

CORPORATE GOVERNANCE AND SUSTAINABILITY REPORTING BY OIL AND GAS FIRMS IN NIGERIA

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ABSTRACT

This study analyses the effect of corporate governance mechanisms on sustainability reporting among indigenous oil and gas firms in Nigeria, utilizing an ex-post facto research design and panel data spanning 18 years (2006-2023) from seven listed firms. The analysis employs descriptive statistics and panel regression techniques. Findings indicate that board independence positively and significantly affects environmental sustainability reporting (EVS), while the effectiveness of the audit committee has a negative and significant impact. Furthermore, board size and audit committee effectiveness are found to negatively influence economic sustainability reporting (ECS), whereas firm size and Tobin's Q positively impact it. Most corporate governance variables show insignificant relationships with social sustainability reporting (SCS), highlighting weak institutional commitment to social sustainability disclosure among the sampled firms. The study concludes that corporate governance mechanisms have a mixed effect on sustainability reporting in Nigeria's indigenous oil and gas sector. It further suggests that mere governance structures are inadequate for ensuring effective sustainability disclosure, particularly in the presence of institutional weaknesses, regulatory inefficiencies, and challenges posed by the political economy. Regulatory authorities should strengthen disclosure requirements and promote governance reforms that focus on improving board independence, sustainability expertise, and institutional accountability within the oil and gas sector.

Keywords: Corporate governance, Sustainability, Oil and gas sector, Extractive industries

JEL classification: G34, Q56, L71, N50

1. Introduction

Nigeria's oil and gas sector occupies a paradoxical position within the national economy, contributing substantially to government revenue and foreign exchange earnings (Koos, 2018; Deloitte, 2021; Nwuke, 2021). Indigenous firms account for about 65% of the sector's cumulative revenue (Nwankwo & Iyeke, 2022), yet the industry continues to grapple with complex corporate governance challenges and sustainability concerns (Erin et al., 2022). It has been associated with weak institutional accountability, persistent environmental degradation, socio-economic instability and rent-seeking behaviour, particularly in the Niger Delta region. This contradiction reflects the broader "resource curse" phenomenon, in which countries endowed with abundant natural resources often experience weak governance systems, institutional fragility, environmental deterioration, and poor developmental outcomes despite substantial resource wealth. Scholars argue that dependence on extractive resources tends to slow economic growth in Nigeria, encourage regulatory capture, weaken public institutions and reduce corporate accountability (Olayungbo, 2019; Oludimu & Alola, 2022; Mesagan et al., 2025; Ekpe et al., 2025).

Heightened scrutiny of the sector's environmental, social, and governance (ESG) performance reflects its significant impact on environmental integrity, community welfare, and economic stability. Stakeholders increasingly demand greater transparency and ethical conduct to address environmental degradation, weak regulatory compliance, and lapses in corporate accountability (Ogbu, 2020; Paseda & Adenikinju, 2025; Noah et al., 2025). Strong corporate governance is therefore essential not only for promoting accountability, ethical leadership, and regulatory compliance, but also for mitigating the socio-political risks arising from weak institutional frameworks and Nigeria's volatile business environment.

Globally, sustainability reporting has emerged as a central mechanism for enhancing corporate accountability (Al Amosh & Khatib, 2021; Kolawole et al., 2024). The introduction of frameworks such as the Global Sustainability Standards Board (GSSB) and Global Reporting Initiative (GRI) has provided guidance for corporations to systematically disclose their environmental, social, and governance performance (MacNeil & Esser, 2022; Mesagan et al., 2026). These frameworks align corporate strategies with the principles of environmental stewardship, social responsibility, and sustainable value creation. However, compliance in developing countries such as Nigeria remains relatively weak and

inconsistent (Ogbu, 2016; Ahmad, 2019). The urgency of adopting effective sustainability reporting practices is particularly evident in the Niger Delta region, where oil spills, gas flaring, and land degradation, caused largely by international oil companies (IOCs), have compromised ecosystems, reduced agricultural productivity, endangered human health, and fostered deep-seated community mistrust (Babatunde, 2020; Angela et al., 2021; Ukhurebor et al., 2021).

Against this backdrop, sustainability reporting has the potential to serve as a strategic tool for Nigerian oil and gas firms by fostering transparency, strengthening stakeholder trust, and promoting sustainable corporate behaviour (Ahmad, 2019). Rooted in stakeholder theory (Freeman, 1984), sustainability disclosure seeks to balance the interests of diverse stakeholders while enhancing long-term corporate legitimacy. Consequently, corporate governance mechanisms are increasingly viewed as critical drivers of sustainability reporting quality, as they influence managerial accountability, disclosure transparency, and regulatory compliance.

Despite the growing emphasis on sustainability reporting, significant concerns remain regarding the effectiveness of corporate governance mechanisms in promoting transparent and comprehensive sustainability disclosures, particularly in developing economies such as Nigeria. The Nigerian oil and gas sector continues to experience persistent environmental degradation, weak regulatory enforcement, community conflicts, and increasing stakeholder pressure arising from oil spills, gas flaring, and poor environmental accountability (Mesagan et al., 2024; Okwechime et al., 2025). Although sustainability reporting has increasingly been adopted as a mechanism to improve corporate transparency and legitimacy, evidence suggests that disclosures by Nigerian oil and gas firms remain inconsistent, selective, and often inadequate in addressing the environmental, economic, and social consequences of corporate activities.

Existing studies on corporate governance and sustainability reporting have largely concentrated on developed economies, where institutional structures, regulatory enforcement, and governance systems are relatively stronger. In Nigeria, available empirical studies mostly examine sustainability reporting as a composite construct or focus predominantly on

environmental disclosures, with limited attention to the economic and social dimensions as distinct components. This limits understanding of how governance mechanisms influence each dimension of sustainability reporting differently. In particular, the economic dimension of sustainability reporting remains underexplored despite its relevance in resource-dependent economies such as Nigeria, where concerns about local value creation, revenue accountability, employment generation, and long-term developmental sustainability are central to debates on the resource curse and extractive governance.

Furthermore, empirical findings on the corporate governance sustainability reporting nexus remain inconclusive, with prior studies reporting mixed and sometimes contradictory results regarding the roles of board size, board independence, gender diversity, board meetings, and audit committees. These inconsistencies suggest that the effectiveness of governance mechanisms is highly context-dependent and requires further investigation within specific institutional environments. Methodologically, much of the existing evidence is based on cross-sectional or short-term analyses, which fail to capture the dynamic nature of governance and reporting practices over time. Although sustainability reporting became formally recognized in Nigeria's regulatory framework in 2023, disclosure practices had existed earlier through firms' annual reports. Nevertheless, there remains a paucity of longitudinal studies that provide robust insights into how corporate governance structures influence sustainability reporting over time, particularly in high-impact industries such as oil and gas. Prior studies have also largely focused on multinational corporations or broad samples of listed firms, with insufficient emphasis on indigenous oil and gas companies operating under distinct governance conditions and institutional constraints.

Given these limitations, there is a clear need for a comprehensive, context-specific analysis of the relationship between corporate governance and the disaggregated dimensions of sustainability reporting in Nigeria's oil and gas sector. This study therefore examines the impact of corporate governance on environmental, economic, and social sustainability reporting among listed indigenous oil and gas firms in Nigeria over an 18-year period. Specifically, the study investigates how key corporate governance attributes, namely board size, board independence, frequency of board meetings, gender diversity, and the presence of an audit committee, influence the three dimensions of sustainability reporting. The

study seeks to answer the following questions: How does corporate governance affect environmental sustainability reporting in Nigerian oil and gas firms? How does corporate governance influence economic sustainability reporting in Nigerian oil and gas firms? To what extent does corporate governance affect social sustainability reporting in Nigerian oil and gas firms?

The study contributes to the literature by providing longitudinal, sector-specific, and contextually-grounded evidence on the relationship between corporate governance and sustainability reporting in an emerging economy characterized by weak institutional frameworks and resource dependence. It also extends existing knowledge by disaggregating sustainability reporting into environmental, economic, and social dimensions, thereby offering deeper insights into how governance mechanisms shape different aspects of sustainability reporting

2. Literature Review

2.1 Theoretical review

The relationship between corporate governance and sustainability reporting is primarily anchored on agency theory and stakeholder theory. These theories provide important insights into how governance mechanisms influence corporate disclosure practices; however, they also present certain limitations, particularly within the context of emerging economies such as Nigeria. Agency theory, developed by Jensen and Meckling (1976), explains corporate governance as a mechanism for reducing information asymmetry and aligning the interests of managers with those of shareholders. The theory suggests that effective governance structures, such as board independence, monitoring systems, and audit committees, help minimize agency conflicts and improve disclosure transparency. Within the Nigerian oil and gas sector, where environmental degradation, oil spills, and social disruptions are prevalent, sustainability reporting becomes an important tool for reducing information gaps between managers, shareholders, and other interested parties (Ofoegbu et al., 2018). Weak disclosure practices may increase agency costs and undermine investor confidence and public trust (Mudiyansele, 2018; Vitolla et al., 2020). Consequently, governance mechanisms such as independent directors and active board oversight are considered essential for ensuring

comprehensive and reliable sustainability disclosures, especially regarding environmental performance. Alta'any et al. (2026) further argued that governance structures and monitoring mechanisms can align managerial actions with corporate objectives and enhance transparency.

Despite its relevance, agency theory is limited by its shareholder-oriented perspective, which places greater emphasis on financial accountability while paying less attention to broader social and environmental responsibilities. Sustainability reporting extends beyond shareholder interests to encompass environmental stewardship, community welfare, ethical responsibility, and long-term societal value creation. As a result, agency theory alone may not sufficiently explain sustainability disclosure practices, particularly in contexts where stakeholder pressure and legitimacy concerns strongly influence corporate behaviour.

Stakeholder theory provides a broader framework by recognizing that organizations are accountable to multiple stakeholders, including investors, employees, communities, regulators, and environmental groups (Freeman, 1984; Donaldson & Preston, 1995; Mitchell et al., 1997). The theory argues that firms engage in sustainability reporting to address stakeholder expectations, maintain legitimacy, and strengthen corporate relationships. In the oil and gas sector, stakeholders in host communities often demand accountability regarding environmental degradation, human rights, public health, and community development. Sustainability reporting therefore serves as a strategic tool through which firms communicate their efforts to mitigate environmental and social risks, comply with international standards, and respond to societal expectations for responsible business conduct.

Empirical studies support the relevance of the stakeholder theory in explaining sustainability reporting practices. Moses et al. (2020) found that effective board governance enhances sustainability reporting quality by aligning corporate activities with stakeholder interests. Similarly, Yadav and Jain (2023) argued that strong corporate governance structures positively influence sustainability disclosures and improve sustainability outcomes. Nevertheless, stakeholder theory has also been criticized for its lack of operational clarity, particularly in identifying and prioritizing stakeholders. The theory does not clearly explain which stakeholder groups exert the greatest influence on disclosure practices or how such influence varies across institutional environments.

Furthermore, both the agency and stakeholder theories largely assume the existence of relatively strong institutional frameworks and effective regulatory systems. This assumption may not adequately reflect the realities of developing countries such as Nigeria, where weak regulatory enforcement, institutional fragility, and governance deficiencies significantly shape corporate behaviour and disclosure practices. Consequently, a theoretical gap remains in explaining how institutional weaknesses interact with governance mechanisms to influence sustainability reporting in resource-dependent economies.

In addition, existing theoretical applications often treat sustainability reporting as a unified construct, with limited attention to its distinct environmental, economic, and social dimensions. This creates an important gap in the literature because governance mechanisms may exert different effects across these dimensions. Therefore, this study adopts an integrated theoretical perspective to examine how specific corporate governance attributes influence environmental, economic, and social sustainability reporting among indigenous oil and gas firms in Nigeria.

2.2 Corporate governance and environmental sustainability reporting (EVSR)

Environmental sustainability reporting (EVSR) has become the focus in corporate governance research (Masud et al., 2018; Ofoegbu et al. 2018), especially in industries sensitive to environmental issues, like oil and gas. Corporate governance tools, including board independence, ownership structure, and regulatory oversight are critical in determining how well firms disclose information about the environment. Board independence is linked to better environmental reporting practices. Masud et al. (2018) examined the effects of corporate governance on environmental sustainability reporting of 88 listed firms in South Asian countries (Bangladesh, India, and Pakistan) using OLS regression analysis from 2009 to 2016, and found that independent boards, diversity, board sizes and committee improve EVSR in vulnerable regions. Ofoegbu et al. (2018) reported similar findings in Nigeria using descriptive, multivariate and regression models, particularly in sectors facing high environmental risks. These studies indicate that independent directors help promote transparency and accountability in environmental disclosures. However,

they are less effective due to weak regulations and corporate influence. Masud et al. (2018) noted that foreign and institutional ownership enhances EVSR in South Asia, while family ownership does not have a significant impact. In contrast, Alodat et al. (2022) adopted a panel data regression model on non-financial firms and found no meaningful link between ownership structure and disclosure in Jordan. According to Masud et al. (2018), institutional investors have pressured oil and gas firms to improve their disclosure in Nigeria while family-controlled firms lag behind because of lack of accountability to stakeholders. The influence of regulatory body and national institutional context is also important. Ortiz-de-Mandojana et al. (2016) examined the effectiveness of corporate governance on environmental sustainability and found that regulatory pressures in North America and Europe can change board structures. Meanwhile, Lu and Wang (2021) argue that a strong legal system and culture are important factors for determining environmental performance. This may lower voluntary disclosure since external enforcement replaces internal oversight. However, in Nigeria, despite the mandate of the Nigerian Extractive Industries Transparency Initiative (NEITI), enforcement and regulation of environmental sustainability disclosure remain weak (Ofoegbu et al., 2018).

According to Disli et al. (2022), board independence and activity further strengthen the impact of governance on EVSR. They applied a dynamic panel two-step system generalized method of moments (GMM) estimator on 439 publicly listed firms across 20 emerging countries from 2010–2019. Conversely, their findings reveal a negative relationship between board size and governance performance. Nuskiya et al. (2021) examined firm-level determinants of corporate environmental disclosure among 41 firms in Sri Lanka using GMM and found that board independence, board size, and board meetings are positively associated with the level of corporate environmental disclosure. However, CEO duality negates CED level in Sri Lanka.

The literature emphasizes the important role of corporate governance in shaping EVSR. Tools like board independence, ownership structure and regulatory oversight greatly affect disclosure practices, although their effectiveness differs across cultural and institutional settings.

2.3 Corporate governance and economic sustainability reporting (ECSR)

Effective corporate governance mechanisms are central to promoting transparent and credible disclosures, thereby advancing economic sustainability. Empirical evidence suggests that board independence, diversity and activity enhance disclosure quality. Ong and Djajadikerta (2020) examine Australian resources firms operating in environmentally-sensitive industries, using the Ong et al. (2016) index. Their findings report positive associations between sustainability disclosures and independent directors, multiple directorships, and female representation on boards. This index facilitates the evaluation of a company's sustainability report in terms of both the quality and quantity of disclosure, using the comprehensive performance indicators available in the GRI framework. Similarly, Vitolla et al. (2020), in a global sample of 134 corporations, using the scoreboard devised by Pistoni et al. (2018), evaluated quality, not only in terms of content, and found that board size, independence, diversity, and activity significantly improved integrated reporting quality. However, contrasting evidence exists: Ho et al. (2024) examined 56 Malaysian-listed firms from 2018 to 2020. Using pooled ordinary least squares, they found no direct impact of board size, independence, diligence, or experience on disclosure, contrary to other findings, noting that only female directors and audit committees exerted significant influence.

The relationship between governance structures and economic outcomes is equally complex. Puni and Anlesinya (2020) analysed 38 Ghanaian listed firms from 2006–2018. Their findings show that board size, meeting frequency, and ownership concentration improve financial performance, while board committees have a negative effect and CEO duality exerts little influence. This illustrates the complex role of governance mechanisms in balancing economic performance with sustainability objectives. Moses et al. (2020) employed content analysis through a literature review to examine the relationship between board governance mechanisms and sustainability reporting quality in Malaysia; they highlight the role of board characteristics and external oversight in enhancing sustainability reporting quality. They found that gender diversity, integrity, and communication within Malaysian boards positively affect sustainability disclosures based on multiple theories. Erin et al. (2022) similarly used a scoring system ranging from 0 – 4 to measure the corporate

governance mechanisms of 120 listed firms on the Nigerian Stock Exchange using the order of logistic regression technique. Their findings reveal that board governance and audit committee attributes enhance sustainability reporting among Nigerian-listed firms, with external assurance further strengthening the reliability of disclosures.

Board diversity also emerged as a significant determinant of ECSR. Fayyaz et al. (2023) adopted the Dow Jones Sustainability Index to examine leading sustainable firms in 73 EU non-financial sustainability organizations across 13 countries from 2016 to 2020. They found that institutional and demographic diversity improves sustainability performance. Also, through stakeholder theory, ESG moderates and partially mediates the association between a diverse board of directors and firm performance, suggesting that diverse boards are better positioned to address complex sustainability issues. This study reveals a gap between theoretical and empirical support for structural and demographic board indicators, their relationship to performance, and the role of ESG as an intervening factor in increasing firm financial performance. Alta'any et al. (2024) reinforce these findings by examining 370 listed firms across 50 countries using a GRI standard disclosure index. The results reveal that sustainability committees positively influence sustainability reporting, with board size significantly affecting both economic and social dimensions. In contrast, board independence and CEO duality negatively affect ECSR.

The literature highlights both consensus and divergence regarding the influence of corporate governance on ECSR. While board size, diversity, audit committees, and sustainability committees frequently demonstrate positive associations, the effects of board independence, CEO duality, and other governance attributes remain mixed and context-dependent. These inconsistencies emphasize the need for further research that accounts for industry variation, regulatory environments, and longitudinal dynamics to develop a more comprehensive understanding of the governance–sustainability nexus.

2.4 Corporate governance and social sustainability reporting (SCSR)

The literature highlights the significant influence of corporate governance mechanisms on social sustainability reporting (SCSR), with board composition and diversity frequently examined as key determinants. Garas and ElMassah (2018) adopted a multi-variate regression analysis to examine 147 firms in Gulf Cooperation Council (GCC) countries from

2007 – 2012. Their findings reveal that managerial ownership and ownership concentration positively affect corporate social responsibility (CSR) disclosure in GCC countries. In East Africa, Githaaga and Kosgei (2023) examined 79 listed firms using the GRI index, the fixed effect model, the random effect model, and the generalised method of moments. They report that board gender diversity, financial expertise, and independence enhance sustainability reporting. Yadav and Jain (2023) applied the system generalised method of moments panel regression on listed firms on the National Stock Exchange (NSE) Nifty Index from 2013 – 2020. They observed negligible effects of board size, gender diversity, and independence on Indian firms' disclosures. These findings underline the context-specific nature of governance attributes, suggesting that their impact may differ across regions and institutional settings.

Garas and ElMassah (2018) assert that ownership structure is another critical factor shaping SCSR. They reveal the positive role of managerial ownership and ownership concentration, whereas Correa-Garcia et al. (2020) applied a logic regression model on corporate governance and its implication on sustainability reporting quality in Latin American business groups. They found that concentrated control negatively affects reporting in Latin American conglomerates, while foreign ownership, board size and age promote sustainability and voluntary disclosure practices. Such contrasting evidence reflects the divergent pressures exerted by domestic versus external investors on firms' social responsibility practices.

Tran et al. (2021) analysed 171 largest companies across Southeast Asian countries. They used a 30-item CSD measure and found that reforms strengthening stakeholder governance in Southeast Asia encouraged greater sustainability disclosure, though they cautioned that such reforms do not always enhance board effectiveness in promoting CSR, pointing to the complexity of the regulation-disclosure relationship.

Ebaid (2022) studied 67 Saudi-listed firms from 2014–2019. He utilized three panel data techniques and found that board independence and size improved CSR disclosure, while female participation showed a positive but statistically insignificant effect. Similarly, Fahad and Rahman (2020) examined the CSR disclosure practices of Indian companies for 10 years (2007-2016) using a panel data regression model. The findings reveal that board independence, CEO duality, and sustainability committees in

Indian firms are positively associated with CSR disclosure, whereas board age, employee CSR training, and female representation are negatively associated with CSR disclosure. Board-level characteristics have also produced mixed evidence.

The findings from the literature suggest that the relationship between corporate governance and SCSR is complex and highly context-dependent. While board independence, gender diversity, and ownership structures often contribute positively to social disclosures, their effects vary significantly across cultural, regulatory, and institutional environments. These findings highlight the need for governance frameworks that account for geographic and firm-specific contexts, as the “one-size-fits-all” approach may not effectively enhance social sustainability reporting.

3. Methodology and Data

3.1 Empirical model

Based on theoretical foundations and the literature, key variables that are likely to influence sustainability reporting are identified. These include: board characteristics, firm-specific factors, and financial metrics. Specific variables found in the literature include, among others, the following:

Board Size (BODS): A larger board can enhance sustainability reporting through diverse perspectives, but may also introduce inefficiencies.

Board Independence (BODI): Independent directors enhance monitoring and ensure the preparation of comprehensive sustainability reports.

Board Meetings (BODD): The frequency and quality of meetings reflect the board’s commitment to governance and sustainability oversight.

Audit Committee (BDAC): The existence of an audit committee improves governance and ensures accuracy in sustainability disclosures.

Board Gender Diversity (BDGD): Gender-diverse boards are linked to ethical decision-making, positively affecting sustainability reporting.

Firm Size (FRMS): Larger firms, under greater scrutiny, tend to produce more comprehensive sustainability reports.

Liquidity (LIQ): Firm liquidity influences investment in sustainability initiatives and quality of disclosures.

Tobin’s Q (TOBQ): This measure reflects market perceptions of a firm’s growth and sustainability practices.

Relationships among the variables are hypothesized based on existing theories and empirical evidence. For example, board independence and diversity were expected to positively influence sustainability reporting due to their role in enhancing governance and accountability.

The functional form of the model is articulated, expressing the dependent variables (Environmental, Economic and Social Reporting denoted as EVSR, ECSR, SCSR respectively) as a function of the identified independent variables (BODS, BODI, BODD, BDAC and BDGD). The selection of each variable is based on its theoretical relevance and empirical support. For instance, board size and independence were chosen due to their well-documented impact on governance quality, while firm size, liquidity and Tobin's Q were included to control for firm-specific characteristics that could affect sustainability reporting.

Consequently, the empirical model takes the form:

$$Y = f(X)$$

where: Y is the vector of sustainability reporting while X depicts the vector of corporate governance. Therefore, the following estimable models are specified and obtained through substitution of variables.

Corporate governance and EVSR equation

$$\begin{aligned} EVSR_{it} &= \beta_0 + \beta_1 BODS_{it} + \beta_2 BODI_{it} + \beta_3 BODD_{it} + \beta_4 BDAC_{it} + \beta_5 BDGD_{it} \\ &+ \beta_6 FRMS_{it} + \beta_7 LIQ_{it} + \beta_8 TOBQ_{it} \\ &+ \varepsilon_{it} \end{aligned} \quad (1)$$

Corporate governance and ECSR equation

$$\begin{aligned} ECSR_{it} &= \beta_0 + \beta_1 BODS_{it} + \beta_2 BODI_{it} + \beta_3 BODD_{it} + \beta_4 BDAC_{it} \\ &+ \beta_5 BDGD_{it} + \beta_6 FRMS_{it} + \beta_7 LIQ_{it} + \beta_8 TOBQ_{it} \\ &+ \varepsilon_{it} \end{aligned} \quad (2)$$

Corporate governance and SCSR equation

$$\begin{aligned} SCSR_{it} &= \beta_0 + \beta_1 BODS_{it} + \beta_2 BODI_{it} + \beta_3 BODD_{it} + \beta_4 BDAC_{it} \\ &+ \beta_5 BDGD_{it} + \beta_6 FRMS_{it} + \beta_7 LIQ_{it} + \beta_8 TOBQ_{it} \\ &+ \varepsilon_{it} \end{aligned} \quad (3)$$

where: β_0 is the intercept, while $\beta_1 \dots \beta_8$ measure the marginal effect (coefficient or elasticity) of each of the various explanatory variables, and ε_{it} is the stochastic error term, i denotes the cross-sectional unit (firm), and t represents the time period.

Panel data analysis has been shown to be suited for cross-country/group empirical studies (Akintunde et al., 2021; Seok & Moon, 2021; Mwangi et al., 2020; Omojolaibi & Ogbeifun, 2017). Furthermore, using the (static) panel estimation method still permits consideration of group-specific characteristics and guarantees the absence of serial correlation, heteroskedasticity, and cross-sectional dependence. The Panel-Corrected Standard Errors (PCSE) estimation technique is considered appropriate for this study since the number of companies (N) is less than the number of time periods (T), i.e., $N < T$. Also, in the absence of cross-sectional dependence among the variables, the PCSE estimation technique can address the possibilities of autocorrelation (or serial correlation) and heteroscedasticity (Adeleye et al., 2023). In addition, we use 2SLS to address endogeneity concerns, instrumenting some regressors with variables that may be strongly correlated or uncorrelated with the current error term. The primary 2SLS tests of endogeneity used in this study are the Durbin (score) chi2 and Wu-Hausman for the F-statistic weak-instrument test, and the Sargan (score) and Basman chi2 for the instrument validity test.

3.2 Data and variable description

The analysis covers seven (7) firms (11Plc, Ardova Plc (Forte Oil), Conoil, Eterna Oil, Japaul Gold & Ventures Plc, MRS, Total), selected based on data availability spanning 18 years (2006-2023) from a population of 12 indigenous oil and gas companies quoted on the Nigerian Stock Exchange (NGX).

The key governance attributes examined include: board size, independence, diligence, gender diversity, and audit committee presence. Control variables, such as firm size, liquidity, and market valuation (Tobin's Q) were incorporated.

Table 1: Variables Measurement and Definition

Variables	Abbreviation	Definition /Measurement	Source
Dependent Variables	Firms Sustainability (FS)	The sum of Economic sustainability, Environmental sustainability and Social Sustainability	MachameRatios
Economic Sustainability	ECSR	Sum of (Revenue, Retained Earnings, Research and Development, Income Tax Paid, Marketing and Selling Expenditure, Employee Compensation, Finance cost and Infrastructure, Physical Asset investment (PPE))	MachameRatios
Environmental Sustainability	EVSR	Sum of Environmental Expenses, Emission Scope 1, Emission Scope 2, Emission Scope 3, Water Consumption, Energy Consumption, Waste Generated, Waste Cycled, Land & Building and Environmental Reclaim Obligation (Biodiversity)	MachameRatios
Social Sustainability	SCSR	Sum of CSR Expenditure, Employment (Jobs), Number of Employee Health & Safety injuries, Number of Female Employee, Employee Training & Development Investment, Pension Contribution and Procurement Practice (Direct cost)	MachameRatios
Independent Variable	Corporate Governance (CG)	Sum of Board size, Board Independence, Board Diligence, Board Audit committee, Board Gender Diversity.	MachameRatios
Board Size	BODS	The total number of members on the board of directors	MachameRatios
Board Independence	BODI	Non-Executive/ Board Size	MachameRatios
Board Diligence (Meetings)	BODD	Number of Board Meetings	MachameRatios
Board Audit Committee	BDAC	Sum of Board Sustainability Committee, Board Audit Committee, External Audit Report Timeliness	MachameRatios
Board Gender Diversity	BDGD	The ratio of female directors to total board membership	MachameRatios
Control Variables			
Firm size	FRMS	Natural Log of Total Assets	MachameRatios
Liquidity	LIQ	Current Asset to Current Liability	MachameRatios
Tobin Q	Tobin Q	Market Value to Replacement Cost of Assets	MachameRatios

4. Results and Discussion

4.1 Descriptive analysis of data

Reported in Table 2 are the descriptive statistics of the variables used in the study. The mean values represent the average of the respective variables during the period covered by the study. The standard deviations measure the extent of dispersion of datasets from the mean value. Lower standard deviation connotes dataset cluster around the mean and that likelihood of volatility is very rare, that is, the dataset is not susceptible to fluctuation. The numerical value of the difference between maximum and minimum denotes the range of the dataset.

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Table 2: Descriptive Statistics

Variables	Observ.	Mean	Stand. Dev	Min.	Max.
ECSR	126	0.8920	0.1557	0.0000	1.0000
EVS	126	0.1238	0.0752	0.1000	0.6000
SCSR	126	0.6896	0.0801	0.2500	0.7500
BODS	126	8.2063	2.1478	0.0000	14.0000
BODI	126	64.5613	15.1402	0.0000	90.0000
BODD	126	4.4841	1.0487	0.0000	7.0000
BDAC	126	5.6429	1.0156	0.0000	8.0000
BDGD	126	11.5480	9.8199	0.0000	37.5000
FRMS	126	17.4202	1.7965	0.0000	19.5500
LIQ	126	1.1047	0.5186	0.0000	4.47000
TOBQ	126	0.8945	1.4961	0.0000	13.4200

4.2 Discussion of findings

The results from estimations of the empirical models are reported in Table 3 and made of two-part PCSE (main estimation technique) and 2SLS (robustness check technique) for each of the components of disaggregate sustainability reporting of environmental (EVS), economic (ECSR), and social (SCSR).

The findings of this study reveal that corporate governance mechanisms exert varying effects on environmental, economic, and social sustainability reporting among indigenous oil and gas firms in Nigeria. These outcomes are consistent with the argument in the literature that governance structures influence sustainability disclosure differently depending on institutional, regulatory, and organizational contexts.

Corporate Governance and Environmental Sustainability Reporting (EVSR)

The estimated coefficients of BODS and BDAC are negative and statistically significant for EVSR. This suggests that if board size and board audit committee increase environmental sustainability reporting will decrease by 0.0061 and 0.0361 units respectively. On the other hand, BODI is positive and significant also for EVSR. This connotes that an increase in board independence would lead to an increase in environmental sustainability reporting by 0.0011 units. The robustness check using 2SLS also affirms the negative and significant impact of BDAC on sustainability reporting.

Our study found that board independence has a positive and significant effect on environmental sustainability reporting (EVSR). This finding is consistent with prior studies which argued that independent directors strengthen monitoring functions and improve transparency in sustainability disclosure (Masud et al., 2018; Ofoegbu et al., 2018). This finding supports the assumptions of the agency theory and the stakeholder theory discussed in the literature review. Agency theory posits that independent directors strengthen monitoring functions and reduce managerial opportunism, thereby encouraging greater transparency in corporate reporting. Similarly, stakeholder theory argues that firms respond to stakeholder expectations through improved disclosure practices (Freeman, 1984). The result is consistent with prior empirical studies which reported that independent boards improve environmental accountability and sustainability disclosure because independent directors are more likely to protect shareholders' interests and corporate legitimacy.

The positive influence of board independence also supports studies that argue that independent directors enhance environmental governance through stronger oversight and compliance with sustainability expectations (García-Sánchez et al., 2020). In the Nigerian oil and gas sector, where environmental concerns such as pollution, gas flaring, and community degradation remain significant, independent directors may encourage firms to disclose more environmental information in order to maintain legitimacy and public confidence.

However, the audit committee variable was found to have a negative and significant relationship with EVSR. While some studies reported

positive associations between audit committees and sustainability disclosure (Appuhami & Tashakor, 2017), the current finding suggests that audit committees within indigenous oil and gas firms may not effectively prioritize environmental sustainability reporting. This finding contradicts some prior studies which found that audit committees improve disclosure quality and strengthen accountability mechanisms. Nevertheless, the result aligns with the political economy perspective highlighted in the literature review, which emphasizes that governance institutions in resource-dependent economies may become symbolic rather than effective monitoring mechanisms. In the Nigerian oil sector, audit committees may focus largely on financial reporting and statutory compliance while paying limited attention to environmental sustainability issues.

The negative effect of audit committees may also indicate weak institutional capacity, limited sustainability expertise, or regulatory capture within the sector. This supports arguments in the literature that governance mechanisms in developing economies often operate within institutional environments characterized by weak enforcement and elite influence. Consequently, audit committees may exist formally without substantially improving sustainability accountability.

The finding that firm size negatively affects environmental sustainability reporting differs from many earlier studies which argued that larger firms disclose more sustainability information because they face greater public scrutiny and reputational pressures (Cormier & Magnan, 2003; Hahn & Kühnen, 2013). However, this result may be explained by the institutional realities of Nigeria's oil and gas sector. Larger indigenous firms may strategically limit environmental disclosures to reduce exposure to regulatory sanctions, environmental activism, or litigation associated with environmental degradation. This finding reinforces the institutional and political economy arguments discussed in the literature review that sustainability reporting in extractive industries is often shaped by strategic interests rather than pure accountability considerations.

Corporate Governance and Economic Sustainability Reporting (ECSR)

Regarding the ECSR, evidence of a significant negative relationship is observed with BODS and BDAC, while a significant positive relationship was established with FRMS and TOBQ. This implies that an increase in BODS and BDAC would lead to a decrease of 0.0096 and 0.0402 units respectively in ECSR, where ECSR would increase by 0.0698 and 0.0200

units respectively because of an increase in FRMS and TOBQ. The negative relationship established by BODS and BDAC with ECSR is also affirmed by the results of the robustness check under the 2SLS.

The study discovered a negative correlation between board size and disclosure on economic sustainability reporting (ECSR). This finding aligns with studies suggesting that excessively large boards reduce coordination efficiency and weaken strategic decision-making processes (Jensen, 1993; Yermack, 1996; Ho et al., 2024)). This finding supports the literature suggesting that excessively large boards may reduce coordination efficiency, weaken decision-making processes, and create communication challenges. Earlier studies reviewed in the literature indicate that smaller boards tend to be more effective in monitoring managerial activities and implementing strategic sustainability decisions.

Similarly, the audit committee variable showed a negative effect on economic sustainability reporting which aligns with the study of Puni and Anlesinya (2020). This outcome further suggests that governance structures within indigenous oil and gas firms may not effectively promote broader sustainability objectives beyond conventional financial oversight. The finding aligns with studies that questioned the effectiveness of corporate governance mechanisms in developing economies due to institutional weaknesses and limited enforcement capacity.

Conversely, firm size and Tobin's Q were found to positively influence economic sustainability reporting. This finding supports earlier studies which argue that financially strong and larger firms possess greater resources and incentives to engage in sustainability disclosure practices (Gray et al., 1995; Frias-Aceituno et al., 2013). The positive relationship between firm size and ECSR supports prior studies which argue that larger firms possess greater financial, managerial, and technological resources necessary for sustainability initiatives and disclosures. Larger firms are also more visible to investors and regulators, thereby encouraging broader disclosure practices.

The positive and significant effect of Tobin's Q on economic sustainability reporting is consistent with the legitimacy theory and the signaling theory. Similar findings were reported by Clarkson et al. (2008) and Plumlee et al. (2015), who observed that firms with stronger market performance are more likely to disclose sustainability information in order

to strengthen investor confidence and corporate reputation. Firms with stronger market performance may disclose more sustainability information to strengthen investor confidence, enhance corporate reputation, and signal long-term financial stability. This finding supports the empirical evidence that financially successful firms are more likely to adopt sustainability reporting practices as part of strategic legitimacy management.

Corporate Governance and Social Sustainability Reporting (SCSR)

With respect to the SCSR component, none of the corporate governance attributes exhibits a significant relationship using the main estimation technique, PCSE. Meanwhile, there is evidence of a significant positive relationship between FRMS and SCSR. This demonstrates that an increase in FRMS would increase SCSR by 0.0229 units. The results of the robustness check using the 2SLS method revealed that BODS and BDAC have significant positive and negative relationships with SCSR. Whereas SCSR would increase by 0.0670 units due to a 1-unit increase in BODS, it would decrease by 0.0381 units due to a 1-unit increase in BDAC.

The results for social sustainability reporting (SCSR) were largely insignificant. This outcome is consistent with studies conducted in developing economies which found weak or inconsistent relationships between governance mechanisms and social sustainability disclosure (Muttakin & Khan, 2014; Ntim & Soobaroyen, 2013; Yadav & Jain, 2023). This finding suggests that the governance variables examined may not substantially influence social sustainability disclosure among indigenous oil and gas firms in Nigeria. This outcome is consistent with some prior studies that found weak governance effects on social disclosure practices in developing economies.

One possible explanation is that social sustainability reporting within the Nigerian oil and gas sector is often driven more by external pressures from host communities, civil society organizations, and government regulations than by internal governance mechanisms. The finding also reflects arguments in the literature that many firms engage in social disclosures primarily for legitimacy purposes or conflict management rather than as part of a comprehensive sustainability strategy.

Table 3: Corporate Governance and EVSR, ECSR and SCSR

VARIABLES	EVSR		ECSR		SCSR	
	PCSE	2SLS	PCSE	2SLS	PCSE	2SLS
BODS	-0.0061** (0.0029)	0.0216 (0.0132)	-0.0096* (0.0052)	0.11580*** (0.0541)	-0.0007 (0.0030)	0.0670*** (0.0233)
BODI	0.0011*** (0.0003)	- (0.0050)	-0.0004 (0.0007)	- (0.0342)	0.0007 (0.0005)	- (0.0147)
BODD	-0.0020 (0.0050)	-0.0050 (0.0084)	0.0120 (0.0092)	-0.0169 (0.0501)	-0.0004 (0.0083)	-0.0115 (0.0216)
BDAC	-0.0361*** (0.0093)	-0.0550*** (0.0123)	-0.0402*** (0.0122)	-0.1106** (0.0501)	-0.0046 (0.0083)	-0.0381* (0.0216)
BDGD	-0.0008 (0.0007)	-0.0005 (0.0008)	-0.0003 (0.0009)	0.0021 (0.0031)	-0.0002 (0.0006)	0.0008 (0.0014)
FRMS	0.0046 (0.0032)	- (0.0039)	0.0698*** (0.0068)	- (0.0125)	0.0229*** (0.0044)	- (0.0044)
LIQ	0.0039 (0.0093)	-0.0035 (0.0164)	0.0125 (0.0328)	-0.0468 (0.0668)	-0.0158 (0.0160)	-0.0404 (0.0288)
TOBQ	0.0081 (0.0067)	0.0055 (0.0050)	0.0200*** (0.0055)	0.0069 (0.0205)	0.0079* (0.0045)	0.0024 (0.0088)
CONSTANT	0.2360*** (0.0436)	0.2833*** (0.0536)	-0.0832 (0.0898)	0.3167 (0.2192)	0.2931*** (0.0482)	0.4398*** (0.0945)
C-D TEST	1.300 (0.19)	-	1.512 (0.14)		5.17 (0.00)	
GROUPWISE HETEROSKEDASTICITY	6685.33 (0.00)	-	44.68 (0.00)		15.49 (0.03)	
AUTOCORRELATION	0.08 (0.79)	-	6.39 (0.04)		4.19 (0.09)	
ENDOGENEITY TEST						
Durbin (score)		6.92 (0.0)		44.52 (0.00)		26.25 (0.00)
Wu-Hauman		6.86 (0.01)		64.48 (0.00)		31.05 (0.00)
WEAK INSTRUMENT TEST		5.15 (0.01)		5.15 (0.01)		5.15 (0.01)
OVERID-TEST						
Sargan (score) chi2		2.153 (0.14)		1.17 (0.28)		0.01 (0.92)
Basmann chi2		2.051 (0.15)		1.11 (0.29)		0.01 (0.92)

Note that standard errors are in parenthesis; ***, **, * represents 1%, 5% and 10% levels of significance respectively

The findings support the broader literature that corporate governance mechanisms influence sustainability reporting, but their effectiveness depends heavily on institutional quality, regulatory enforcement, and organizational commitment. The mixed results observed across EVSR, ECSR, and SCSR reinforce the need for stronger governance reforms, improved sustainability oversight, and more effective regulatory frameworks within Nigeria's oil and gas industry. The study therefore contributes to the literature by demonstrating that governance mechanisms in developing resource-dependent economies may produce varied sustainability outcomes due to political economy and institutional constraints.

5. Conclusion

Collectively, the findings revealed that corporate governance variables exert mixed influences on sustainability disclosure practices within the oil and gas sector. We established that board independence positively and significantly influences environmental sustainability reporting, suggesting that independent directors strengthen transparency and accountability in environmental disclosure practices. Conversely, audit committee effectiveness showed a negative relationship with environmental and economic sustainability reporting, indicating possible weaknesses in governance oversight and sustainability monitoring within indigenous oil and gas firms. The findings further revealed that board size negatively affects economic sustainability reporting, while firm size and Tobin's Q positively influence economic sustainability disclosure, implying that financially stronger and larger firms possess greater capacity and incentives to engage in sustainability reporting activities.

The findings relating to social sustainability reporting were largely insignificant, indicating that governance mechanisms may not substantially drive social disclosure practices within the Nigerian oil and gas industry. This suggests that social sustainability reporting is influenced more by external institutional and community pressures than by internal governance structures.

Overall, the study concludes that although corporate governance mechanisms contribute to sustainability reporting practices, their effectiveness remains uneven across different sustainability dimensions. The institutional

environment, regulatory weaknesses, and political economy realities within Nigeria's oil and gas sector significantly shape the extent and quality of sustainability disclosures. The study therefore concludes that strengthening governance structures alone may not be sufficient without corresponding improvements in regulatory enforcement, institutional accountability, and sustainability-oriented corporate culture.

The study highlights significant implications for corporate governance and sustainability reporting, particularly in developing economies like Nigeria. It affirms the relevance of the agency, stakeholder, legitimacy, and political economy theories in understanding the sustainability practices of oil and gas firms. Positive correlations between board independence and environmental reporting suggest effective governance enhances transparency. Methodologically, the study employs panel data analysis and calls for advanced estimation techniques to address issues like endogeneity. Practically, stronger governance reforms and regulatory enforcement are necessary to enhance sustainability reporting. Firms are encouraged to adopt substantial sustainability practices rather than mere symbolic compliance, specifically improving social reporting in oil-affected communities.

This study has several limitations that impact the interpretation of its findings. Firstly, it focuses on seven indigenous oil and gas firms from the Nigerian Exchange Group, resulting in a small sample size that may not be generalizable to the broader sector or other industries in Nigeria. Secondly, while the longitudinal period from 2006 to 2023 facilitates analysis over time, it may not capture future changes in sustainability practices driven by new regulations or technological advancements. Thirdly, the reliance on content analysis to measure sustainability reporting poses risks of subjectivity and potential misrepresentation of actual performance. Additionally, potential endogeneity issues, such as reverse causality and omitted variable bias, were present, although panel estimation techniques were employed to mitigate them. The study's focus on specific corporate governance variables, such as board independence and audit committee characteristics, also limits its comprehensiveness, as it omits other factors, such as ownership structure and managerial incentives. Finally, the distinct institutional and political conditions

in Nigeria's oil and gas sector may restrict the applicability of the findings to other contexts.

The study contributes to the growing literature on corporate governance and sustainability reporting in developing resource-dependent economies by providing empirical evidence from indigenous oil and gas firms in Nigeria. It also extends existing discussions by integrating political economy and institutional perspectives into the analysis of sustainability reporting practices within the extractive sector. The study lays the groundwork for future research on sustainability disclosure in emerging markets, inviting broader analyses of governance variables and contextual factors.

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