tools facilitate the automation of Environmental, Social, and Governance (ESG) reporting, ensuring accuracy and consistency in disclosures (Morais et al., 2024). Analyses of vast datasets reveal that AI identifies patterns and anomalies, aiding in the detection of potential ESG risks and enhancing compliance with regulatory frameworks. This helped Africa, where regulatory standards vary across regions. The deployment of AI in environmental risk prediction necessitates robust governance frameworks to address ethical considerations. African nations are increasingly recognizing the importance of ethical AI, with countries like Rwanda and Kenya establishing national AI policies that emphasize transparency, accountability, and inclusivity (Gikunda, 2023). These policies ensure that AI technologies are developed and implemented in ways that align with societal values and promote sustainable development.

5.5 Real-Time Internal Audit

The results showed that internal audit functions integrate AI across Africa to enhance green corporate governance. Additionally, by enabling real-time monitoring and analysis, AI assists organizations in aligning their operations with environmental, social, and governance (ESG) criteria, thereby promoting sustainability and accountability (Nelson et al., 2025). AI facilitates the continuous assessment of ESG performance by analyzing data from various sources, including financial records, environmental reports, and social impact assessments. This real-time monitoring allows organizations to promptly identify deviations from sustainability goals and implement corrective actions. AI detects anomalies in energy consumption patterns or supply chain practices that may indicate non-compliance with environmental standards.

A study in Rwanda highlighted that AI adoption in Rwanda's corporate sector increased from 25% in 2020 to 72% in 2023, with real-time monitoring (91%) and improved reporting accuracy (84%) as key benefits. The study found a strong positive correlation ($R^2 = 0.96$) between AI investment and compliance rates, underscoring AI's role in enhancing corporate governance and aligning practices with global standards. Ghana's National Artificial Intelligence Strategy emphasizes innovation, talent development, and addressing AI-related risks through ethical and regulatory frameworks (Kwarkye, 2025). This approach aims to integrate AI into governance structures, promoting responsible AI adoption for sustainable development.

5.6 Intelligent-Powered ESG Transparency And Disclosure

Environmental, Social, and Governance (ESG) transparency and disclosure are foundational to green corporate governance, which ensures businesses act responsibly toward the environment, society, and stakeholders. In Africa, where sustainability challenges are compounded by resource limitations and regulatory inconsistencies, AI and intelligent systems offer transformative tools for improving ESG practices (Morais et al., 2024). Intelligent-powered ESG solutions, driven by AI, machine learning (ML), and natural language processing (NLP), automate, scale, and enhance the accuracy, timeliness, and comparability of ESG disclosures, fostering investor confidence and policy alignment. AI systems extract and process data from non-standard sources (e.g., unstructured reports, satellite imagery, supply chain data). Tools like NLP allow for automated interpretation of company reports, identifying relevant ESG information, and reducing manual labor and errors.

Results showed that in South Africa, for instance, firms listed on the Johannesburg Stock Exchange (JSE) are beginning to adopt AI-enabled ESG dashboards that help synthesize disclosures for regulatory and investor reporting (CDH, 2025). In countries like Kenya and Nigeria, startups are piloting smart monitoring systems in agriculture and mining to assess compliance with ESG metrics. AI standardizes ESG metrics across industries and jurisdictions, critical in Africa, where regulatory frameworks differ. AI tools benchmark company performance against global standards (e.g., GRI, SASB), enhancing comparability for investors and regulators. AI algorithms detect inconsistencies between disclosed ESG metrics and actual company behavior.

6. IMPLICATIONS OF THE STUDY

Integrating AI into green governance processes promotes evidence-based decisions. Firms should make a paradigm shift from reactive to proactive strategies by forecasting environmental risks, monitoring ESG metrics in real-time, and detecting anomalies before they escalate. Boards need to develop competencies in AI literacy to understand how intelligent systems inform environmental strategies, risk management, and compliance. Policymakers should work on harmonized sustainability reporting standards across Africa through the organs of the African Union (AU) to prevent inconsistencies and manipulation. African nations might adopt regulatory sandboxes to test AI-based governance models before full-scale implementation, balancing innovation with oversight. Interestingly, investors should demand transparency and disclosure of green governance metrics.

Moreover, there should be public access to AI-processed environmental data that allows civil society to hold corporations accountable, empowering grassroots environmental advocacy. For Africa, such green culture promotes context-specific knowledge that goes beyond Western ESG models, accounting for local socio-economic, ecological, and governance realities. This could help African universities, governments, and private firms to co-develop AI tools and homegrown solutions to tackle sustainability challenges in Africa. This goes a long way to assist in decolonizing green corporate governance narratives.

7. CONCLUSION

This paper has covered a comprehensive examination of the role of AI in promoting green corporate governance in Africa. It is widely accepted that although issues of sustainability in green governance are currently advocated for by business scholars and professionals, the transformative power of AI is under-researched. Despite the availability of deeply-seated ethical concerns, the findings showed that AI plays a supporting role in green corporate governance as it streamlines green corporate governance processes, automates ESG performance indicators, allows efficient monitoring of supply chain compliance, fosters algorithmic environmental risk prediction modeling, supports real-time internal audit, and ensures intelligent-powered ESG transparency and disclosure. It is concluded that AI plays an innovative role in

green corporate governance in Africa. Therefore, African governments are recommended to embrace AI to address the deeply seated environmental concerns of the stakeholders.

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REFERENCES

- AboelImaged, M., & Hashem, G. (2019). Absorptive capacity and green innovation adoption in SMEs: The mediating effects of sustainable organisational capabilities. *Journal of Cleaner Production*, 220, 853–863
- Acemoglu, D., & Restrepo, P. (2020). Robots and jobs: Evidence from US labor markets. *Journal of Political Economy*, 128(6), 2188–2244
- Randhawa GS, Soltysiak MPM, El Roz H, de Souza CPE, Hill KA, Kari L. Machine learning using intrinsic genomic signatures for rapid classification of novel pathogens: COVID-19 case study. *bioRxiv*, 2020.
- Adebiyi, O. (2024). *Leveraging AI to enhance ESG reporting in West Africa's energy sector*. <https://businessday.ng/opinion/article/leveraging-ai-to-enhance-esg-reporting-in-west-africas-energy-sector/>
- Arokiasamy, A. R. A., Nguyen, K.-L., & Nguyen, H. T. N. (2021). The impact of knowledge management on firm innovativeness via mediating role of innovative culture – The case of MNEs in Malaysia. *Interdisciplinary Journal of Information, Knowledge, and Management*, 16, 435–457.
- Arokiasamy, A. R. A. (2021). The uncharted territory: Plotting the relationships between perceived organizational support, work engagement, and expatriate retention in Vietnam. *Journal of Asia-Pacific Business*. <https://doi.org/10.1080/10599231.2021.1943809>
- Arokiasamy, A. R. A., Wider, W., Tanucan, J. C. M., & Hossain, S. F. A. (2025). Optimizing employee productivity: The mediating role of employee engagement in training programs for Malaysian SMEs. *Asian Development Policy Review*, 13(3), 310-324. <https://doi:10.55493/5008.v13i3.5603>
- Arokiasamy, A. R. A. , Wider, W. ., Vasudevan, A. , Tanucan, J. C. M. ., & Hossain, S. F. A. . (2025). Enhancing employee creativity: The role of ethical and transformational leadership in driving innovation and organizational citizenship in Malaysia's private universities. *International Journal of Innovative Research and Scientific Studies*, 8(4), 45–61. <https://doi.org/10.53894/ijirss.v8i3.7738>
- Buerkle, A., Eaton, W., AlYacoub, A., Zimmer, M., Kinnell, P., Henshaw, M., ... & Lohse, N. (2023). Towards industrial robots as a service (IRaaS): Flexibility, usability, safety and business models. *Robotics and Computer-Integrated Manufacturing*, 81, 102484.
- Caglar, A. E. (2023). Can nuclear energy technology budgets pave the way for a transition toward low-carbon economy: Insights from the United Kingdom. *Sustainable Development*, 31(1), 198–210.
- Caglar, A. E., & Askin, B. E. (2023). A path towards green revolution: How do competitive industrial performance and renewable energy consumption influence environmental quality indicators? *Renewable Energy*, 205, 273–280.
- Mukonzo, B., & Dzingirai, M. (2025). Green Leadership and ESG. *Financial Inclusion and Sustainable Development in Sub-Saharan Africa*, 231.
- CDH (2025). *ESG and corporate compliance: Adapting to disclosure and sustainability requirements*. <https://www.cliffedekkerhofmeyr.com/news/publications/2025/Practice/Corporate-Commercial/corporate-and-commercial-alert-esg-and-corporate-compliance-adapting-to-disclosure-and-sustainability-requirements>
- Celestin, M., & Gidisu, J. A. (2023). *AI in accounting policy formation: challenges for regulators and corporate boards in Ghana*. https://www.researchgate.net/publication/390406773_AI-POWERED_ACCOUNTING_ANALYTICS_IN_GHANA_ENHANCING_FINANCIAL_REPORTING_ACCURACY_AND_TRANSPARENCY
- Cocoa Post (2020). *Olam Cocoa Sets out Digitally-led Scheme Tackling Child Labour in Cameroon*. <https://thecocoapost.com/olam-cocoa-sets-out-digitally-led-scheme-tackling-child-labour-in-cameroon/>
- Debbarma, J., & Choi, Y. (2022). A taxonomy of green governance: A qualitative and quantitative analysis towards sustainable development. *Sustainable Cities and Society*, 79, 103693.
- Dixon, J., Hong, B., & Wu, L. (2021). The robot revolution: Managerial and employment consequences for firms. *Management Science*, 67(9), 5586–5605
- Dong, F., Li, Y., Zhang, X., Zhu, J., & Zheng, L. (2021). How does industrial convergence affect the energy efficiency of manufacturing in newly industrialized countries? Fresh evidence from China. *Journal of Cleaner Production*, 316, 128316.
- Dzingirai, M., Zvitambo, K., & Masukume, H. (2025). Green Corporate Governance and Sustainable Development Goals: Lessons for Africa from Global North. In *Sustainable Green Marketing Strategies for a Circular Economy: African Realities and Imperatives* (pp. 19-38). Cham: Springer Nature Switzerland.
- Dzingirai, M., & Mhlanga, D. (2025). Overcoming Challenges in Green Banking for Sustainable Development in Africa. *Financial Inclusion and Sustainable Development in Sub-Saharan Africa*, 246.
- Faber, M. (2020). Robots and reshoring: Evidence from Mexican labor markets. *Journal of International Economics*, 127, 103384.
- Fang, L., Karakiulakis, G., & Roth, M. (2020). *Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection?* *Lancet Respir Med* In press, 2020. doi:10.1016/S2213-2600(20)30116-8.
- Gan, J., Liu, L., Qiao, G., & Zhang, Q. (2023). The role of robot adoption in green innovation: Evidence from China. *Economic Modelling*, 119, 106128.
- Ge, Y., Tian, T., Huang, S., Wan, F., Li, J., Li, S., ... & Zeng, J. (2020). A data-driven drug repositioning framework discovered a potential therapeutic agent targeting COVID-19. *BioRxiv*, 2020-03.

- Gikunda, K. (2023). Empowering Africa: An In-depth Exploration of the Adoption of Artificial Intelligence Across the Continent. *arXiv preprint arXiv:2401.09457*.
- Grau, A., Indri, M., Lo Bello, L., & Sauter, T. (2021). Robots in industry: The past, present, and future of a growing collaboration with humans. *IEEE Industrial Electronics Magazine*, 15(1), 50–61.
- Hao, X., Chen, F., & Chen, Z. (2022). Does green innovation increase enterprise value? *Business Strategy and the Environment*, 31(3), 1232–1247.
- He, F., Yan, Y. L., Hao, J., & Wu, J. (2022). Retail investor attention and corporate green innovation: Evidence from China. *Energy Economics*, 115, 106308.
- Hoo, W. C., Tatt, W. C., & Teck, T. S. (2024). The influence of perceived organizational support on employee commitment: A systematic review. *WSEAS Transactions on Business and Economics*, 21, 121-129.
- Izukanne, O. (2024). *AI-Driven Supply Chain Optimisation: A Green Catalyst for Africa*. <https://www.supplychain-outlook.com/supply-chain-technology/ai-driven-supply-chain-optimisation-a-green-catalyst-for-africa>
- Karimi Takalo, S., Sayyadi Tooranloo, H., & Shahabaldini parizi, Z. (2021). Green innovation: A systematic literature review. *Journal of Cleaner Production*, 279, 122474.
- Kim, I., Pantzalis, C., & Zhang, Z. (2021). Multinationality and the value of green innovation. *Journal of Corporate Finance*, 69, 101996.
- Kogi, S. K., Kristanto, A. B., & Cao, J. (2025). A Systematic Literature Review of Environmental, Social and Governance (ESG) Research in Africa. This paper has been accepted for publication in *Meditari Accountancy Research* (DOI: 10.1108/MEDAR-08-2024-2623).
- Kwarkye, T. G. (2025). “We know what we are doing”: the politics and trends in artificial intelligence policies in Africa. *Canadian Journal of African Studies/Revue canadienne des études africaines*, 1-19.
- Leng, J., Wang, D., Shen, W., Li, X., Liu, Q., & Chen, X. (2021). Digital twins-based smart manufacturing system design in Industry 4.0: A review. *Journal of Manufacturing Systems*, 60, 119–137
- Liu, J., Chang, H., Forrest, J.Y.-L., & Yang, B. (2020). Influence of artificial intelligence on technological innovation: Evidence from the panel data of china’s manufacturing sectors. *Technological Forecasting and Social Change*, 158, 120142.
- Ma, D., & Zhu, Q. (2022). Innovation in emerging economies: Research on the digital economy driving high-quality green development. *Journal of Business Research*, 145, 801–813.
- Metsky HC, Freije CA, Kosoko-Thoroddsen T-SF, Sabeti PC, Myhrvold C (2020). CRISPR-based COVID-19 surveillance using a genomically comprehensive machine learning approach. *bioRxiv*, 2020. doi:10.1101/ 2020.02.26.967026.
- Mhlanga, D., & Shao, D. (2025). AI-optimized urban resource management for sustainable smart cities. In *Financial inclusion and sustainable development in sub-saharan Africa* (pp. 96-116). Routledge.
- Morais, F., De Villiers, V., Prinsloo, M., & Vawda, S. (2024). *The state of ESG strategic integration in JSE listed companies*. <https://centaur.reading.ac.uk/115172/>
- Munana, S.M. (2025). *Digital Innovation In Rwanda’s Legal Industry: Leveraging Practice Management Tools With Legaltech And Regtech*. <https://www.ktpress.rw/2025/05/digital-innovation-in-rwandas-legal-industry-leveraging-practice-management-tools-with-legaltech-and-regtech/>
- Nelson, J. O., Oladipupo, E. O., & Onuoha, N. P. (2025). Optimization of Renewable Energy Systems Using Artificial Intelligence in Nigeria: A Focus on Generation and Distribution. *International Journal of Engineering and Modern Technology*, 11(4), 213-228.
- Oppong, G. K., & Pattanayak, J. K. (2019). Does investing in intellectual capital improve productivity? Panel evidence from commercial banks in India. *Borsa Istanbul Review*, 19(3), 219–227.
- Pan, X., Ai, B., Li, C., Pan, X., & Yan, Y. (2019). Dynamic relationship among environmental regulation, technological innovation and energy efficiency based on large scale provincial panel data in China. *Technological Forecasting and Social Change*, 144, 428–435
- Qiu, L., Hu, D., & Wang, Y. (2020). How do firms achieve sustainability through green innovation under external pressures of environmental regulation and market turbulence? *Business Strategy and the Environment*, 29(6), 2695–2714.
- Senior, A. W., Evans, R., Jumper, J., Kirkpatrick, J., Sifre, L., Green, T., ... & Hassabis, D. (2020). Improved protein structure prediction using potentials from deep learning. *Nature*, 577(7792), 706-710.
- Singh, S. K., Giudice, M. D., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting and Social Change*, 150, 119762
- Tang, H., Liu, J., & Wu, J. (2020). The impact of command-and-control environmental regulation on enterprise total factor productivity: A quasi-natural experiment based on China’s “Two Control Zone” policy. *Journal of Cleaner Production*, 254, 120011.
- Dzingirai, M., & Dzapasi, R. (2025). Green Management Strategy and Firm Performance. *Finance, Innovation and Corporate Sustainability: The Impact of Proactive Environmental Strategy on Firm Performance*, 51.
- Tinonetsana, F., Musariwa, P., & Madondo, E. (2024). Integrating AI for environmental sustainability in medium to large corporations: a case study of South Africa. *International Journal of Business Ecosystem and Strategy* (2687-2293), 6(6), 15-21.
- Tironi, M., & Lisboa, D. I. R. (2023). Artificial intelligence in the new forms of environmental governance in the Chilean State: Towards an eco-algorithmic governance. *Technology in Society*, 74, 102264.
- Mutanda, V., Chirodzero, T. C., & Dzingirai, M. (2024). The role of green leadership in promoting responsible production. In *Responsible business and sustainable development* (pp. 200-218). Routledge.
- Wakunuma, K., Ogoh, G., Eke, D. O., & Akintoye, S. (2022, May). Responsible AI, SDGs, and AI governance in Africa. In *2022 IST-Africa Conference (IST-Africa)* (pp. 1-13). IEEE.

- Wang Y, Hu M, Li Q, Zhang X-P, Zhai G, Yao N (2020). Abnormal respiratory patterns classifier may contribute to large-scale screening of people infected with COVID-19 in an accurate and unobtrusive manner. *arXiv2002.05534*. 2020.
- Wang, C.-H. (2019). How organizational green culture influences green performance and competitive advantage: The mediating role of green innovation. *Journal of Manufacturing Technology Management*, 30(4), 666–683.
- Xu, J., Zeng, S., Qi, S., & Cui, J. (2023). Do institutional investors facilitate corporate environmental innovation? *Energy Economics*, 117, 106472.
- Yan, L., Zhang, H. T., Xiao, Y., Wang, M., Sun, C., Liang, J., ... & Tang, X. (2020). *Prediction of survival for severe Covid-19 patients with three clinical features: development of a machine learning-based prognostic model with clinical data in Wuhan*. MedRxiv.
- Yigitcanlar, T., Mehmood, R., & Corchado, J. M. (2021). Green artificial intelligence: Towards an efficient, sustainable and equitable technology for smart cities and futures. *Sustainability*, 13(16), 8952.
- Yousaf, U. B., Ullah, I., Jiang, J., & Wang, M. (2022). The role of board capital in driving green innovation: Evidence from China. *Journal of Behavioral and Experimental Finance*, 35, 100714.
- Zhang, J., & Li, S. (2023). The impact of human capital on green technology innovation—Moderating role of environmental regulations. *International Journal of Environmental Research and Public Health*, 20(6), 4803
- Zhou, P., Yang, X. L., Wang, X. G., Hu, B., Zhang, L., Zhang, W., ... & Shi, Z. L. (2020). A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*, 579(7798), 270-273.
- Zou, R., Yang, J., & Feng, C. (2023). Does informatization alleviate energy poverty? A Global Perspective. *Energy Economics*, 126, 106971.