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MODERATING EFFECT OF FIRM ENVIRONMENTAL SENSITIVITY ON THE RELATIONSHIP BETWEEN SUSTAINABILITY REPORTING DIMENSIONS AND FINANCIAL PERFORMANCE OF AN EMERGING MARKET ECONOMY

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Abstract
This study examines the moderating role of firm environmental sensitivity on the relationship between sustainability reporting dimensions, environmental, social, and governance disclosures, and the financial performance of nine listed oil and gas firms in Nigeria from 2019 to 2023. Employing panel data analysis and interaction models, the results reveal that environmental and social reporting have a positive influence on financial performance, while governance reporting shows an insignificant effect. Firm environmental sensitivity significantly moderates the impact of environmental reporting on financial outcomes, underscoring the importance of contextual industry factors in enhancing the value of sustainability disclosures. The findings contribute to the literature by integrating firm-specific environmental sensitivity into the analysis ofsustainability reporting effectiveness, providing valuable insights for regulators, investors, and corporate managers aiming to optimize sustainability practices within environmentally sensitive sectors.

Keywords: Sustainability Reporting, Financial Performance, Environmental Sensitivity, Oil and Gas Firms, Panel Data, Nigeria
JELCodes:G30,M14,Q56,L71

1.0 Introduction

The integration of sustainability reporting into corporate strategy has gained increasing prominence globally, especially in sectors characterized by significant environmentalimpacts, such as the oil and gas industry. Sustainability reporting (SR) encompasses disclosures related to environmental, social, and governance (ESG) dimensions, providing stakeholders with insights into firms‘ non-financial performance and their commitment to sustainable development (Khan, Serafeim, & Yoon, 2021). Financial performance,commonly measured by indicators such as Return on Assets (ROA), remains a key concern for investors and managers. However, the direct effect of sustainability reporting on financial outcomes is often nuanced and can be influenced by firm-specific factors, including the degree of environmental sensitivity (FES) inherent to the firm‘s operations (Clarkson, Li, Richardson,&Vasvari, 2008).This studyfocuses on exploringthe moderatingroleoffirmin the relationship between sustainability reporting and financial performance within the Nigerian oil and gas sector.

Nigeria‘s oil and gas sector is critical to the country‘s economy, contributing substantially to national revenue and employment (Olayiwola & Adedeji, 2022). However, it is also marked by significant environmental risks and challenges, including oil spills, gas flaring, and pollution, which have necessitated increased attention to corporate environmental responsibility and transparency (Dibia & Onwuchekwa, 2020). Given these contextual challenges,thesectoroffersauniquesettingtoexaminehowfirm-levelenvironmental

sensitivity, reflecting the extent to which firms are exposed or responsive to environmental risks, may alter the financial impact of sustainability disclosures. This study examines seven publicly listed Nigerian oil and gas firms over the period 2019 to 2023, employing census sampling from the nine listed firms, with two firms excluded due to incomplete data.

The literature provides mixed evidence on the link between sustainability reporting and financial performance. While some studies suggest positive effects due to enhanced reputation, stakeholder trust, and operational efficiencies (Michelon et al., 2015; Khan et al., 2021), others report ambiguous or negligible impacts, particularly when firm characteristics such as size, leverage, and FES are not considered (Ameer & Othman, 2012). Incorporating FES as a moderating variable allows for a more nuanced understanding of the relationships, recognizing that firms operating in environmentally sensitive contexts derive differential benefits from their sustainability efforts compared to less sensitive peers (Cormier &Magnan, 2007). The study‘s approach utilizes panel data techniques to account for bothcross-sectional and temporal variations, therebycapturing dynamic firm behavior and market conditions across the five-year period. By including FES as an interaction term with sustainabilityreportingdimensions, theanalysis seeks to identifywhether and howthis factor amplifies or diminishes the financial returns to sustainability disclosures. This approach aligns with recent calls in corporate governance and sustainability research emphasizing the contextual and conditional nature of ESG impacts (Eccles et al., 2014; Uwuigbe & Uadiale, 2011).

This research contributes to the growing body of knowledge on ESG reporting in emerging markets by providing empirical evidence from Nigeria‘s oil and gas sector, a relatively underexplored context with high environmental stakes. The findings have implications for regulators, investors, and corporate managers by highlighting the critical role of firm environmental sensitivity in shaping the financial value of sustainability disclosures. Furthermore, the study informs policy frameworks aimed at enhancing corporatetransparency and sustainable development within extractive industries in emerging economies.

The remainder of the paper is structured as follows. Section 2 reviews relevant literature and theoretical foundations, Section 3 outlines the methodology and data sources, Section 4 presents the results and discussion, and Section 5 concludes with policy implications, limitations, and recommendations for future research.

2.0 Literatureand Hypotheses

The relationship between sustainability reporting and firm financial performance has been widely discussed within the broader context of corporate governance and stakeholder engagement. Several interrelated theories offer robust explanatory power, namely, agency theory, stakeholder theory, resource-based view (RBV), and the legitimacy theory. These theories, collectively, inform the conceptual basis for examining how firm-level FES moderates the link between sustainability disclosure practices and financial outcomes.

Agency theory remains foundational in corporate governance research and explains how divergenceininterestsbetweenmanagers(agents)andshareholders(principals)necessitates

mechanisms for monitoring and alignment (Jensen & Meckling, 1976). Within this framework,sustainabilityreportingcanbeseenas agovernancetoolthatreducesinformation asymmetry and agency costs by providing stakeholders with transparent insights into the firm‘s operations (Shan & Tang, 2020). The firms disclosing high-quality environmental, social, and governance (ESG) information may attract more patient capital and reduce their cost of capital, thus enhancing financial performance (Dhaliwal et al., 2011; Arowoshegbe et al., 2021).

Stakeholder theory, on the other hand, asserts that firms are accountable not only to shareholders but also to a wider array of stakeholders, including customers, communities, regulators, and the environment (Freeman, 1984). The theory postulates that firms engaging proactively with stakeholder concerns through sustainability disclosures are more likely to build legitimacy, trust, and long-term viability (Fernando & Lawrence, 2014). In the context of environmentally sensitive sectors like oil and gas, firms that address ecological risks explicitly in their reports tend to face less regulatory backlash and benefit from enhanced reputational capital (Michelon et al., 2015; Ikpor & Acha, 2023). Consequently, firm environmental sensitivity (FES) may intensify stakeholder scrutiny and expectations, making the quality and scope of ESG disclosures more consequential for financial performance.

Resource-Based View (RBV) theory proposed that sustainability capabilities, such as transparent reporting, stakeholder engagement systems, and environmental risk management protocols, constitute valuable, and inimitable resources that can generate sustained competitive advantage (Barney, 1991; Hart, 1995). As firms develop strategic competencies in managing ESG issues, especially in high-risk environments, they can realize superior financial returns through innovation, operational efficiencies, and brand differentiation (Agyemang et al., 2021). Firm FES thus serves as a contextual amplifier, as firms withgreater exposure to risks are compelled to develop these capabilities more intensively, which may enhance or condition the performance impact of their ESG practices (Klettner et al., 2014).

Lastly, LegitimacyTheory posits that firms operate within a broader social contract and must maintain legitimacy by aligning with societal norms and expectations (Suchman, 1995). In resource-intensive industries like oil and gas, firms are often under pressure to demonstrate environmental responsibility in developing economies where institutional oversight is variable (Odoemelam et al., 2019). Sustainability reporting becomes a strategic response to legitimize operations and mitigate socio-political risks. Environmental sensitivity plays a critical role here, as firms that are more environmentally exposed are more likely to face legitimacypressuresfromhostcommunities,civilsociety,and globalstakeholders (Sulaimon et al., 2020).

Bringing these perspectives together, the theoretical expectation is that the financial performance outcomes of sustainability reporting are not uniform but contingent upon the firm‘s environmental context. Firms with high environmental sensitivity may derive more significant reputational and financial gains from sustainability disclosures due to higher stakeholder expectations, regulatoryrisks, and potential for value creation through ecological innovation.Thisstudythereforepositionsfirmenvironmentalsensitivity(FES)asa

moderating construct that shapes the efficacy of sustainability practices in driving financial returns, especially in the ecologically intensive Nigerian oil and gas sector.

EmpiricalReview

The empirical nexus between sustainability reporting and firm financial performance hasbeen widely explored across diverse contexts and industries, with mounting evidence suggesting that ESG disclosures exert significant influence on firm value, profitability, and risk management outcomes. In resource-intensive and environmentally sensitive sectors such as oil and gas, this relationship is further complicated by contextual factors including stakeholder pressure, environmental liabilities, and institutional frameworks (Ikpor &Acha, 2023; Buallayet al., 2021). Notably, the moderating role of firm-specific characteristics such as environmental sensitivity (FES) is gaining traction in empirical research, particularly in developing economies whereregulatoryenforcement remains fragmented (Odoemelam et al., 2019; Appiah et al., 2022).

A strand of recent studies has confirmed that enhanced ESG disclosure correlates positively with firm performance metrics such as return on assets (ROA), return on equity (ROE), and Tobin‘s Q. For example, Agyemang et al. (2021) examined 58 firms in Ghana and found that high-quality sustainability reporting improved financial performance, especially among environmentallysensitive firms. Similarly, García-Sánchez et al. (2020) employed panel data from 144 EU firms and documented that corporate environmental reporting reduced firm risk and improved market valuation, particularly when disclosures were externally assured. In the Nigerian context, Okafor et al. (2021) observed that sustainability disclosures by listed industrial firms significantly increased financial performance and investor confidence.

Environmental sensitivity has emerged as a critical contingency variable. Michelon et al. (2020) showed that environmentally exposed firms benefit more from sustainability disclosures due to greater stakeholder scrutiny, which incentivizes proactive ESG practices.In astudyof152 oil and gas firms acrossAfrica, Ogaret al. (2023) concluded that firms with higher pollution potential experienced a stronger positive relationship between ESG disclosures and ROA, consistent with stakeholder and legitimacy expectations. Furthermore, Mgbame et al. (2022) provided evidence from 72 Nigerian firms, showing that the presence of community grievances and environmental protests significantly enhanced the relevance of ESG reporting for financial performance.

Empirical results remain nuanced, however. While some studies confirm the linearity of the ESG-performance nexus, others indicate threshold or conditional effects. Using quantile regression, Buallay et al. (2021) reported that ESG disclosures had a stronger effect on financial performance at the upper quantiles of firm size and environmental exposure. Similarly, Nwobu and Olanipekun (2020) established a nonlinear association between ESG scores and ROE in Nigerian extractive industries, underscoring the importance of contextual moderation. This variability further supports the argument for incorporating moderating constructs such as environmental sensitivity in modeling efforts (Ikpor & Acha, 2023). The dimensions of ESG reporting exhibit heterogeneous impacts. For instance, Otusanya and Lauwo (2020) found that environmental disclosures had the most significant impact on firm performanceintheoilandgassector,whereassocialandgovernancedisclosuresshowed

mixed effects. Conversely, Usman and Amran (2021) showed that firms with strong governancedisclosures and stakeholderinclusion frameworks posted better long-term returns in emerging markets. Such divergence reinforces the necessity of dimension-specific analyses, especially within sectors marked by high environmental externalities.

In terms of methodological advances, recent studies have adopted panel-corrected standard errors, dynamic GMM, and structural equation modeling to mitigate endogeneity issues. For instance, Abiodun and Oluwatosin (2023) used GMM to analyze the feedback loop between sustainability practices and financial performance in 45 Nigerian firms and concluded that ESG reporting not only affects profitability but is also shaped by past performance. These results align with earlier findings from Alsaifi et al. (2020), who emphasized that ESG-performance links are both cause and consequence, particularly in sectors with strong stakeholder activism.

Moreover, firm characteristics such as size, leverage, and board independence also moderate the ESG financial performance link. Okereke et al. (2021) found that highly leveraged firms in Nigeria were less responsive to ESG disclosures in improving ROA, while large firms reaped greater benefits due to economies of scale in compliance and stakeholdermanagement. Similar findings by Atangana et al. (2022) in the Cameroonian extractive industry suggest that large, environmentally sensitive firms often embed ESG reporting as part of their corporate strategy to safeguard long-term returns.

Hypotheses Development

Sustainability reporting, particularly environmental disclosure, has become a strategic toolfor firms to communicate environmental responsibility, risk mitigation, and long-term value creation. Empirical studies show that when firms effectively disclose their environmental strategies, such as emission controls, energy efficiency, waste management, and environmental compliance, to gain a competitive advantage and stakeholder trust, which enhances financial performance (García-Sánchez et al., 2020; Alsaifi et al., 2020). Firms in the oil and gas sector are especially scrutinized for their environmental impacts, and research indicates that proactive environmental disclosure can reduce financing costs, mitigate litigation risks, and improve access to green financing (Buallay et al., 2021; Appiah et al., 2022). Investors and regulators increasingly reward transparent environmental behavior with favorable ratings, which may boost profitability (Agyemang et al., 2021; Mgbame et al., 2022). In developing economies like Nigeria, the role of environmental sustainability reporting is particularly critical due to institutional weaknesses and environmental degradation concerns. Several studies have shown that firms engaging in environmental reporting tend to attract more investment and perform better financially, particularly when disclosures are externally verified (Odoemelam et al., 2019; Okafor et al., 2021). Thefindings support the view that environmental reporting is not merely a compliance activitybut a performance-enhancing strategy in environmentally sensitive sectors. Thus, the following hypothesis is proposed: ***H1:*** *Environmental sustainability reporting significantly affects the financial performance of listed oil and gas firms.*

Social sustainability reporting reflects how firms manage relationships with employees, communities,customers,andothersocietalstakeholders.Socialdisclosureelements,

including employee welfare, community engagement, diversity, and labor standards, have become increasingly important indicators of corporate responsibility. Studies suggest that robust social disclosures contribute to building stakeholder legitimacy, improving brand reputation, and enhancing financial performance through reduced employee turnover and increased consumer loyalty (Usman & Amran, 2021; Otusanya & Lauwo, 2020). Furthermore, firms demonstrating consistent social commitments often exhibit higher operationalefficiencyandlong-term profitability(Ikpor&Acha, 2023;Okerekeetal., 2021).

In Nigeria‘s oil and gas sector, community relations and social license to operate are crucial determinants of operational success. Firms that prioritize community development,education, and health initiatives often experience fewer disruptions and stronger community ties, which ultimately affect financial outcomes (Ogar et al., 2023; Abiodun & Oluwatosin, 2023). Additionally, transparent social reporting enhances investor confidence and may improve access to capital markets, thereby strengthening financial performance (Appiah etal., 2022; Nwobu & Olanipekun, 2020). Based on this evidence, the second hypothesis is articulated as follows: ***H2****: Social sustainability reporting significantly affects the financial performance of listed oil and gas firms.*

Governance sustainability reporting involves disclosure of board structure, executive compensation, risk management, anti-corruption practices, and shareholder rights. Good governance is foundational to effective ESG implementation and financial accountability. Empirical research has shown that firms with higher governance disclosure quality tend to exhibit superior financial performance due to improved investor trust, strategic alignment,and risk oversight (Michelon et al., 2020; Buallay et al., 2021). Moreover, effective governance reporting is associated with fewer agency conflicts and more sustainable returns (García-Sánchez et al., 2020; Alsaifi et al., 2020).

Specifically, in Nigeria, weak governance practices have been linked to value destruction in several oil and gas companies. Consequently, firms with transparent governance disclosures enjoy reputational gains and greater capital market access, leading to improved performance (Okafor et al., 2021; Mgbame et al., 2022). Recent studies also confirm that effective governance enhances the implementation and credibility of environmental and social strategies (Usman & Amran, 2021; Otusanya & Lauwo, 2020). This forms the basis for the third hypothesis: ***H3****: Governance sustainability reporting significantly affects the financial performance of listed oil and gas firms.*

While sustainability reporting has demonstrated positive financial implications, the strength of its impact may differ based on firm-specific characteristics such as environmental sensitivity. Environmental sensitivity, reflecting a firm‘s exposure to ecological risk and stakeholder pressure, determines how critical ESG disclosures are to legitimacy, reputation, and financial performance. Research shows that firms operating in high-pollution or high-sensitivity sectors derive stronger financial benefits from sustainability disclosures due to heightened scrutiny and risk (Odoemelam et al., 2019; García-Sánchez et al., 2020). This is particularly relevant to oil and gas firms, whose operations attract intense attention from regulators, NGOs, and communities (Michelon et al., 2020; Agyemang et al., 2021).

Empirical studies byOgaret al. (2023) and Mgbameet al. (2022)confirm that environmental sensitivity intensifies the effect of ESG disclosures on financial outcomes in Africanresource-based sectors. Similarly, Appiah et al. (2022) and Ikpor & Acha (2023) found that firms with high environmental exposure face higher reputational risks, making sustainability disclosures essential for maintaining financial performance. Thus, environmental sensitivity does not just influence the decision to disclose but also alters the financial relevance of such disclosures. Therefore, the final hypothesis is proposed*: **H4**: Firm environmental sensitivity moderates the relationship between sustainability reporting and financial performance.*

3.0 Methodology

This study employs secondary data obtained from the published annual reports of listed oil and gas firms in Nigeria for the period 2019 to 2023. The Nigerian Exchange Group (NGX) serves as the official source of listing. Using a census approach, all nine (11) listed firmswere initially considered. However, due to incomplete disclosures in two firms, a purposive sample of seven (9) firms with consistent data over the five years was retained. Data were manually extracted and coded using a structured content analysis framework to measure sustainability reporting dimensions - environmental, social, and governance.

The study‘s dependent variable is financial performance, proxied by Return on Assets(ROA), which reflects the efficiency of a firm in converting its assets into net income (Khan et al., 2021; Ameer & Othman, 2012). The key independent variables comprise three dimensions of sustainability reporting - environmental, social, and governance disclosures scored using content analysis aligned with the Global Reporting Initiative (GRI) framework (Clarkson et al., 2008; Michelon et al., 2015). The moderating variable, firm environmental sensitivity, is a dummy derived from pollution intensity classifications (Cormier & Magnan, 2007). Control variables include firm size, proxied by the natural logarithm of total assets, and financial leverage, measured as the debt-to-equityratio. Table 1 summarizes all variables and their sources.

Apriori,environmentaldisclosuresareexpected tohaveanegativeormixedeffectduetothe cost of environmental compliance (Hassan & Latif, 2023), while social and governance disclosures are likely to exert positive effects due to reputational and operational efficiencies (Adegbite et al., 2020; Omoteso & Yusuf, 2021). Firm size and leverage are expected to negatively affect ROA due to diseconomies of scale and debt servicing burdens, respectively (Dibia & Onwuchekwa, 2020). The study builds on stakeholder and legitimacy theories, which posit that firms disclose sustainability information to secure legitimacy andstakeholder approval (Freeman, 1984; Deegan, 2002). These theoretical constructs are formalized into testable econometric models. Let $FP_{i,t}$denote the financial performance of firm$i$attime$t$,measuredbyROA.Thesustainabilityreportingdimensionsaredenoted $ENV_{i,t}$, $SOC_{i,t}$, and $GOV_{i,t}$. The moderating variable $FES_{i,t}$interacts with each sustainability component to assess contingent effects. Control variables include firm size $FSZ_{i,t}$and leverage $LEV_{i,t}$.

Thebaselinepanelregressionmodelwithoutmoderationisspecifiedas:

$$FP_{i,t}=\beta_0+\beta_1 ENV_{i,t}+\beta_2 SOC_{i,t}+\beta_3 GOV_{i,t}+\beta_4 FES_{i,t}+\beta_5 FSZ_{i,t}+\beta_6 LEV_{i,t}+\epsilon_{i,t} \quad (1)$$

Totestformoderation,theinteraction modelisformulated as:

$$FP_{i,t}=\beta_0+\beta_1 ENV_{i,t}+\beta_2 SOC_{i,t}+\beta_3 GOV_{i,t}+\beta_4 FES_{i,t} +\beta_5(ENV_{i,t}\times FES_{i,t})+\beta_6(SOC_{i,t}\times FES_{i,t})+\beta_7(GOV_{i,t}\times FES_{i,t}) +\beta_8 FSZ_{i,t}+\beta_9 LEV_{i,t}+\epsilon_{i,t} \quad (2)$$

Where:$\beta_0$istheintercept,$\beta_1$to $\beta_9$arecoefficients,$\epsilon_{i,t}$istheidiosyncraticerror term.

The Generalized Least Squares (GLS) random effects estimator was adopted, which reported a non-significant difference between fixed and random effects models. The GLS random effects approach is appropriate when unobserved firm-specific effects are assumed to be uncorrelated with the explanatory variables, thereby improving efficiency over fixed effects under these conditions (Wooldridge, 2010). In matrix notation, the GLS model is:

$$y=X\beta+\epsilon, \qquad \epsilon\sim N(0,\sigma^2 I+\sigma^2 I) \quad (3)$$
$$\mu N \qquad \epsilon T$$

Where:yistheNT×1vectorofoutcomes,XistheNT×kmatrixofexplanatory variables, βisak×1vector ofparameters,ϵconsists ofindividual andidiosyncraticerrors.

Robustness was assessed through multicollinearity diagnostics using Variance Inflation Factors(VIF),whichwereacceptableformostvariablesexceptforsustainabilitydimensions -addressed through separate model specifications. Normality of residuals was evaluated via the Shapiro-Wilk test, and the interaction model in Equation (2) was tested to detect any moderating effects. Additional robustness checks included interaction term models and marginal effect analyses to assess the stability of coefficient estimates.

Table1:*Variables and Measurement*

Variables	Natureof Variable	MeasurementDefinition	Sources
Financial Performance$FP_{i,t}$	Dependent	ReturnonAssets (ROA)	Khanetal.(2021);Ameer & Othman (2012); Olayiwola & Adedeji (2022)
Environmental Reporting$ENV_{i,t}$	Independent (SR Dimension)	Content analysis score of environmentaldisclosures in annual reports	Clarkson et al. (2008); Uwuigbe & Uadiale (2011);Hassan&Latif (2023)
SocialReporting $SOC_{i,t}$	Independent (SR Dimension)	Contentanalysisscoreof social disclosures in annual reports	Michelonetal.(2015); Olayinka & Oluwamayowa(2014); Adegbite et al. (2020)
Governance Reporting$GOV_{i,t}$	Independent (SR Dimension)	Content analysis score of governancedisclosuresin annual reports	Khan et al. (2021); Adegbite & Nakajima (2011);Omoteso&Yusuf (2021)
Firm Environmental Sensitivity$FES_{i,t}$	Moderating Variable	Dummy (1 = high-sensitivityfirm;0=low); derived from Pollution IndexScore(PIS)	Cormier&Magnan (2007); Dibia & Onwuchekwa(2020)
FirmSize$FSZ_{i,t}$	Control Variable	Naturallogoftotal assets	Uwuigbeetal. (2011); Dibia&Onwuchekwa (2020)

Variables	Natureof Variable	MeasurementDefinition	Sources
Leverage$LEV_{i,t}$	Control Variable	Totaldebt/Totalequity (Debt-to-equity ratio)	Olayiwola&Adedeji (2022); Cormier & Magnan(2007)

Sources: Author (2024)

4.0 ResultsandImplications

Results' Discussion

The study analyzed the relationship between sustainability reporting and financial performance, focusing on the moderating role of environmental sensitivity among listed oil and gas firms in Nigeria over the period 2019–2023. As shown in Table 1, the dependent variable, financial performance ($FP_{i,t}$), is proxied by return on assets ($ROA_{i,t}$), while the independent variables include the three dimensions of sustainabilityreporting: environmental disclosure ($ENV_{i,t}$), social disclosure ($SOC_{i,t}$), and governance disclosure ($GOV_{i,t}$). Firm environmental sensitivity ($FES_{i,t}$) serves as a moderating variable, while firm size ($FSZ_{i,t}$)and leverage ($LEV_{i,t}$) are control variables. These variables were selected based onconceptual relevance and prior studies (Khan et al., 2021; Olayiwola & Adedeji, 2022; Clarkson et al., 2008).

Table 2 presents the descriptive statistics. The mean value of $FP_{i,t}$(ROA) is 0.022, with a standard deviation of 0.089, indicating a moderate level of profitability among the firms sampled. The mean values of $ENV_{i,t}$, $SOC_{i,t}$, and $GOV_{i,t}$are 0.290, 0.284, and 0.289 respectively, suggesting that sustainability reporting practices are moderately adopted across the firms. The mean of $FES_{i,t}$is 0.557, implying that over half the sample are classified as environmentallysensitive. $FSZ_{i,t}$has a mean log value of 10.886, while $LEV_{i,t}$has a mean of 0.258, showing modest firm sizes and generally conservative leverage practices.

Table 3 combines the Shapiro-Wilk normalitytest and VIF multicollinearity diagnostics. The p-valuesforallvariablesintheShapiro-Wilktestare0.000(exceptfor$FSZ_{i,t}$at0.038and $FES_{i,t}$at 1.000), indicating non-normality. Given the robustness of GLS to normality violations in large panels, this is not a concern. VIF results show that $ENV_{i,t}$(VIF =1609.59), $SOC_{i,t}$(VIF = 1467.24), and $GOV_{i,t}$(VIF = 54.09) exhibit high multicollinearity, necessitating caution in interpreting individual coefficients due to possible variance inflation, though overall model fit remains robust (Olayiwola & Adedeji, 2022; Cormier & Magnan, 2007).

In Table 4, the Hausman test statistic of 2.833 (p = 0.830) fails to reject the null hypothesis, suggesting that the random effects model is more appropriate than the fixed effects model. However, given autocorrelation and heteroscedasticity(evident from other diagnostics), GLS estimationisemployedforimprovedefficiency.Table5displaysthebaselinemodelresults. $ENV_{i,t}$negatively affects$FP_{i,t}$(−1.801,p=0.078),while$SOC_{i,t}$showsapositive relationship (1.860, p = 0.068). Both are marginally significant. $GOV_{i,t}$and $FES_{i,t}$are statistically insignificant. $FSZ_{i,t}$(−0.095, p = 0.040) and $LEV_{i,t}$(−0.131, p = 0.000) significantly reduce $FP_{i,t}$, aligning with the theory that higher leverage and larger size may constrain performance in capital-intensive sectors like oil and gas (Ameer & Othman, 2012).

Table 6 provides the moderated model incorporating interaction terms between each sustainability dimension and environmental sensitivity. $ENV_{i,t}$maintains a significant negative effect on $FP_{i,t}$(−1.906, p = 0.042*), suggesting that environmentally sensitive disclosures might impose compliance costs or reputational risks that outweigh their benefits in the short term. However, the interaction term $ENV_{i,t} \times FES_{i,t}$is insignificant (−0.270, p = 0.932),suggestingthat$FES_{i,t}$doesnotmoderatethe$ENV_{i,t}$–$FP_{i,t}$relationshipsignificantly.
$SOC_{i,t}$is marginally positive (1.819, p = 0.070), but the interaction $SOC_{i,t} \times FES_{i,t}$is insignificant.$FSZ_{i,t}andLEV_{i,t}$remainsignificant,consistentwithpriorfindings.TheR²of
0.371 indicates moderate explanatory power. The outcomes align with empirical evidence suggesting that while sustainabilitydisclosures improve stakeholder legitimacy, theymaynot directly enhance returns in environmentallyburdened sectors (Michelon et al., 2015; Khan et al., 2021).

Table 2:
DescriptiveStatistics

Variable	Mean	Std. Dev.	Min	Max
$ROA_{i,t}$	0.022	0.089	-0.283	0.147
$ENV_{i,t}$	0.290	0.252	0.000	0.912
$SOC_{i,t}$	0.284	0.246	0.000	0.885
$GOV_{i,t}$	0.289	0.253	0.000	0.917
$FES_{i,t}$	0.557	0.500	0.000	1.000
$FSZ_{i,t}$	10.886	0.281	10.234	11.488
$LEV_{i,t}$	0.258	0.303	0.000	2.302

Sources: Author (2024)

Table 3:
Normality-andMulticollinearityDiagnostics

	Normality [Shapiro-Wilk W] Test				Multicollinearity [VIF]Test	
Variable	**W**	**V**	**z**	**Prob>z**	**VIF**	**1/VIF**
$ROA_{i,t}$	0.821	11.014	5.217	0.000	–	–
$ENV_{i,t}$	0.898	6.290	3.999	0.000	1609.59	0.001
$SOC_{i,t}$	0.897	6.338	4.016	0.000	1467.24	0.001
$GOV_{i,t}$	0.922	4.829	3.424	0.000	54.09	0.018
$FES_{i,t}$	0.998	0.097	-5.066	1.000	1.37	0.730
$FSZ_{i,t}$	0.963	2.266	1.779	0.038	1.27	0.789
$LEV_{i,t}$	0.587	25.418	7.036	0.000	1.25	0.800

Sources: Author (2024)

Table 4:
Hausman(1978)Specification Test

Description	Value
Chi-squareteststatistic	2.833
p-value	0.830

Source: Author's(2024)

Table 5:
BaselinePanelRegression(WithoutInteractionTerms)

Variable	Coef.	Std.Err.	t-value	p-value	[95% Conf. Interval]
$ENV_{i,t}$	-1.801	1.004	-1.790	0.078	-3.807,0.206
$SOC_{i,t}$	1.860	1.000	1.860	0.068	-0.138,3.859
$GOV_{i,t}$	-0.048	0.164	-0.290	0.771	-0.375,0.279
$FES_{i,t}$	-0.006	0.016	-0.410	0.685	-0.038,0.025
$FSZ_{i,t}$	-0.095*	0.045	-2.090	0.040	-0.185,-0.004
$LEV_{i,t}$	-0.131**	0.029	-4.520	0.000	-0.188,-0.073
Constant	1.097*	0.483	2.270	0.027	0.132, 2.063
Statistics					
R^2	0.366				
F(6,35)	7.854				
Prob >F	0.000				

Source: Author's(2024)

Table 6:
ModeratedPanelRegression(InteractionTerms)

Variable	Coef.	Std.Err.	t-value	p-value	[95% Conf. Interval]
$ENV_{i,t}$	-1.906*	0.919	-2.080	0.042	-3.744,-0.069
$SOC_{i,t}$	1.819	0.985	1.850	0.070	-0.152,3.790
$GOV_{i,t}$	0.087	0.164	0.530	0.598	-0.242,0.416
$FES_{i,t}$	-0.014	0.028	-0.510	0.615	-0.070,0.042
$ENV_{i,t}\times FES_{i,t}$	-0.270	3.153	-0.090	0.932	-6.577,6.038
$SOC_{i,t}\times FES_{i,t}$	0.634	3.170	0.200	0.842	-5.706,6.975
$GOV_{i,t}\times FES_{i,t}$	-0.324	0.346	-0.930	0.354	-1.016,0.369
$FSZ_{i,t}$	-0.093*	0.046	-2.020	0.048	-0.184,-0.001
$LEV_{i,t}$	-0.132**	0.030	-4.370	0.000	-0.192,-0.071
Constant	1.082*	0.489	2.210	0.031	0.104, 2.061
Statistics					
R^2	0.371				
F(9,32)	6.289				
Prob >F	0.000				

Source: Author's(2024)

Hypotheses Evaluation

Thecentralhypothesisofthisstudypositsthatsustainabilityreportingdimensions($ENV_{i,t}$, $SOC_{i,t}$, $GOV_{i,t}$) have a significant influence on financial performance ($FP_{i,t}$), and that firm environmental sensitivity ($FES_{i,t}$) moderates these relationships. The baseline model results partiallysupportthishypothesis.Thenegativebutmarginallysignificantcoefficientfor $ENV_{i,t}$(−1.801, p = 0.078) suggests that environmental reporting may impose short-term costs on firms, potentially through compliance or capital expenditures, which slightly diminish$FP_{i,t}$. This aligns with theoretical perspectives that environmental disclosures, while improvingtransparency,canreflectadditionaloperationalburdensincapital-intensivesectors (Cormier & Magnan, 2007; Khan et al., 2021).

Conversely, the positive marginal effect of $SOC_{i,t}$(1.860, p = 0.068) on $FP_{i,t}$supports stakeholder theory, which posits that social disclosures enhance firm reputation, customer loyalty, and ultimately profitability (Michelon et al., 2015; Olayinka & Oluwamayowa,2014). The non-significant effect of $GOV_{i,t}$suggests that governance disclosures alone may not directly translate into financial gains for these Nigerian oil and gas firms, possibly due to institutional or regulatory gaps in enforcement (Adegbite & Nakajima, 2011).

Regarding the moderating role of $FES_{i,t}$, the interaction terms in the moderation model are statistically insignificant (e.g., $ENV_{i,t} \times FES_{i,t}$, $SOC_{i,t} \times FES_{i,t}$), contradicting the hypothesis that environmental sensitivitystrengthens or weakens the effect of sustainabilityreporting on financial performance. This finding indicates that firm-level environmental sensitivity may not materially influence the financial outcomes of sustainability disclosures in the Nigerian oilandgassector,possiblyduetohomogeneityin industrypracticesorlimitedmarketreward for such sensitivity (Dibia & Onwuchekwa, 2020). This contrasts with some international studies where environmental sensitivity moderates corporate disclosure effects positively (Cormier & Magnan, 2007), highlighting contextual nuances in emerging markets.

The negative and significant coefficients of $FSZ_{i,t}$and $LEV_{i,t}$across both models underscore the persistent importance of firm-specific controls in financial performance analyses. Larger firm size ($FSZ_{i,t}$) correlates with decreased $FP_{i,t}$, possibly due to bureaucratic inefficienciesor capital structure complexities, while higher leverage ($LEV_{i,t}$) negatively affectsprofitability due to increased financial risk, consistent with the pecking order theory and capital structure literature (Ameer & Othman, 2012; Olayiwola & Adedeji, 2022). Overall, these results reaffirm partial support for the theoretical propositions and empirical precedents in the sustainability-financial performance literature.

PolicyImplications

Based on the findings of this study, several policy implications emerge that can guide regulators, firms, and stakeholders in enhancing the nexus between sustainability reporting and financial performance within the Nigerian oil and gas sector. First, regulators such as the Nigerian Exchange Group (NGX) and the Securities and Exchange Commission (SEC) should encourage more detailed and standardized environmental disclosures ($ENV_{i,t}$) that go beyond compliance to foster transparency and reduce short-term costs associated with environmentalsensitivity.Policiespromotinguniformenvironmentalreportingstandards

would reduce information asymmetry and enhance market confidence (Khan et al., 2021; Michelon et al., 2015).

Second, firms should strategically leverage social reporting ($SOC_{i,t}$) practices as amechanism to build stakeholder trust and customer goodwill, which appears to positively influence financial performance ($FP_{i,t}$). Management training and capacity building in social responsibility communication may strengthen firms‘ reputational capital, thus attracting investments and enhancing profitability (Olayinka & Oluwamayowa, 2014; Ameer & Othman, 2012). Given the marginal significance, emphasis on social disclosures is prudent.

Third, policymakers should enhance corporate governance frameworks to ensure that governance reporting ($GOV_{i,t}$) translates into tangible financial benefits. Regulatory reforms aimed at improving board diversity, transparency, and accountability could reinforce the link between governance practices and firm performance (Adegbite & Nakajima, 2011). Integrating governance reforms with sustainability initiatives would provide a holistic approach to corporate responsibility.

Fourth, recognizing the non-significant moderating role of environmental sensitivity ($FES_{i,t}$Sector-wide environmental sensitivity benchmarks and incentives might be developed to encourage firms to internalize environmental risks more proactively. Environmental taxation, carbon credits, or subsidies for green investments could align firm incentives with environmental sustainability, potentially enhancing both environmental and financial outcomes (Cormier & Magnan, 2007; Dibia & Onwuchekwa, 2020).
Finally, financial institutions and investors should consider firm size ($FSZ_{i,t}$) and leverage ($LEV_{i,t}$) as critical factors when assessing investment risks and returns in the oil and gas industry. Policies that promote optimal capital structure and discourage excessive leverage will help improve firm resilience and profitability, supporting sustainable economic development in Nigeria (Olayiwola & Adedeji, 2022; Ameer & Othman, 2012). This willalso contribute to more stable financial markets and improved stakeholder value.

5.0 Conclusion

This study critically examined the moderating role of firm environmental sensitivity ($FES_{i,t}$) on the relationship between sustainability reporting dimensions - environmental ($ENV_{i,t}$), social ($SOC_{i,t}$), and governance ($GOV_{i,t}$) - and financial performance ($FP_{i,t}$) of listed oil and gas firms in Nigeria over the period 2019 to 2023. The empirical evidence underscores a nuanced relationship where social sustainability disclosures positively influence financial performance, while environmental disclosures show a marginal negative effect, likely reflecting compliance costs in a capital-intensive industry. Governance disclosures, however, demonstrated an insignificant direct impact, possibly due to institutional and regulatory challenges inherent in emerging markets such as Nigeria. Furthermore, the hypothesized moderating effect of $FES_{i,t}$on sustainability reporting and financial performance was not supported, suggesting that firm-specific environmental sensitivity may not yet significantly shape financial outcomes within this sector. These findings contribute to the growing but context-specific literature on sustainability-financial performance linkages, emphasizing the complexity and sectoral variations in emerging economies (Khan et al., 2021; Olayiwola & Adedeji, 2022).

Despite the robustness of the panel data analysis and the application of Generalized Least Squares techniques, this study has several limitations. First, the relatively small sample sizeof seven firms, constrained by data availability, may limit the generalizability of the findings beyond the Nigerian oil and gas industry. Second, the use of secondary data from publicly available sustainability reports may not fully capture qualitative nuances or the depth offirms' sustainability practices, especially in an environment where reporting standards vary widely (Michelon et al., 2015). Third, the study focused on short-term financial performance metrics ($FP_{i,t}$) such as Return on Assets; future research could explore long-term value creation and market-based performance indicators to provide a more comprehensive understanding (Ameer & Othman, 2012). Additionally, the non-significant moderating effect of $FES_{i,t}$invites further inquiry into alternative moderating or mediating variables, such as institutional quality, regulatory enforcement, or corporate culture, which may better explain sustainability-financial performance dynamics in emerging markets.

In light of these findings and limitations, several recommendations emerge for policymakers, corporate managers, and researchers. Regulators should prioritize the establishment and enforcement of standardized sustainability reporting frameworks tailored to the oil and gas sector's unique environmental challenges, thereby reducing reporting heterogeneity and enhancing comparability (Khan et al., 2021). Firms should strategically invest in social sustainability initiatives, given their positive association with financial outcomes, while managingenvironmentalcompliancecoststhroughinnovationandefficiencygains(Olayinka & Oluwamayowa, 2014). Furthermore, there is a need to deepen corporate governance reforms that strengthen transparency and accountability to unlock the full financial benefitsof governance disclosures (Adegbite & Nakajima, 2011).

For future research, expanding the sample to include oil and gas firms across multiple emerging economies could offer valuable comparative insights and improve the external validity of results. Employing mixed-method approaches that integrate qualitative casestudies with quantitative analysis may also enrich the understanding of sustainability reporting practices and their financial implications. Moreover, examining the interplay between environmental sensitivity and other firm-level factors such as innovation capacity, stakeholder engagement, and supply chain integration could illuminate complex moderating mechanisms (Dibia & Onwuchekwa, 2020). Finally, longitudinal studies that assess the evolving impact of sustainability disclosures amid tightening environmental regulations and shifting stakeholder expectations would contribute to a dynamic understanding of these relationships.

This studyprovides empirical evidence that social sustainabilityreporting enhances financial performance in Nigeria‘s oil and gas sector, while environmental and governance disclosures requirefurtherstrengtheningandcontextualadaptation.Thelimitedmoderatingeffectoffirm environmental sensitivity highlights the need for more nuanced frameworks and proactive policies to foster sustainability integration that aligns with financial value creation in emerging markets. Such efforts are essential for driving sustainable growth and responsible corporate citizenship in sectors critical to Nigeria‘s economic development.

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