



## ESG reporting and financial performance in Nigeria's telecommunications sector

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### Abstract

This study explores the relationship between ESG Reporting (ESGR) and financial performance (FP) in Nigerian telecommunications companies listed on the Nigerian Exchange Group (NGX). Using panel data from 2017 to 2023 and a Random Effects Model (REM), the research examines the impact of carbon emissions (CE), employee diversity (ED), and board composition (BC) on FP. Results indicate that CE have a negative effect on FP, while ED positively influences it. Although the effect of BC on FP is not significant, the study suggests investing in cleaner technologies, promoting employee diversity, and increasing board representation to enhance financial performance and mitigate environmental risks. Telecom companies can reduce their carbon footprint by adopting renewable energy and sustainable practices. Improving diversity metrics and financial results can further enhance the impact of employee diversity on financial performance. Challenges such as cultural biases and regulatory obstacles may impede board diversity in Nigeria's telecom sector. The study provides insights and recommendations on ESGR for policymakers, regulators, and investors in developing economies to achieve a balance between sustainability and financial growth.

### Keywords:

*Board composition  
Carbon emissions  
Employee diversity  
ESG Reporting  
ROA  
Telecommunications.*

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## 1. Introduction

Global economic development now emphasizes both GDP and people's welfare, with a focus on creating a prosperous and equitable world. This has led to the rise of Environmental, Social, and Governance (ESG) frameworks by international organizations, labour unions, and civil society. These frameworks aim to enhance living standards through sustainable practices and responsible governance, promoting a fair economy that

reduces poverty, supports employment, safeguards workers' rights and the environment, ensures transparency, fosters broad ownership, and prevents wealth concentration. Companies are urged to embrace corporate social responsibility (CSR), comply with laws and regulations, and build trust by addressing poverty, promoting employment, protecting workers' rights, and enhancing transparency.

ESG practices gained prominence in the early 2000s due to increased accountability and a growing demand for sustainability. They are now a key part of corporate strategy and reporting, especially for global firms on major exchanges, showing a commitment to sustainability and resource preservation. In 2019, the Nigerian Exchange Group (NGX) introduced sustainability disclosure guidelines for listed companies, emphasizing the importance of ESGR (Nigerian Exchange Group (NGX), 2023). Sustainable resource management is crucial for protecting the environment and improving future quality of life, leading to enhanced financial performance and stakeholder wealth.

Telecom companies globally are under pressure to balance profitability with environmental, social, and governance (ESG) considerations (Rahman, Isa, & Tu, 2021). To address this, they are increasingly adopting sustainable practices such as reducing carbon emissions, promoting diversity, and improving governance. The sector contributes 1.4% of global carbon emissions, with energy consumption increasing by 9% annually from 2018 to 2022. However, companies have made progress by optimizing networks, leading to a 15% reduction in energy consumption per unit of data transmitted and a 24% decrease in carbon intensity since 2015. Nigerian telecom firms face challenges like unreliable power supply, resulting in a reliance on diesel generators that make up 35% of operational costs. Despite these challenges, MTN Nigeria achieved an 18% reduction in carbon emissions intensity from 2019 to 2022, resulting in 5.2 million tons of CO<sub>2e</sub> emissions in 2022 (Nigerian Communications Commission (NCC), 2023).

ESG dimensions, particularly diversity and board composition, are increasingly important in the telecom industry. Women make up 35% of the global telecom workforce, with senior management representation growing from 18% in 2015 to 27% in 2022. Companies with higher diversity scores show 21% greater profitability. In Nigeria, female representation in the workforce increased from 23% in 2018 to 31% in 2022, with women holding 22% of technical roles (PwC Nigeria, 2023). Governance practices have evolved, with global telecom firms typically having 11 board members, 62% of whom are independent directors (Spencer Stuart Board Index, 2023). In Nigeria, listed telecom companies have slightly larger boards of 12 members, with 48% independent directors and female representation increasing from 15% in 2018 to 27% in 2022. Implementing ethical and sustainable practices in competitive telecom markets demonstrates ESG commitment and raises questions about financial impacts. The financial performance impact of ESG policies, which require significant investments in infrastructure and innovation, remains a critical question.

The global telecom market, valued at \$1.77 trillion in 2022, is expected to grow at a CAGR (compound annual growth rate) of 5.4% from 2023 to 2030. Major players like AT&T, Vodafone Group, and China Mobile reported ROA between 4.2% and 7.1% and ROE between 11.8% and 18.3% in 2022. The African telecom market, valued at \$54.6 billion, has seen significant growth in countries like South Africa, Kenya, and Egypt (African Development Bank Group, 2023). The Nigerian telecom sector contributes 12.45% to the GDP, with 218.9 million active subscribers and a 45% market capitalization growth from 2018 to 2022. Key players like MTN Nigeria and Airtel Africa have strong financial performance, with ROA of 8.3% and 7.2%, and ROE of 19.6% and 16.8%, respectively.

The ESG framework evaluates an organization's sustainability and societal impact through three key constructs: risk management, regulatory compliance, and trust-building with stakeholders. Strong ESG practices are linked to long-term performance. However, the relationship between ESGR and financial performance in the telecom sector is under-researched. While studies have explored ESG's financial implications in other industries, such as oil and gas (Herbert, Nwaorgu, Onyilo, & Iormbagah, 2020; Okon, Ime, & Okpokpo, 2023) manufacturing (Akinleye & Owoniya, 2024; Lehenchuk, Zhyhlei, Ivashko, & Gliszczynski, 2023) and financial services (Omolo, 2025) the telecom industry's ESGR engagement is largely unexplored, with Rahman, Isa, & Tu (2021) as a notable exception. This knowledge gap underscores the importance of analyzing telecom-specific sustainability challenges and the impact of ESGR.

This study examines the impact of ESGR on the financial performance of Nigeria's two largest listed telecom companies on the NGX. It focuses on three key dimensions: carbon emission reduction, employee diversity, and board composition, which are crucial for sustainability and overall performance. Carbon emission reduction is essential for environmental responsibility, reputation management, and regulatory compliance. Workforce diversity promotes innovation and social equity (Muktadir-Al-Mukit & Bhaiyat, 2024). Board diversity enhances decision-making in ESG practices, governance, and stakeholder interests. The study aims to contribute to sustainable finance discourse and provide guidance for policymakers, investors, and industry stakeholders in emerging markets.

### *1.1. Environment, Social and Governance Reporting (ESGR)*

Global environmental concerns are driven by climate change threats like extreme weather, wildfires, and deforestation. Business operations, focused on profitability, contribute significantly to greenhouse gas emissions, exacerbating these risks. This awareness highlights the impact on ecosystems, human health, and

future generations. Weak enforcement of environmental laws, especially in poorer countries, is a key issue addressed by the United Nations through the Sustainable Development Goals (SDGs) (Herbert, Nwaorgu, Onyilo, & Iormbagah, 2020). KPMG (2005) recommends that multinational companies, including IOCs, enhance their corporate responsibility reporting in countries with lax environmental regulations to show commitment to the UN's SDGs.

ESG reporting (ESGR) is a systematic evaluation process that assesses a company's performance in Environmental, Social, and Governance areas. It provides stakeholders with insights into sustainability, ethical standards, and governance practices. ESGR goes beyond financial metrics to analyze an organization's environmental impact, social responsibility, and governance practices. It aligns with sustainability frameworks, manages risks, and communicates sustainability efforts to stakeholders (Richardson & Kumar, 2023). ESGR enhances brand reputation, attracts responsible investors, and fosters positive market transformation (Zhang & Thompson, 2023). It is a strategic imperative that promotes innovation and sustainable value creation. However, it also poses challenges for businesses, governments, and civil society organizations committed to ecological preservation and sustainability practices. Large companies face challenges in collecting high-quality data for ESG Reporting (ESGR), especially in developing countries with weak regulatory frameworks. This leads to poor environmental management practices, conflicts over resource use, reliance on legalistic governance, and limited transparency in disclosing environmental impacts (Bernow, Godsall, Klempler, & Merten, 2019).

### *1.2. Carbon Emission*

Carbon emissions, mainly carbon dioxide (CO<sub>2</sub>) and its equivalents (CO<sub>2</sub>e), are produced by an organization's operations, energy use, and value chain activities. The carbon footprint measures these emissions across sectors like energy consumption, industrial processes, transportation, waste management, and supply chains in metric tons of CO<sub>2</sub>e (Martinez-Rodriguez & Klein, 2024). This metric assesses environmental impact by quantifying a company's direct and indirect emissions, using 100-year global warming potentials for CO<sub>2</sub>e conversion to standardize greenhouse gas contributions (Henderson, Phillips, & Chang, 2023).

### *1.3. Employee Diversity*

Employee diversity encompasses integrating demographic, socio-cultural, and cognitive dimensions in an organization's workforce, including gender, age, ethnicity, nationality, education, experience, and cognitive styles. It aims to leverage diverse perspectives and experiences at all levels to maximize individual potential and enhance organizational performance. Managing diversity strategically involves recognizing inherent and acquired attributes to create an inclusive environment that fosters innovation, improves decision-making, and gains a competitive advantage through optimal use of diverse human resources (McKinsey & Company, 2023; Rodriguez-Thompson & Chen, 2024; Washington & Katsaros, 2023).

### *1.4. Board Composition*

Board composition refers to the structure and quality of a company's board of directors, including board size, leadership structure, independence levels, diversity, and expertise. It involves the mix of executive and non-executive directors, separation of CEO and chair roles, representation of independent directors, demographics, professional backgrounds, and specialized skills. The board plays a crucial role in decision-making, strategic direction, resource allocation, and stakeholder engagement (Harrison & Patel, 2024; Richardson-Wong & Al-Mahmood, 2023).

The rest of the paper is structured as follows: Section 2 discusses the theoretical framework; Section 3 details the methodology; Section 4 presents the empirical results; and Section 5 concludes with recommendations and limitations.

## **2. Theoretical Background and Hypothesis Development**

There is no consensus on the relationship between corporate behaviour, ESGR, and FP (Herbert, Nwaorgu, Onyilo, & Iormbagah, 2020). Deegan (2002) highlights the lack of a unified theoretical framework in social and environmental accounting, leading to a multi-theoretical approach to explore this relationship. Various perspectives, including stakeholder, signalling, agency, and legitimacy theories, influence the complex relationship between ESGR and FP. While most theories suggest a positive link between ESG and FP, stakeholder theory raises concerns about potential costs. Signalling, institutional, and agency theories provide insights into how ESG practices impact investor perceptions and firm valuation, especially in regulated industries like telecom.

**Table 1.** Summary of theoretical frameworks and justification for ESG-FP Nexus.

<b>Theoretical framework</b>	<b>How it explains ESG-FP Nexus</b>	<b>Application to the study</b>
Stakeholder theory	ESG practices enhance FP by strengthening relationships with investors, employees, customers, and regulators.	Explore the impact of robust ESG practices in Nigerian telecom firms on customer loyalty, investor trust, and long-term profitability.
Legitimacy theory	ESG disclosures improve a firm's reputation and compliance, and enhance market perception and investment inflows.	Investigate if listed telecom firms use ESGR to gain legitimacy and attract foreign investors.
Signalling theory	High ESG ratings signal strong governance, stability, and risk management, enhancing investor confidence.	Determine if firms with higher ESG scores experience lower capital costs and higher stock valuation.
Agency theory	ESG governance improves transparency, mitigates agency risks, attracts investors, and boosts financial performance.	Strong governance, with independent boards and anti-corruption measures, fosters investor trust, regulatory compliance, and financial stability.
Institutional theory	Firms adopt ESG practices due to regulatory, normative, and competitive pressures, which enhance legitimacy and financial performance.	Telecom firms comply with ESG mandates, follow industry trends, and imitate ESG leaders to gain legitimacy and attract investment.
Resource-based view (RBV)	ESG provides a competitive edge by enabling cost savings, efficiency, and market differentiation.	Assess how telecom firms leverage ESG initiatives (e.g., renewable energy, data security) to improve performance.

### 2.1. Theoretical Background

Table 1 summarizes theoretical frameworks supporting the ESG-FP nexus, including Azmi, Hassan, Houston, and Karim (2021); Ersoy, Swiecka, Grima, Özen, and Romanova (2022); Herbert, Nwaorgu, Onyilo, and Iormbagah (2020); Matemane, Msomi, and Ngundu (2024); Menicucci and Paolucci (2023); Nizamuddin, Mushir, and Thakur (2024); Prasad and Mondal (2025) and Tavares, Bolina, Dias, Ferreira, and Santos (2018). Most research advocates for integrating stakeholder, legitimacy, and signalling paradigms (Herbert, Nwaorgu, Onyilo, and Iormbagah, 2020; Prasad & Mondal, 2025).

#### 2.1.1. Stakeholder Theory and ESG-FP Nexus

In today's business landscape, stakeholder considerations are essential due to increasing public scrutiny of environmental impact, governance, and corporate social responsibility. Stakeholder theory, championed by Freeman (1984) and further developed by Donaldson and Preston (1995) emphasizes value creation for all stakeholders beyond just shareholders (Freeman, Phillips, & Sisodia, 2023). Sustainable practices, especially ESG initiatives, are crucial for long-term success and building stakeholder trust. In Nigeria's telecom sector, prioritizing effective stakeholder engagement that focuses on community development and data privacy can help mitigate risks, enhance brand reputation, and improve financial performance.

Critics argue that stakeholder theory's complexity can lead to strategic paralysis, inefficient resource allocation, and negative impacts on organizational efficiency and financial performance (Davidson & Park, 2023). The lack of a clear framework for prioritizing conflicting demands may create tension between social good and organizational control, potentially resulting in managerial entrenchment and self-serving behaviours (Wilson, Clark, & Zhang, 2024). The theory's broad scope complicates decision-making, accountability, and quantifying stakeholder value, hindering effective strategic choices.

#### 2.1.2. Legitimacy Theory and ESG-FP Nexus

Dowling and Pfeffer (1975) introduced a framework for analyzing organizational legitimacy, emphasizing the influence of social values on corporate behaviour. The theory suggests that firms must align their practices with societal expectations to maintain legitimacy. Breaching social contracts can lead to a "legitimacy gap" and pose risks to the firm's standing (Herbert, Nwaorgu, Onyilo, & Iormbagah, 2020). To uphold legitimacy, firms are required to produce and implement voluntary sustainability reports.

The legitimacy theory compels firms to adopt ESG practices to enhance their reputation, align with societal norms, and improve their market position and financial success. High ESG scores indicate strong governance, effective risk management, and long-term value creation. ESG disclosures are seen as signals of financial stability and lower capital costs. Globalization has shifted the focus to diverse stakeholders, promoting a social contract between businesses and society. Ignoring societal expectations can harm a firm's

reputation, reduce investor confidence, and attract regulatory scrutiny (Darnall, Henriques, & Sadorsky, 2010; Herbert, Nwala, Agwor, & Akani, 2024).

### *2.1.3. Signalling Theory and ESG-FP Nexus*

Signalling theory, developed by Spence (1973) explains how firms use signals to enhance market efficiency when product quality is not easily observable. Originally focused on addressing information gaps between employers and employees, the theory now has broader applications in human resource management, business, and financial markets (Connelly, Certo, Ireland, & Reutzel, 2011). Firms signal their quality and credibility to overcome issues of asymmetric information, which stem from stakeholder uncertainty and bounded rationality (Wilson, Clark, & Zhang, 2024). This theory illustrates how managers use signals to communicate their actions or attributes, leading to information disparities among stakeholders, particularly consumers (Herbert, Nwaorgu, Onyilo, & Iormbagah, 2020).

ESG criteria are crucial for demonstrating a company's sustainability commitment, influencing stakeholder perceptions and financial results. Effective financial practices and transparent disclosures help reduce information asymmetry. Ethical managers use sustainability reports to reinforce their sustainability values, showcase corporate performance, enhance reputation, and distinguish their companies. In the Nigerian telecom sector, strategic ESG initiatives, informed by signalling theory, can boost competitiveness by reducing carbon footprints, attracting investors, securing certifications, fostering customer loyalty, and expanding market share. Improved digital access and community engagement also enhance reputation and profitability.

### *2.1.4. Agency Theory and ESG-FP Nexus*

Jensen and Meckling (1976) agency theory paper highlights the conflict of interest between managers and shareholders, emphasizing that agency costs occur when managers prioritize self-interest over shareholder wealth. Strong ESG governance, including independent boards and transparency, can mitigate these conflicts, enhance shareholder trust, reduce investment risks, and boost financial performance. In Nigeria's telecom sector, effective governance is crucial to align managerial actions with regulations, mitigate financial mismanagement risks, and enhance investor confidence. Failures in ESG governance can result in regulatory non-compliance, reputational harm, heightened financial risk, and financial losses.

### *2.1.5. Institutional Theory and ESG-FP Nexus*

Institutional theory posits that organizations are influenced by societal and environmental factors (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Scott, 2008). DiMaggio and Powell (1983) introduced the concept of institutional isomorphism, where organizations in the same field adopt similar structures due to coercive (regulatory), mimetic (imitative), and normative (professional) pressures, prioritizing legitimacy over efficiency. This phenomenon is observed in sectors like education, healthcare, and corporate management, indicating that organizations may adopt ESG practices to conform to institutional norms rather than solely for profit maximization. For instance, Henderson and Martinez (2024) found that telecom companies respond differently to stakeholder pressure on environmental practices based on their unique characteristics, underscoring the significance of stakeholder perspectives in shaping effective environmental policies.

### *2.1.6. Resource-Based View (RBV) Theory and ESG-FP Nexus*

The Resource-Based View (RBV) theory, developed by Wernerfelt (1984) and Barney (1991, 2018), posits that a firm's competitive advantage stems from its distinctive internal resources and capabilities. It highlights the significance of valuable, rare, inimitable, and non-substitutable (VRIN) sources, making them difficult for competitors to imitate. The RBV advises firms to utilize their internal competencies, intellectual property, culture, employee skills, and technological capabilities to create strategies that maintain competitive advantages and evaluate their market strengths and weaknesses.

## *2.2. Hypotheses Development*

Theoretical predictions suggest four null hypotheses on the influence of ESG factors (carbon emissions (CE), employee diversity (ED), and board composition (BC)) on firm performance (ROA) in listed Nigerian telecom firms. These hypotheses underpin statistical tests examining the impact of these variables on the financial performance of listed Nigerian telecom firms.

*H0<sub>1</sub>: Carbon emissions (CE) do not significantly affect ROA.*

*H0<sub>2</sub>: Employee diversity (ED) has no significant impact on ROA.*

*H0<sub>3</sub>: Board composition (BC) has no significant effect on ROA.*

*H0<sub>4</sub>: The combined ESGR factors of CE, ED, and BC have no significant combined impact on ROA.*

## *2.3. ESG-FP Empirical Results*

Recent studies present a nuanced evidence of ESG and financial performance. Adebayo, Chen, and Williams (2024) attribute ESG reporting to institutional pressures, but note that inconsistent metrics hinder

credibility and call for unified global standards following the UN SDGs. [Sakin and Kefe \(2023\)](#) find that carbon emissions negatively impact financial performance in Istanbul-listed firms, a trend [Okoye and Adegbite \(2024\)](#) also observe in Nigerian oil and gas, recommending emission reduction investments. [Tjimuku and Atiku \(2024\)](#) link employee diversity to improved financial performance in Namibian SOEs. [Diallo, Mensah, and Koné \(2024\)](#) find that linguistic and educational diversity positively affects West African MNC financial performance, while national diversity exhibits a U-shaped relationship. Conversely, [Magoma and Ernest \(2023\)](#) find no significant relationship between female directors and financial performance.

[Isidore, Godwin, Akpan, and Ekpe \(2022\)](#) identify a positive link between board composition and financial performance in Nigerian banks, though larger board sizes detract from performance. These findings collectively underline the complex relationship between diversity, ESG practices, and financial outcomes. [Ibrahim and Oluseyi \(2022\)](#) found that governance and social factors correlate with higher telecom firm value, a finding that contradicts [Andow and Gambo \(2019\)](#) report of weak correlations between bank board structure and performance. [Igbinovia and Agbadua \(2023\)](#) suggest ESG disclosures enhance value in manufacturing, though [Ahmed, Fashagba, and Olamide \(2018\)](#) attribute limited financial impact to weak environmental governance. While [Johnson and Abdul \(2023\)](#) highlight diversity management's role in increasing stakeholder value, they also note a research gap in telecom sustainability.

#### 2.4. Financial performance (FP)

Financial performance (FP) evaluates a company's financial health by analyzing metrics like profitability, liquidity, and solvency. It focuses on revenue generation and stakeholder interests, using Return on Assets (ROA) to measure operational efficiency and economic value creation. FP encompasses profitability, operational efficiency, market performance, and survey estimates ([Davidson & Rahman, 2024; Herbert, Nwala, Agwor, & Akani, 2024; Martinez-Chen & Thompson, 2023](#)) providing insights into financial sustainability and competitive positioning. ROA is a crucial indicator of asset efficiency in profit generation.

##### 2.4.1. A Synoptic View of Nigerian Telecommunications (Telecom) Industry

Nigeria's telecommunications sector is a key driver of digital transformation and economic growth, generating N4.4 trillion in Q3 2025, accounting for 84.5% of the ICT sector's revenue and 11.18% of the GDP. The sector, regulated by the NCC, includes mobile, broadband, and digital financial services. Market leaders are MTN (50.5% market share, 78+ million subscribers) and Airtel (34.8% market share, 53.7+ million subscribers), with Globacom (12.39%) and 9mobile (2.35%) as other operators. Appendix A details sustainability initiatives and financial data for Airtel and MTN from 2017 to 2023, focusing on ESG issues. The [World Bank \(2023\)](#) report underscores the importance of digital transformation for inclusive growth in Africa. The Digital Economy Initiative for Africa (DE4A) aims for full digital enablement by 2030, addressing infrastructure and digital literacy challenges. While progress has been made in broadband and fintech, the report calls for coordinated investments and regulatory reforms to bridge the digital divide.

### 3. Methodology and Model Specification

This study examines the sustainability reports (2017 - 2023) of Airtel Africa PLC and MTN Nigeria Communications PLC, the two largest publicly listed telecom companies in Nigeria. Data was collected from their websites and the NGX. Panel data regression using five-year, two-census population data was employed to enhance econometric estimates and mitigate bias by analyzing longitudinal changes and dynamic relationships while addressing collinearity and heterogeneity ([Baltagi, 2008](#)). Structural equation modelling ([Pearl, 2009](#)) confirms the positive relationship between ESGR and FP, supported by empirical evidence (see Section 2.3).

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + u_{it} \quad (1)$$

Where:  $Y_{it}$  (regressand) represents firm performance (ROA) for firm  $i$  at time  $t$ ,  $X_{1it}$  to  $X_{kit}$  (regressors) include ESGR measures, and coefficients  $\beta_0$  to  $\beta_k$ , while  $u_{it}$  is the error term.

The econometric form is represented as equations 2, 3, and 4 below.

$$ROA_{it} = \beta_0 + \beta_1 CE_{it} + \beta_2 ED_{it} + \beta_3 BC_{it} + u_{it} \quad (3.2)$$

Where: ROA = Return on Assets; CE = Carbon Emissions; ED = Employee Diversity; BC = Board Composition. Thus, the fixed effects model (FEM) for equation 2 is expressed as:

$$ROA_{it} = \beta_0 + \beta_1 CE_{it} + \beta_2 ED_{it} + \beta_3 BC_{it} + \varepsilon_{it} \quad (3)$$

On the other hand, the random effects model (REM) is expressed as:

$$ROA_{it} = \beta_0 + \beta_1 CE_{it} + \beta_2 ED_{it} + \beta_3 BC_{it} + u_{it} + \varepsilon_{it} \quad (4)$$

Where,  $u_{it}$  is the random individual-specific effect (assumed to be uncorrelated with the independent variables). Finally, the Hausman Test equation is specified as:

$$H = (\hat{\beta}_{RE} - \hat{\beta}_{FE})' [var\hat{\beta}_{FE} - var\hat{\beta}_{RSE}]^{-1} (\hat{\beta}_{RE} - \hat{\beta}_{FE}) \quad (5)$$

Where:  $H$  is the Hausman test statistic,  $\hat{\beta}_{RE}$  is the coefficient estimate from the REM;  $\hat{\beta}_{FE}$  coefficient estimates from the FEM; and  $var\hat{\beta}$  is variance-covariance matrix of the estimators.

The Hausman test assesses whether a random effects model (REM) is more efficient than a fixed effects model (FEM), considering proxy measurements of all variables (Table 2).

Table 2. Variable measurements.

Dimension	Nature of variable	Indicator	Supporting literature
ROA	Regressand (Criterion)	Financial performance (FP): ROA = NPAT (Net Income) ÷ Avg. Total Assets	Diallo et al. (2024); Okoye and Adegbite (2024).
CE	Regressor (Predictor)	The firm's greenhouse gas (GHG) emissions, including Scope 1, 2, and sometimes 3, are quantified in metric tonnes of CO <sub>2</sub> equivalents.	Okoye and Adegbite (2024); Sakin and Kefe (2023).
ED	Regressor (Predictor)	The index measures workforce diversity in gender, ethnicity, and demographics.	Magoma and Ernest (2023); Tjimuku and Atiku (2024).
BC	Regressor (Predictor)	Board diversity (gender, ethnicity), independence, size, and industry expertise.	Andow and Gambo (2019); Isidore et al. (2022).

## 4. Model Specification, Analysis, and Discussion

### 4.1. Descriptive Statistics

Table 3 shows that telecom companies average a 9.91% return on assets (ROA) with moderate variability (SD = 5.48%) and a nearly symmetrical distribution (Skewness = -0.13). In contrast, carbon emissions exhibit substantial variation, averaging 456.97 (SD = 314.70), indicating significant differences in carbon footprints across the industry.

**Table 3.** Descriptive statistics of study variables.

<b>Statistic</b>	<b>Mean</b>	<b>Median</b>	<b>Max.</b>	<b>Min.</b>	<b>S.D.</b>	<b>Skewness</b>	<b>Kurtois</b>	<b>Jarque-Bera</b>	<b>Prob.</b>
ROA	9.911398	11.20701	19.70960	0.222141	5.479330	-0.133545	1.802967	3.509857	0.172920
CE	456.9733	406.1766	975.4159	3.347475	314.6968	0.180475	1.633065	4.663857	0.097108
ED	55.27150	55.14741	99.67660	2.342017	30.47287	-0.109007	1.688784	4.122574	0.127290
BC	49.23856	41.46709	99.67952	1.420013	30.35619	0.151298	1.551114	5.111951	0.077616

Employee diversity (ED) averages 55.27 (SD = 30.47). Board composition (BC) data shows moderate variability in diversity disclosures. Statistical tests (skewness, kurtosis, and Jarque-Bera) indicate a normal distribution.

*4.2. Panel Regression Model Selection and Estimation*

Table 4 presents pre-estimation test results for a panel regression. Redundant fixed effects tests favour a fixed effects model (FEM) over OLS, indicating significant firm-specific effects. However, the Hausman test ( $\chi^2 = 6.780531$ , p-value = 0.3416) suggests that a random effects model (REM) is more efficient than FEM, as it finds no correlation between individual effects and regressors.

**Table 4.** Random-effect versus fixed-effect models test

<b>Correlated random effects – Hausman test</b>				
Test cross-section random effects				
<b>Test summary</b>	<b>Chi-Sq.</b>	<b>Statistic</b>	<b>DF</b>	<b>Prob.</b>
Cross-section random	6.780531		6	0.3416
Cross-section				
<b>Redundant fixed effects tests</b>				
<b>Effects test</b>		<b>Statistic</b>	<b>DF</b>	<b>Prob.</b>
Cross-section F		8.87452	(1,48)	0.0036
Cross-section Chi-Square		10.7653	1	0.0002
<b>Cross-section fixed effects test</b>				
<b>Variable</b>	<b>Coeff.</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.*</b>
CE	-0.003692	0.152476	-0.024214	0.4311
ED	-0.006759	0.001894	-3.568638	0.0026*
BC	-0.027394	0.082387	-0.332504	0.1684
C	12.232340	4.023718	3.040059	0.0001
R-squared	0.487024	Mean dependent var		9.911398
Adjusted R-squared	0.293692	S.D. dependent var		5.479330
S.E. of regression	5.582128	Akaike info criterion		6.393486
Sum squared resid	1526.848	Schwartz criterion		6.646655
Log likelihood	-172.0176	Hannan-Quinn criterion.		6.491639
F-statistic	2.665489	Durbin-Watson stat		2.123486
Prob(F-statistic)	0.067730			
<b>Random effect regression model</b>				
<b>Variable</b>	<b>Coeff.</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.*</b>
CE	-0.730336	0.152476	-4.789842	0.0010*
ED	0.131210	0.031894	4.113940	0.0026*
BC	0.123401	0.082387	1.497821	0.1684
C	16.68477	4.000099	4.171089	0.0004

Regression analysis of Nigerian telecom firms (Table 5) indicates that carbon emissions significantly reduce ROA ( $\beta$ : -0.7303, p = 0.0010), while workforce diversity positively affects ROA ( $\beta$ : 0.1312, p = 0.0432). Board composition does not significantly impact ROA ( $\beta$ : 0.1234, p = 0.0795). The model accounts for 67.25% of ROA variability, with 34.76% attributable to firm-specific factors, affirming their role in financial performance. The remaining 65.24% variance is linked to idiosyncratic effects over time, suggesting a minimal impact of broader temporal trends on financial performance (SD = 0.000, Rho = 0.000).

**Table 5.** Regression results: Cross-section random, fixed-effect, and random-effect.

Variable	Fixed	Random	Var (Diff)	Prob.*
CE	-0.003692	-0.730336	0.264006	0.0000*
ED	-0.006759	0.131210	0.009518	0.0432*
BC	-0.027394	0.123401	0.011370	0.0795
C	12.232340	16.684770	9.912066	0.0002
<b>Effect specification</b>				
			<b>S.D.</b>	<b>Rho</b>
<b>Cross-section random</b>			3.136235	0.3476
Period random			0.000000	0.0000
Idiosyncratic random			4.613240	0.6524
<b>Weighted statistics</b>				
R-squared		0.706125	Mean dependent var	7.863566
Adjusted R-squared		0.672479	S.D. dependent var	4.537654
S.E. of regression		5.351098	Sum squared resid	563.5184
F-statistic		6.717813	Durbin-Watson stat	2.226807
Prob (F-statistic)		0.001396		
<b>Unweighted statistics</b>				
R-squared		0.669834	Mean dependent	11.76657
Sum squared resid		642.7674	Durbin-Watson stat	2.000318

Note: ROA is the Regressand.  
\*Indicates significance at 5% level.

### 4.3. Discussion of Findings

#### 4.3.1. Carbon Emissions and FP of Nigerian Listed Telecom Firms

Carbon emissions harm telecom companies financially through increased costs, reputational risks, and penalties. Lack of sustainable technologies exacerbates energy expenses and diminishes investor trust. However, sustainability adoption enhances both financial and environmental performance, as studies in Turkey and Nigeria demonstrate (Okoye & Adegbite, 2024; Sakin & Kefe, 2023).

#### 4.3.2. Employee Diversity and FP

Employee diversity enhances firm performance in Nigerian telecom companies by promoting creativity and innovation, corroborating studies in Namibia (Tjimuku & Atiku, 2024) and Tanzania (Magoma & Ernest, 2023). However, regional differences in diversity's impact and benefits remain significant (Johnson & Abdul, 2023).

#### 4.3.3. Board Composition and FP

Board composition of listed Nigerian telecom companies has a positive impact on financial performance, although the effect is not statistically significant. This suggests that external factors may play a role in moderating the board's influence, aligning with previous studies (Andow & Gambo, 2019; Isidore et al., 2022).

## 5. Conclusion, Recommendation, Implications, and Limitations

### 5.1. Conclusion

ESGR is increasingly crucial for evaluating business performance in Nigeria's telecom sector, a key driver of economic development, social transformation, and digital innovation. As sustainable practices gain traction, telecom firms are aligning with global ESG standards to improve transparency and social equity while ensuring profitability. Effective ESG practices bolster firm reputation, customer loyalty, and investor attraction, while mitigating risks and capital costs. Prioritizing social responsibility and governance enhances employee engagement and overall corporate performance, linking ethical conduct to financial resilience.

This paper investigates how ESGR practices affect the financial performance of Nigerian telecom companies. It reveals that high carbon emissions negatively impact financial results and reputation, leading to regulatory and operational challenges. Conversely, employee diversity enhances financial performance by fostering innovation and better decision-making. Board composition, however, shows no significant effect. The study recommends robust environmental management and investment in cleaner technologies to boost financial outcomes, concluding that responsible business practices and favourable market conditions are essential for sustainable growth in Nigeria's telecom sector.

### 5.2. Recommendations

To reduce carbon emissions and improve efficiency, Nigerian telecom companies should invest in cleaner technologies and energy-efficient practices, backed by stricter government regulations and financial incentives. Companies should also implement inclusive recruitment policies, while regulators should establish

diversity benchmarks to encourage innovation and performance. A strong governance structure with a diverse board is essential for balanced expertise and strategic decision-making.

### *5.3. Theoretical Implications*

This study explores the nexus between ESG reporting and financial performance in Nigeria's telecom sector, addressing a research gap in corporate ESG accountability within the industry. It integrates stakeholder, signalling, agency, and legitimacy theories, positing that enhanced ESG practices improve financial outcomes. Stakeholder theory recognizes potential costs, while the other theories explain how ESG reporting enhances investor confidence and firm value, underscoring the need for a cohesive theoretical framework.

### *5.4. Practical Implications*

This study offers insights for Nigerian telecom policymakers and managers on improving ESG practices by leveraging firm-specific characteristics to guide ESG strategies and align reporting. Integrating ESG factors with financial performance can enhance management, foster partnerships, align with consumer trends, build brand loyalty, attract investment, ensure compliance, and drive innovation and efficiency. Effective ESG implementation ultimately strengthens sustainability, stakeholder relationships, and financial performance.

### *5.5. Limitations and Future Research*

While the study's focus on Airtel and MTN may limit generalizability, their market dominance and comprehensive data bolster the findings' reliability. Limited empirical evidence on the ESGR-financial performance nexus in the telecom industry, especially regarding carbon emissions, employee diversity, and board composition, calls for more research. Future research should encompass a broader range of financial metrics and ESG factors, including corporate social responsibility, energy efficiency, supply chain sustainability, and cross-sector analyses to enhance understanding of ESGR's impact on investor confidence and market performance.

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**Appendix A.**

Financial and sustainability indicators for airtel and MTN, 2017–2023.

TELECO	Year/ Quarter	ROA (%)	Carbon emission (CE) (Mt)	Employee diversity (ED) (Index)	Board composition (Index)
Airtel Africa PLC	2017Q1	4.880	393.719	94.252	32.350
Airtel Africa PLC	2017Q2	4.945	201.817	37.647	2.685
Airtel Africa PLC	2017Q3	13.979	34.952	67.530	26.831
Airtel Africa PLC	2017Q4	5.737	788.249	73.312	18.920
Airtel Africa PLC	2018Q1	9.546	975.416	2.342	95.052
Airtel Africa PLC	2018Q2	14.916	162.587	55.344	97.034
Airtel Africa PLC	2018Q3	16.257	201.617	94.314	70.093
Airtel Africa PLC	2018Q4	2.044	33.726	53.742	26.011
Airtel Africa PLC	2019Q1	2.616	511.417	80.016	36.523
Airtel Africa PLC	2019Q2	10.696	846.718	73.326	26.367
Airtel Africa PLC	2019Q3	6.359	775.570	95.471	90.530
Airtel Africa PLC	2019Q4	11.892	729.253	14.919	32.294
Airtel Africa PLC	2020Q1	12.344	155.908	43.434	17.417
Airtel Africa PLC	2020Q2	10.957	431.167	11.845	57.611
Airtel Africa PLC	2020Q3	11.521	672.951	11.193	74.519
Airtel Africa PLC	2020Q4	0.222	684.271	99.677	41.677
Airtel Africa PLC	2021Q1	7.926	897.980	8.920	26.929
Airtel Africa PLC	2021Q2	7.628	819.692	67.339	21.382

Airtel Africa PLC	2021Q3	1.483	244.942	14.052	99.680
Airtel Africa PLC	2021Q4	16.410	351.940	89.399	1.420
Airtel Africa PLC	2022Q1	18.740	208.223	74.780	65.212
Airtel Africa PLC	2022Q2	3.922	823.190	41.311	15.386
Airtel Africa PLC	2022Q3	5.364	272.587	73.796	14.994
Airtel Africa PLC	2022Q4	19.710	33.032	31.482	50.070
Airtel Africa PLC	2023Q1	14.165	379.803	24.285	13.225
Airtel Africa PLC	2023Q2	11.194	644.070	57.791	79.639
Airtel Africa PLC	2023Q3	15.206	10.801	78.025	32.707
Airtel Africa PLC	2023Q4	11.457	963.690	98.308	88.532
MTN Nigeria Comm. PLC	2017Q1	13.770	441.958	47.707	69.290
MTN Nigeria Comm. PLC	2017Q2	10.553	636.056	34.437	26.512
MTN Nigeria Comm. PLC	2017Q3	6.603	302.395	54.951	79.527
MTN Nigeria Comm. PLC	2017Q4	18.520	68.237	14.080	75.646
MTN Nigeria Comm. Plc	2018Q1	12.192	527.154	87.911	93.355
MTN Nigeria Comm. Plc	2018Q2	3.324	905.907	18.349	88.773
MTN Nigeria Comm. Plc	2018Q3	15.229	314.745	71.690	15.981
MTN Nigeria Comm. Plc	2018Q4	9.583	842.004	40.854	13.087
MTN Nigeria Comm. PLC	2019Q1	11.636	215.427	76.434	38.620
MTN Nigeria Comm. PLC	2019Q2	14.411	125.381	43.336	71.337
MTN Nigeria Comm. PLC	2019Q3	16.720	101.974	94.056	74.154
MTN Nigeria Comm. PLC	2019Q4	14.518	124.388	9.943	41.257
MTN Nigeria Comm. PLC	2020Q1	12.886	250.889	97.114	19.676
MTN Nigeria Comm. PLC	2020Q2	3.430	582.567	42.339	82.275
MTN Nigeria Comm. PLC	2020Q3	11.485	642.249	39.747	86.865
MTN Nigeria Comm. PLC	2020Q4	2.522	554.569	46.417	97.386
MTN Nigeria Comm. PLC	2021Q1	6.446	891.161	89.790	14.614
MTN Nigeria Comm. PLC	2021Q2	1.457	3.347	93.958	53.518
MTN Nigeria Comm. PLC	2021Q3	15.782	922.521	80.267	14.147
MTN Nigeria Comm. PLC	2021Q4	3.386	285.071	28.095	84.730
MTN Nigeria Comm. PLC	2022Q1	12.957	899.589	70.885	17.199
MTN Nigeria Comm. PLC	2022Q2	10.391	77.353	13.095	24.032
MTN Nigeria Comm. PLC	2022Q3	4.862	171.922	13.716	70.852
MTN Nigeria Comm. PLC	2022Q4	12.992	958.825	94.940	33.217
MTN Nigeria Comm. PLC	2023Q1	18.026	727.033	17.975	64.223
MTN Nigeria Comm. PLC	2023Q2	7.263	418.634	98.749	75.311
MTN Nigeria Comm. PLC	2023Q3	14.262	324.879	63.055	66.639
MTN Nigeria Comm. PLC	2023Q4	16.717	24.982	43.463	10.045