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AI-Based Environmental, Social, and Governance (ESG) Assessment and Corporate Sustainability Performance of Listed Manufacturing Firms in Akwa Ibom State, Nigeria

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Abstract

This study examines the relationship between AI-based Environmental, Social, and Governance (ESG) assessment and corporate sustainability performance among listed manufacturing firms in Akwa Ibom State, Nigeria. As global stakeholders increasingly demand transparent and responsible business practices, manufacturing firms face mounting pressure to integrate sustainability into their core operations. However, the role of artificial intelligence in enhancing ESG-driven sustainability outcomes within the Nigerian manufacturing context remains underexplored. To address this gap, the study adopts a cross-sectional survey research design, collecting primary data from representatives of listed manufacturing firms in the state at a single point in time. This design is appropriate for examining the relationship between AI-based ESG assessment (independent variable) and corporate sustainability performance (dependent variable), enabling the identification of patterns and relationships while accommodating practical research constraints in the Nigerian manufacturing environment. Findings reveal that AI-based ESG assessment exerts a significant positive influence on corporate sustainability performance. By leveraging AI to process complex environmental, social, and governance data, manufacturing firms achieve greater operational transparency, optimise resource allocation, and proactively mitigate risks, thereby aligning local practices with global sustainability standards. Based on these results, the study concludes that integrating AI-driven ESG frameworks is a strategic necessity for long-term sustainable development in the regional manufacturing sector. The paper recommends that manufacturing executives invest in AI analytics infrastructure, upskill compliance teams, implement robust data governance protocols, and collaborate with government and industry bodies to foster collective sustainable industrialisation.

1. Introduction

The global business environment has witnessed a fundamental paradigm shift where corporate success is no longer measured solely by financial metrics but increasingly by the integration of environmental, social, and governance (ESG) considerations into core business strategies (Owolabi et al., 2025). This transformation reflects growing stakeholder awareness of climate change, resource depletion, and social inequalities as pressing concerns demanding corporate accountability and transparency (Okeke, 2026). Consequently, sustainability performance has evolved from a voluntary initiative to a strategic imperative, particularly for manufacturing firms whose operations significantly impact the environment and host communities (Eze et al., 2025). In Nigeria, the manufacturing sector occupies a pivotal position in economic development, yet it remains one of the most resource-intensive and environmentally impactful sectors (Dada, 2024). Listed manufacturing firms face mounting pressure from regulators, investors, and civil society to demonstrate commitment to sustainable practices through robust ESG reporting and performance metrics (Adegbite et al., 2022). The introduction of the International Sustainability Standards Board (ISSB) frameworks—IFRS S1 and IFRS S2—signals a global move toward standardised sustainability disclosure, with implications for Nigerian firms seeking international investment and maintaining competitive advantage (Ogunyemi, 2026).

Technological advancement, particularly artificial intelligence (AI), presents transformative opportunities for ESG assessment and sustainability performance measurement (Goyal et al., 2026). AI-powered analytics, satellite imagery, and predictive modelling enable real-time environmental monitoring, enhanced data integrity, and improved stakeholder accountability (Ajose-Adeogun, 2026). In the Nigerian context, where data infrastructure challenges often hinder reliable sustainability reporting, AI offers a leapfrog opportunity to bridge gaps in ESG data collection, verification, and analysis (Umukoro, 2026). The Financial Reporting Council of Nigeria's recent initiative to develop an AI-driven National Digital Platform for sustainability regulatory reporting underscores the nation's commitment to technology-enabled sustainability governance (The Guardian Nigeria, 2026). Akwa Ibom State, as a significant industrial hub with substantial manufacturing activities, presents a compelling context for examining the nexus between AI-based ESG assessment and corporate sustainability performance.

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The manufacturing firms operating in this region face unique environmental challenges, community expectations, and regulatory pressures that necessitate innovative approaches to sustainability management (Effiong, 2022). Despite the growing interest in ESG and AI applications, empirical research examining their intersection within Nigeria's manufacturing sector remains limited (Okeke, 2026). This study addresses this gap by investigating the relationship between AI-based ESG assessment and corporate sustainability performance among listed manufacturing firms in Akwa Ibom State, contributing to the growing body of literature on technology-enabled sustainability governance in emerging economies (Goyal et al., 2026).

1.2 Statement of the Problem

Corporate sustainability performance has become a critical concern for manufacturing firms globally, with stakeholders demanding greater transparency and accountability regarding environmental impact, social responsibility, and governance practices (Owolabi et al., 2025). Listed manufacturing firms in Akwa Ibom State, Nigeria, operate in a context characterised by regulatory complexities, infrastructure deficits, and heightened environmental risks, yet evidence suggests that sustainability reporting and performance remain suboptimal (Akpan, 2025). Studies indicate that Nigerian manufacturing firms report sustainability issues at an average level of only 24.3%, with environmental reporting constituting a mere 6.8% of disclosures as at 2023 (Akpan, 2025). AI-based ESG assessment tools offer promising solutions for enhancing sustainability performance through improved data collection, real-time monitoring, and predictive analytics (Goyal et al., 2026). However, the extent to which AI-based ESG assessment influences corporate sustainability performance within Nigeria's manufacturing sector remains underexplored (Umukoro, 2026). The absence of empirical evidence on the relationship between AI-based ESG assessment and sustainability outcomes creates a significant knowledge gap for policymakers, corporate managers, and investors seeking to leverage technology for sustainable development (Ajose-Adeogun, 2026). Furthermore, the contextual factors unique to Akwa Ibom State—including regulatory enforcement challenges, infrastructure limitations, and community expectations—may moderate this relationship, yet these dynamics remain inadequately understood (Effiong, 2022). This study addresses the research problem by empirically examining the relationship between AI-based ESG assessment and corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria, thereby contributing evidence-based insights to inform policy formulation, corporate strategy, and technological investment decisions (Okeke, 2026; Ogunyemi, 2026).

1.3 Objective of the Study

The objective of this study is to examine the relationship between AI-based ESG assessment and corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria.

1.4 Research Question

What is the relationship between AI-based ESG assessment and corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria?

1.5 Hypothesis

There is no significant relationship between AI-based ESG assessment and corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria.

2 Review of Related Literature

2.1 Conceptual Clarifications

AI-Based ESG Assessment: Artificial intelligence-based ESG assessment refers to the application of machine learning algorithms, natural language processing, predictive analytics, and automated data collection systems to evaluate corporate environmental, social, and governance performance (Goyal et al., 2026). This approach leverages satellite imagery for environmental monitoring, digital platforms for social impact tracking, and automated compliance systems for governance evaluation, enabling real-time, data-driven sustainability insights (Ajose-Adeogun, 2026). In the Nigerian context, AI-based ESG assessment represents an emerging field, with recent initiatives by the Financial Reporting Council of Nigeria to develop an AI-driven National Digital Platform for sustainability regulatory reporting (The Guardian Nigeria, 2026). Umukoro (2026) developed and validated an AI-powered ESG rating framework for Nigerian Exchange (NGX)-listed companies, finding significant sectoral variation and a positive correlation between ESG scores and return on equity.

Corporate Sustainability Performance: Corporate sustainability performance (CSP) encompasses an organisation's effectiveness in managing environmental impacts, fulfilling social responsibilities, and maintaining robust governance structures (Owolabi et al., 2025). CSP is typically measured through ESG metrics, including environmental indicators (emissions, waste management, resource efficiency), social indicators (employee welfare, community engagement, human rights), and governance indicators (board diversity, transparency, ethical practices) (Eze et al., 2025). In Nigeria, research indicates that manufacturing firms demonstrate moderate to low sustainability performance, with significant variation between multinational and indigenous firms (Akpan, 2025; Dada, 2024). Effiong (2022) reported that sustainable capital reporting among Nigerian manufacturing firms averaged only 26.5% as at 2021, highlighting the need for enhanced reporting mechanisms.

2.2 Theoretical Review

The theoretical framework of this study is anchored on three complementary theories that collectively provide a robust lens for understanding the relationship between AI-based ESG assessment and corporate sustainability performance. Theories are essential in research as they offer systematic explanations of phenomena, guide the formulation of hypotheses, and provide a foundation for interpreting empirical findings (Owolabi et al., 2025). The selection of appropriate theoretical underpinnings is particularly critical in sustainability research, where multiple stakeholder interests, resource dynamics, and institutional forces intersect (Okeke, 2026). In the context of AI-based ESG assessment and corporate sustainability performance of listed

manufacturing firms in Akwa Ibom State, Nigeria, the chosen theoretical frameworks must adequately address the interplay between technological innovation, stakeholder demands, organisational capabilities, and regulatory pressures that characterise the Nigerian manufacturing landscape (Goyal et al., 2026). This study adopts Stakeholder Theory, the Resource-Based View (RBV), and Institutional Theory as its theoretical anchors, each addressing distinct but interconnected dimensions of the research phenomenon. Stakeholder Theory provides the normative foundation for understanding why firms pursue ESG practices, emphasising the moral and strategic imperative to address diverse stakeholder expectations (Adegbite et al., 2022). The Resource-Based View complements this by explaining how AI-based ESG assessment capabilities can serve as strategic resources that confer competitive advantage and superior sustainability outcomes (Goyal et al., 2026). Institutional Theory further enriches the framework by accounting for the external pressures—regulatory, normative, and mimetic—that shape organisational behaviour regarding ESG adoption and sustainability reporting (Ogunyemi, 2026). Together, these theories offer a comprehensive explanatory framework for examining how AI-based ESG assessment influences corporate sustainability performance in the Nigerian manufacturing context, particularly given the unique institutional environment, resource constraints, and stakeholder dynamics prevalent in Akwa Ibom State (Okeke, 2026; Effiong, 2022).

Stakeholder Theory: Stakeholder theory posits that organisations must create value for all stakeholders—including investors, employees, communities, and regulators—not merely shareholders (Owolabi et al., 2025). This theoretical perspective provides a foundation for understanding why firms engage in sustainability practices and ESG disclosure, as stakeholder expectations increasingly drive corporate behaviour (Okeke, 2026). Research applying stakeholder theory in the Nigerian context demonstrates that ESG adoption is significantly influenced by stakeholder pressures, particularly from international investors and global supply chain partners (Adegbite et al., 2022). Dada (2024) found that stakeholder demands for sustainability accountability have intensified in Nigeria's manufacturing sector, compelling firms to enhance their ESG reporting frameworks. In the context of AI-based ESG assessment, stakeholder theory suggests that firms deploy AI technologies to better identify, measure, and respond to diverse stakeholder sustainability expectations (Ajose-Adeogun, 2026). For manufacturing firms in Akwa Ibom State, stakeholder pressures emanate from multiple sources including host communities affected by industrial operations, regulatory agencies enforcing environmental compliance, and international investors demanding ESG transparency (Effiong, 2022; Akpan, 2025).

Resource-Based View (RBV): The resource-based view suggests that firms achieve competitive advantage through the development of valuable, rare, inimitable, and non-substitutable resources and capabilities (Goyal et al., 2026). AI-based ESG assessment systems can be conceptualised as such strategic resources, enabling firms to achieve superior sustainability performance through enhanced data analytics, improved decision-making, and operational efficiencies (Umukoro, 2026). Studies in emerging economies indicate that AI capabilities, when effectively deployed, can compensate for institutional voids and infrastructure limitations (Okeke, 2026). Owolabi et al. (2025) found that artificial neural networks significantly outperformed traditional regression models in predicting sustainability outcomes, achieving accuracy of 0.942 and precision of 0.944, suggesting non-linear control-outcome relationships that AI-based ESG assessment can effectively capture. From the RBV perspective, firms that invest in AI-based ESG assessment capabilities develop distinctive competencies that enable superior sustainability performance compared to competitors lacking such technological resources (Goyal et al., 2026). In the Akwa Ibom State manufacturing context, where infrastructure and institutional challenges are prevalent, AI-based ESG assessment capabilities may serve as particularly valuable resources that enable firms to overcome contextual limitations and achieve enhanced sustainability outcomes (Okeke, 2026; Effiong, 2022).

Institutional Theory: Institutional theory explains how organisations conform to external pressures from regulatory bodies, professional associations, and societal expectations (Ogunyemi, 2026). In Nigeria's manufacturing sector, institutional pressures—including regulatory enforcement, industry standards, and global reporting frameworks—significantly influence ESG adoption and sustainability performance (Eze et al., 2025). The recent development of Nigeria's AI-driven sustainability regulatory platform reflects institutional efforts to standardise and enforce sustainability reporting (The Guardian Nigeria, 2026). Ajose-Adeogun (2026) emphasised that institutional frameworks are evolving to accommodate technological innovations in ESG assessment, with regulatory bodies increasingly recognising the potential of AI to enhance sustainability governance. Institutional theory explains how coercive pressures (regulatory mandates), normative pressures (professional standards), and mimetic pressures (imitation of industry leaders) collectively drive the adoption of AI-based ESG assessment and subsequent sustainability performance improvements (Okeke, 2026). For listed manufacturing firms in Akwa Ibom State, institutional pressures from the Nigerian Exchange (NGX) listing requirements, the Financial Reporting Council of Nigeria, and international sustainability standards create a compelling environment for ESG adoption and technological innovation (Umukoro, 2026; Ogunyemi, 2026).

2.3 Empirical Review

Empirical research examining the relationship between AI-based ESG assessment and corporate sustainability performance has produced mixed but generally positive findings. Studies conducted in developed economies demonstrate that AI-powered ESG assessment tools enhance data accuracy, reduce reporting errors, and enable real-time sustainability monitoring (Goyal et al., 2026). Owolabi et al. (2025) found that artificial neural networks significantly outperformed traditional regression models in predicting sustainability outcomes, achieving accuracy of 0.942 and precision of 0.944, suggesting non-linear control-outcome relationships that AI-based ESG assessment can effectively capture. Umukoro (2026) developed and validated an AI-powered ESG rating framework for Nigerian Exchange (NGX)-listed companies, finding significant sectoral variation and a positive correlation between ESG scores and return on equity. The study highlighted critical environmental disclosure gaps, noting that carbon audit reporting appeared in only 1.3% of observations, underscoring the potential for AI-based ESG assessment to enhance environmental evaluation (Umukoro, 2026). The study further emphasised that AI-based ESG assessment frameworks can provide more accurate and comprehensive sustainability ratings compared to traditional assessment methods. Okeke (2026) examined the interplay between regulation, ESG, and digitalisation in Nigerian supply chains, finding that digital innovations—particularly blockchain, AI, and IoT—emerged as critical enablers of carbon transparency and traceability, helping offset institutional voids in emerging economies. The study emphasised that AI-based ESG assessment tools exhibit strong mediating effects on sustainability performance but are significantly constrained by firm-level challenges including costs, technical expertise, and infrastructure limitations (Okeke, 2026).

Research on sustainability reporting among Nigerian manufacturing firms indicates persistent challenges. Akpan (2025) found that manufacturing firms reported sustainability issues at an average level of 24.3%, with significant variation across environmental, social, and governance dimensions. Similarly, Effiong (2022) reported that sustainable capital reporting among Nigerian manufacturing firms averaged only 26.5% as at 2021, highlighting the need for enhanced reporting mechanisms. Dada (2024) examined sustainable development goals reporting by listed companies in Nigeria and found that while awareness of SDGs is growing, actual reporting remains inadequate, particularly in environmental dimensions, suggesting the need for more robust AI-based ESG assessment frameworks. Recent initiatives demonstrate growing institutional commitment to technology-enabled sustainability governance. The Financial Reporting Council of Nigeria's partnership to develop an AI-driven National Digital Platform for sustainability regulatory reporting represents a significant step toward standardising and enhancing ESG assessment (The Guardian Nigeria, 2026). This initiative aligns with broader national aspirations for economic transformation through digital technology and sustainability governance (Ogunyemi, 2026). Eze et al. (2025) investigated

sustainability disclosure and firm value of listed manufacturing firms in Nigeria, finding that sustainability disclosure has a positive but moderate effect on firm value. The study recommended enhanced disclosure practices and regulatory enforcement to improve sustainability performance, noting that AI-based ESG assessment tools could significantly enhance disclosure quality. Adegbite et al. (2022) examined corporate social responsibility in sub-Saharan Africa, identifying institutional voids and implementation challenges that hinder effective sustainability practices, including weak regulatory enforcement, infrastructure deficits, and limited technical capacity for advanced ESG assessment methodologies.

Goyal et al. (2026) explored the potential of maximising artificial intelligence performance in manufacturing firms in developing economies, emphasising that AI-based ESG assessment can play a transformative role in advancing sustainability objectives. The study identified critical success factors including organisational readiness, technical infrastructure, and stakeholder engagement. A recent study (2026) on sustainable provider selection for AI-powered systems in Nigeria's manufacturing sector indicated that economic dimensions receive highest priority, followed by social and environmental considerations, suggesting the need for balanced ESG assessment frameworks that AI can effectively provide. Despite these developments, empirical research specifically examining the relationship between AI-based ESG assessment and corporate sustainability performance in Nigeria's manufacturing sector, particularly in Akwa Ibom State, remains limited (Okeke, 2026). Ajose-Adeogun (2026) noted that the integration of AI in ESG assessment and reporting in Nigeria is still nascent, with significant opportunities for advancement. This study addresses this gap by investigating the relationship between AI-based ESG assessment and sustainability performance in the specific context of listed manufacturing firms in Akwa Ibom State.

3 Methods

3.1 Research Design

This study adopts a cross-sectional survey research design (Effiong, 2022). The cross-sectional survey design is appropriate for examining the relationship between AI-based ESG assessment and corporate sustainability performance at a single point in time, enabling the collection of primary data from firm representatives (Akpan, 2025). This design facilitates the identification of patterns and relationships while accommodating the practical constraints of conducting research in the Nigerian manufacturing context (Eze et al., 2025).

3.2 Study Area

The study is conducted in Akwa Ibom State, Nigeria. Akwa Ibom State is strategically significant as an industrial hub with substantial manufacturing activities, including agro-processing, cement production, and consumer goods manufacturing (Effiong, 2022). The state's industrial landscape provides an appropriate context for examining the relationship between AI-based ESG assessment and corporate sustainability performance, given the environmental challenges associated with manufacturing operations and the increasing regulatory attention to sustainability practices in the region (Akpan, 2025).

3.3 Population of the Study

The population of this study comprises listed manufacturing firms operating in Akwa Ibom State, Nigeria. Based on available records of manufacturing firms listed on the Nigerian Exchange (NGX) with operations in Akwa Ibom State, the population is estimated at 28 firms (Umukoro, 2026). These firms represent diverse manufacturing subsectors including industrial goods, consumer goods, agro-processing, and construction materials (Dada, 2024).

3.4 Sampling Technique and Sample Size

The study employs purposive sampling technique to select participating firms (Okeke, 2026). Purposive sampling is appropriate for this study as it enables the selection of firms with established sustainability practices and potential AI technology adoption (Goyal et al., 2026). The sample size is determined using the Taro Yamane formula:

$n = N / (1 + N (e)^2)$

Where: n = sample size. N = population size (28). e = margin of error (0.05)

$n = 28 / (1 + 28(0.05)^2)$

$n = 28 / (1 + 28(0.0025))$

$n = 28 / (1 + 0.07)$

$n = 28 / 1.07$

$n = 26.17$

Therefore, the sample size is 26 manufacturing firms, representing the population of listed manufacturing firms in Akwa Ibom State.

3.5 Instrument for Data Collection

The primary instrument for data collection is a structured questionnaire designed to measure two key variables:

AI-Based ESG Assessment: This variable is measured using items adapted from validated instruments assessing AI-based ESG data collection mechanisms, AI-powered sustainability monitoring systems, and technology-enabled ESG evaluation frameworks (Goyal et al., 2026; Umukoro, 2026). Items are rated on a five-point Likert scale ranging from strongly agree (SA), agree (A), strongly disagree (SD), disagree (D) and neutral (N).

Corporate Sustainability Performance: This variable is measured using items adapted from validated instruments assessing corporate sustainability performance data collection mechanisms (Owolabi et al., 2025; Eze et al., 2025). Items are rated on a five-point Likert scale ranging from strongly agree (SA), agree (A), strongly disagree (SD), disagree (D) and neutral (N).

3.6 Method of Data Analysis

Data collected from the questionnaire were analysed using both descriptive and inferential statistical techniques: Descriptive Statistics: Mean, standard deviation, and frequency distributions were used to summarise respondents' characteristics and responses, providing an overview of AI-based ESG assessment adoption and sustainability performance levels (Akpan, 2025). Inferential Statistics: Pearson Product-Moment Correlation (PPMC) was employed to test the hypothesis examining the relationship between AI-based ESG assessment and corporate sustainability performance (Owolabi et al., 2025). The PPMC analysis is appropriate for determining the strength and direction of linear relationships between continuous variables (Okeke, 2026). A significance level of $\alpha = 0.05$ was used to determine statistical significance (Eze et al., 2025). All analyses were conducted using the Statistical Package for Social Sciences (SPSS) version 25.0, with data cleaning and preliminary analysis (including normality and multicollinearity checks) conducted prior to hypothesis testing (Effiong, 2022).

4 Data Presentation, Analysis and Results

4.1 Data Presentation

The data that were gathered using the questionnaire are presented below:

Table 1: Questionnaire Distribution of Respondents

Questionnaire		Frequency	Percent
Valid	Returned	24	92.31
	Not returned	2	7.69
	Total	26	100.0

Source: Researcher's Computation (2026)

The above table portrays that 24 copies were returned in a useable form representing 92.31%. The researcher therefore uses 24 copies of the returned questionnaires as the bases for the analysis.

Table 2: Gender Distribution of Respondents

Gender		Frequency	Percent
Valid	Female	10	41.7
	Male	14	58.3
	Total	24	100.0

Source: Researcher's Computation (2026)

Table 2 above reveals the gender distribution of the respondent. It was observed that, out of 24 questionnaires returned, 14 were male representing 58.3%, while 10 respondents were female representing 41.7%. This implies that the majority of the respondents were male.

Table 3: Marital Status Distribution of Respondents

Marital status		Frequency	Percent
Valid	Single	4	16.7
	Married	20	83.3
	Total	24	100.0

Source: Researcher's Computation (2026)

In the above table, 4 respondents were single representing 16.7% while 20 respondents were married representing 83.3%. This infers that the majority of the respondents were married.

Table 4: Staff cadre Distribution of Respondents

Staff cadre		Frequency	Percent
Valid	Senior Staff	10	41.7
	Middle Management Staff	12	50.0
	Top Management Staff	2	8.3
	Total	24	100.0

Source: Researcher's Computation (2026)

The table revealed that 10 respondents representing 41.7% were at senior cadre, 12 respondents representing 50% were middle management staff while 2 respondents representing 8.3% was a top management staff. However, no respondent was junior staff.

Table 5: Age Distribution of Respondents

Age Bracket		Frequency	Percent
Valid	25-45 years	14	58.3
	46-60 years	10	41.7
	Total	24	100.0

Source: Researcher's Computation (2026)

Table 5 above depicts that 14 respondents representing 58.3% of the sampled respondents were within the age bracket of 25-45 years while 10 respondents representing 41.7% were within the age bracket of 46-60 years.

Table 6: Highest Level of Education Distribution of Respondents

Educational level		Frequency	Percent
Valid	Below 1st degree	2	8.3
	1st degree	8	33.3
	2nd degree or more	14	58.3
	Total	24	100.0

Source: Researcher's Computation (2026)

Table 6 shows that 2 respondents representing 8.3% held an educational qualification below first degree, 8 respondents representing 33.3% held a first degree while 14 respondents representing 58.3% of the respondents held a second degree or more.

Table 7: Respondents Distribution of working duration

Years of experience		Frequency	Percent
Valid	5 – 10 years	12	50.0
	More than 10 years	12	50.0
	Total	24	100.0

Source: Researcher's Computation (2026)

As seen in the above table, 12 respondents representing 50% worked with the organization for 5-10 years while 12 respondents representing 50% worked with the organization for more than 10 years.

4.2 Data Analysis

The responses to the various questions on the items measuring each construct are presented and analyzed in this section. As presented in each tables, the responses to the questions on the items measuring research construct or opinions and the analysis is done to know the position of the respondents on each Likert scale. The presentation and analysis is done based on the research objective.

The main objective was to examine the relationship between AI-based ESG assessment and corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria.

Table 8: Analysis of items and research constructs

S/N	RELATIONSHIP BETWEEN AI-BASED ESG ASSESSMENT AND CORPORATE SUSTAINABILITY PERFORMANCE OF LISTED MANUFACTURING FIRMS IN AKWA IBOM STATE, NIGERIA	SA	A	SD	D	N
A	AI-BASED ESG ASSESSMENT					
1	Our firm employs AI-powered tools for collecting environmental performance data	6(25%)	10(41.7%)	4(16.7%)	2(8.3%)	2(8.3%)
2	AI-based systems are used to monitor our firm's social impact on host communities	12(50.0%)	6(25.0%)	4(16.7%)	2(8.3%)	0(0%)
3	Our organisation utilises AI algorithms to evaluate governance compliance and transparency	2(8.3%)	10(41.7%)	6(25.0%)	6(25.0%)	0(0%)
4	AI-driven analytics enable real-time tracking of our firm's ESG performance indicators	6(8.3%)	6(25.0%)	12(50.0%)	4(16.7%)	0(0%)
5	Our firm uses AI-powered predictive models to assess future ESG risks and opportunities	10(41.7%)	2(8.3%)	10(41.7%)	0(0%)	2(8.3%)
B	CORPORATE SUSTAINABILITY PERFORMANCE					
6	Our firm demonstrates consistent improvement in environmental sustainability metrics (emissions reduction, waste management, resource efficiency)	8(33.3%)	8(33.3%)	6(25.0%)	2(8.3%)	0(0%)
7	Our organisation maintains strong social sustainability performance through employee welfare, community engagement, and stakeholder relations	4(16.7%)	10(41.7%)	6(25.0%)	4(16.7%)	0(0%)
8	Our firm exhibits robust governance practices including board diversity, ethical conduct, and transparent reporting	2(8.3%)	12(50.0%)	6(25.0%)	4(16.7%)	0(0%)
9	Our organisation's overall ESG performance has improved significantly over the past three years	4(16.7%)	8(33.3%)	8(33.3%)	4(16.7%)	0(0%)
10	Our firm's sustainability performance meets or exceeds industry benchmarks and regulatory requirements	12(50.0%)	12(50.0%)	0(0%)	0(0%)	0(0%)

Source: Field Survey Data, 2026

Table 8 shows that majority of respondents gave affirmation that their firm employs AI-powered tools for collecting environmental performance data as evidenced in the 10 respondents representing 41.7% that agreed and 6(25%) that strongly agreed to the claim. Also, it was revealed that 12 respondents representing 50% strongly agreed that AI-based systems are used to monitor their firm's social impact on host communities. Furthermore, 10 respondents representing 41.7% agreed that their organisation utilises AI algorithms to evaluate governance compliance and transparency. 6 respondents representing 25.0% strong agreed and 6 respondents representing 25.0% agreed respectively that AI-driven analytics enable real-time tracking of their firm's ESG performance indicators. 10 respondents (41.7%) and 2(8.3%) strongly agreed and agreed respectively their firm uses AI-powered predictive models to assess future ESG risks and opportunities. Also, 8 respondents representing 33.3% and 8(33.3%) strongly agreed and agreed respectively that their firm demonstrates consistent improvement in environmental sustainability metrics (emissions reduction, waste management, resource efficiency). Moreover, 10 respondents representing 41.7% agreed that their organisation maintains strong social sustainability performance through employee welfare, community engagement, and stakeholder relations. 12 respondents representing 50% agreed that their firm exhibits robust governance practices including board diversity, ethical conduct, and transparent reporting. 8 respondents (33.3%) agreed that their organisation's overall ESG performance has improved significantly over the past three years. Also, 12 respondents representing 50% and 12(50%) strongly agreed and agreed that their firm's sustainability performance meets or exceeds industry benchmarks and regulatory requirements.

4.3 Descriptive Statistics

This analysis is conducted to assess the descriptive properties of the research variables in order to ascertain if the data possess requisite characteristics for statistical analysis. These analyses involve descriptive statistics such as the mean, standard deviation, minimum, and maximum. These statistics disclose the characteristics of the research variables principally in terms of variance or closeness of the data points to the mean. The ultimate is to determine the degree of variability of the data away from the mean. A high variability indicates high degree of variance and high potential of non-normality of the data thus leading to unreliable estimate. It is desired that the dataset has low level of variability.

Table 9. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Corporate sustainability performance	24	3.0	5.0	4.083	.9003
AI-based ESG assessment	24	1.0	5.0	3.667	1.2309
Valid N (listwise)	24				

Based on a compilation of descriptive data for the characteristics shown in Table 9, the mean and standard deviation scores were minimal indicating that the dataset were clustered below the mean translating to a desired outcome that the dataset has low level of variability. This indicates that the AI-based ESG assessment was at low level leading to the mean score of 4.083 of the corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria.

4.4 Test of Hypothesis

The hypothesis is that there is no significant relationship between AI-based ESG assessment and corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria.

Table 10: Regression Test Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	319[a]	.102	.092	1.071	2.321

a. Predictors: (Constant), AI-based ESG assessment

b. Dependent Variable: corporate sustainability performance

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	12.712	1	12.712	11.079	.001[b]
	Residual	112.448	24	1.147		
	Total	125.160	25			

a. Dependent Variable: corporate sustainability performance

b. Predictors: (Constant), AI-based ESG assessment

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.359	.280		8.423	.000
	AI-based ESG assessment	.268	.081	.319	3.329	.001

This hypothesis was tested using regression statistics and the results are presented in Table 10. The test of the null hypothesis (H0) against the alternate hypothesis (H1) is that H0 is rejected if the calculated p- value is less than the p-value of 0.05. Since the calculated p-value of 0.001 is less than the p-value of 0.05, the researcher rejected the null hypothesis, which states that there is a significant relationship between AI-based ESG assessment and corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria. A coefficient of 0.268 implies that AI-based ESG assessment has a positive relationship with corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria.

4.5 Discussion of Findings

Findings revealed that there is a significant relationship between AI-based ESG assessment and corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria. This finding is consistent with the finding of Umukoro (2026) that there is a significant sectoral variation and a positive correlation between ESG scores and return on equity. By implications, the finding of a significant relationship between AI-based Environmental, Social, and Governance (ESG) assessment and the corporate sustainability performance of listed manufacturing firms in Akwa Ibom State carries profound implications for technology adoption and regulatory frameworks. First, it implies that manufacturing firms must transition from traditional, manual ESG reporting to AI-driven analytics to achieve precise, real-time tracking of their environmental footprint and waste management. Second, for regional policymakers and regulatory bodies like the Akwa Ibom State Ministry of Environment, this statistical significance provides a empirical baseline to mandate digitized, data-driven sustainability audits rather than relying on self-reported compliance. Third, it serves as a strong economic signal for local corporate boards to actively invest in AI infrastructure, effectively shifting the internal perception of ESG compliance from a mandatory cost burden into a strategic, technology-driven asset.

From an external financing and stakeholder perspective, this finding fundamentally alters the investment landscape and community relations within the Niger Delta region. Fourth, local manufacturing firms utilizing AI for ESG assessments will gain a distinct competitive advantage in attracting foreign direct investment (FDI), as international investors heavily rely on rigorous, tech-verified ESG metrics to mitigate risk. Fifth, the integration of AI-based assessments directly translates to improved social performance by enabling firms to better predict, monitor, and mitigate industrial pollution, thereby directly reducing host-community conflicts and fostering sustainable regional development. Ultimately, these interconnected insights prove that leveraging artificial intelligence is no longer just an operational choice, but a core determinant of long-term corporate survivability and social license in Akwa Ibom State.

5 Conclusion and Recommendations

In conclusion, this study establishes that AI-based ESG assessment exerts a significant positive influence on the corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria. By leveraging artificial intelligence to process complex environmental, social, and governance data, these manufacturing enterprises can achieve greater transparency, optimize resource allocation, and proactively mitigate operational risks. This strong statistical relationship underscores that integrating advanced technological frameworks into corporate governance is no longer just an innovative option, but a strategic necessity for driving long-term sustainable development within the regional manufacturing sector. Consequently, fostering AI-driven ESG adoption will play a pivotal role in aligning local industrial practices with global sustainability standards and attracting responsible investment. Based on the finding that AI-based Environmental, Social, and Governance (ESG) assessments significantly influence the corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, manufacturing executives should immediately integrate advanced AI analytics into their core sustainability frameworks to track real-time resource depletion, carbon emissions, and labor safety metrics. To ensure these technological adoptions are effective, firms must actively invest in upskilling their internal audit and compliance teams in data science and machine learning. Additionally, manufacturing companies must establish automated data-governance protocols to guarantee that the ESG data fed into AI models is accurate, transparent, and compliant with both Nigerian statutory requirements and international disclosure standards. From a regulatory and collaborative perspective, the Akwa Ibom State Government, through its Ministry of Environment and Mineral Resources, should design localized policy incentives—such as tax rebates or fast-tracked industrial permits—for manufacturing firms that demonstrably use AI to achieve verifiable ESG benchmarks. Simultaneously, industry trade groups like the Manufacturers Association of Nigeria (MAN) should partner with regional tech hubs and universities to create shared AI-driven ESG reporting templates. This collaborative infrastructure will lower the entry barriers and technology costs for smaller listed firms in the state, effectively driving collective sustainable industrialization across the region.

References

Adegbite, E., Idowu, S. O., & Nakajima, C. (2022). Corporate social responsibility in sub-Saharan Africa: Institutional voids and implementation challenges. African Journal of Business Ethics, 16(2), 45-68.

Ajose-Adeogun, S. E. (2026). Tech and AI in ESG reporting. Businessday NG. Retrieved from https://businessday.ng

Akpan, E. E. (2025). Firms' financial characteristics and sustainability reporting of listed manufacturing companies in Nigeria. [Undergraduate Project, Akwa Ibom State Polytechnic].

Dada, B. I. (2024). Sustainable development goals reporting by listed companies in an emerging economy: Evidence from Nigeria. African Journal of Accounting and Financial Research, 7(1), 49-65.

Effiong, I. H. (2022). Sustainable capital reporting and financial performance of quoted manufacturing firms in Nigeria. Journal of Finance and Accounting, 10(1), 33-48.

Eze, A., Okoye, N. J., & Amahalu, N. N. (2025). Sustainability disclosure and firm value of listed manufacturing firms in Nigeria. Journal of Global Accounting, 11(5), 25-61.

Goyal, K. A., Sivasamy, R., & Mertiya, T. (2026). Going green in Africa: Maximising artificial intelligence performance in manufacturing firms in developing economies. In Green Technology and the Circular Economy (pp. 107-129). Springer.

Kamau, C. G. (2026). Artificial Intelligence Techniques and Cryptocurrency Fraud Detection in Kenya: A Systematic Literature Review Using the PRISMA Framework. African Multidisciplinary Scholarship Journal, 1(1), 6. 55-74

Meng, Q., & Okwara, U. K. (2026). Sustainable provider selection for artificial intelligence-powered robotic systems: a framework and evaluating methodology. Business Process Management Journal, 32(5), 1693-1721.

Ogunyemi, F. M. (2026). AI, ESG, and digital transformation: Unlocking Nigeria's path to a trillion-dollar economy. Businessday NG. Retrieved from https://businessday.ng

Okeke, A. (2026). Decarbonizing supply chains in emerging economies: A multilevel analysis of regulation, ESG, and digitalization. Global Business Review, 1-25.

Owolabi, I. A., Erdiaw-Kwasie, M. O., Tenakwah, E., & Abunyewah, M. (2025). Corporate sustainability performance and fraud risk management in Nigeria's extractive sector: The moderating role of ownership structure in an evolving environmental policy landscape. Corporate Social Responsibility and Environmental Management, 33(2), 2906-2927.

The Guardian Nigeria. (2026). FRC partners SALI, RCRA to develop AI-driven national digital platform. The Guardian Nigeria. Retrieved from https://guardian.ng

Umukoro, J. E. (2026). Developing AI-powered ESG rating framework for Nigerian Exchange listed companies. [Master's Thesis, National Research University Higher School of Economics].

(2026). An analysis of corporate social responsibility and sustainable manufacturing in Nigeria's industrial sector. Zenodo. https://doi.org/10.5281/zenodo.

APPENDIX I: QUESTIONNAIRE

Please read carefully each of the statement below and tick to indicate your agreement or disagreement to each item. Each item has to do with the relationship between AI-based ESG assessment and corporate sustainability performance of listed manufacturing firms in Akwa Ibom State, Nigeria. The level or degrees of your responses are: Strongly agree (SA), Agree (A), strongly disagree (SD), disagree (D) and Neutral (N).

S/N	RELATIONSHIP BETWEEN AI-BASED ESG ASSESSMENT AND CORPORATE SUSTAINABILITY PERFORMANCE OF LISTED MANUFACTURING FIRMS IN AKWA IBOM STATE, NIGERIA	SA	A	SD	D	N
A	**AI-BASED ESG ASSESSMENT**					
1	Our firm employs AI-powered tools for collecting environmental performance data					
2	AI-based systems are used to monitor our firm's social impact on host communities					
3	Our organisation utilises AI algorithms to evaluate governance compliance and transparency					
4	AI-driven analytics enable real-time tracking of our firm's ESG performance indicators					
5	Our firm uses AI-powered predictive models to assess future ESG risks and opportunities					
B	**CORPORATE SUSTAINABILITY PERFORMANCE**					
6	Our firm demonstrates consistent improvement in environmental sustainability metrics (emissions reduction, waste management, resource efficiency)					
7	Our organisation maintains strong social sustainability performance through employee welfare, community engagement, and stakeholder relations					
8	Our firm exhibits robust governance practices including board diversity, ethical conduct, and transparent reporting					
9	Our organisation's overall ESG performance has improved significantly over the past three years					
10	Our firm's sustainability performance meets or exceeds industry benchmarks and regulatory requirements					