
CORPORATE ATTRIBUTES AND VOLUNTARY NON-FINANCIAL INFORMATION DISCLOSURE OF TOP TEN OIL AND GAS FIRMS IN NIGERIA

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Abstract

This study examines the relationship between corporate attributes and voluntary non-financial information disclosure (VNID) among the Top ten oil and gas firms listed on the Nigerian Exchange Group (NGX) as of December 31, 2023. Using an ex-post facto design over 2014–2023, the study conducted a census of all ten firms, extracted data from annual reports, and applied content analysis to construct a VNID index. Hypotheses were tested with a pooled-effects regression model following standard diagnostics (Pearson correlation, Variance Inflation Factor, Breusch–Pagan/Cook–Weisberg heteroscedasticity, Breusch-Pagan Lagrangian multiplier, and Hausman specification tests). Results show that auditor type and profitability have positive, statistically significant associations with VNID, whereas firm size and leverage exhibit positive but insignificant associations. These findings suggest that high-quality auditors and stronger financial performance are salient correlates of voluntary disclosure, while size and capital structure play more limited roles within this cohort. The study contributes by jointly assessing multiple firm attributes in Nigeria’s oil and gas sector, an underexplored, environmentally sensitive context and offers evidence relevant to corporate transparency and stakeholder trust in emerging markets. Overall, the study concludes that although corporate attributes positively influence VNID, disclosure levels in Nigeria’s oil and gas sector remain comparatively low. This underscores the need for firms to strengthen sustainability-focused reporting and for regulators to promote more structured, comparable, and credible non-financial disclosure practices. Policy recommendations include encouraging the engagement of reputable auditors through audit-quality standards and leveraging profitability to deepen ESG reporting and voluntary disclosure practices.

Keywords: : Corporate attributes, Voluntary Non-Financial Information Disclosure (VNID), Auditor Type, Profitability, Nigerian Oil and Gas Sector, Sustainability reporting

1. Introduction

Voluntary non-financial information disclosure (VNID) has become a critical aspect of contemporary corporate reporting as firms face increasing demands for transparency, accountability, and sustainable practices. VNID includes environmental, social, and governance (ESG) information that exceeds statutory financial requirements and supports stakeholder assessment of corporate responsibility (Fifka, 2013; Kühn et al., 2018). Globally,

VNID has expanded due to regulatory developments such as the EU Directive 2014/95/EU and standardized frameworks like the Global Reporting Initiative (GRI), which promote credibility, comparability, and consistency in sustainability reporting (Dicko et al., 2020; GRI, 2015). Investor-driven initiatives such as the Principles for Responsible Investment (PRI), coupled with heightened consumer awareness and technological transparency, have further strengthened pressure on firms to improve voluntary disclosure (USSIF, 2019; Moravcikova et al., 2015).

However, VNID remains uneven in developing economies. Barriers such as the absence of harmonized standards, high disclosure costs, regulatory weaknesses, and limited internal reporting capacity hinder effective and consistent disclosure (He & Loftus, 2014; García-Sánchez et al., 2013; Hahn & Kühnen, 2013). In Nigeria, although bodies like the Financial Reporting Council (FRC) and the Nigerian Exchange Group (NGX) encourage sustainability reporting, compliance remains voluntary and inconsistent (FRC, 2018; Ofoegbu et al., 2018). Challenges are most pronounced in the oil and gas sector, where environmental degradation, community conflict, and governance concerns intensify the need for transparent reporting (Aluwong & Fodio, 2019; Oba et al., 2012; Onyekwelu & Ubesie, 2016; NEITI, 2020). Multinational firms generally comply with international standards, while many indigenous firms provide minimal or unverified disclosures (Uwuigbe, 2011; Wofuru & Eberechi, 2024).

To explain variations in VNID, scholars have examined firm-specific attributes. Auditor type influences disclosure because Big Four auditors require higher reporting quality aligned with global standards (Simnett, 2012). Profitability is associated with greater disclosure as profitable firms signal strength and responsible behaviour (Reverte, 2009). Larger firms disclose more due to visibility and stakeholder pressure (Gray, Kouhy & Lavers, 1995). Leverage shows mixed effects: some theories predict more disclosure to reduce information gaps, while others suggest disclosure may be reduced to conceal financial vulnerability (Jensen & Meckling, 1976; Roberts, 1992).

Research has rarely examined how multiple firm attributes jointly influence VNID in Nigeria's high-risk oil and gas sector. Most studies focus on single attributes or use mixed theories, highlighting the need for a sector-specific, theoretically grounded investigation.

Against this background, this study investigates the relationships between key corporate attributes and voluntary non-financial information disclosure among the top ten oil and gas firms in Nigeria. Specifically, the study aims to:

1. Examine the relationship between auditor type and voluntary non-financial information disclosure.
2. Investigate the association between profitability and voluntary non-financial information disclosure.
3. Determine how firm size relates to voluntary non-financial information disclosure.
4. Assess the relationship between leverage and voluntary non-financial information disclosure.

The study examines the top ten oil and gas firms on the NGX from 2014–2023 to track voluntary non-financial disclosure trends and the impact of recent governance and sustainability reforms. Focusing on this high-impact sector fills a major literature gap and reinforces corporate reporting theories. Its findings offer practical insights for regulators and policymakers seeking to improve transparency, accountability, and stakeholder engagement in Nigeria’s oil and gas industry.

2. Theoretical Background & Hypotheses Statements

This study is underpinned by three key theoretical perspectives, i.e. Agency Theory, Stakeholder Theory, and Legitimacy Theory, which together provide a comprehensive foundation for explaining why firm attributes may relate to voluntary nonfinancial information disclosure (VNID), particularly within Nigeria’s oil and gas sector. These theories guide the study’s conceptual framework by explaining corporate incentives, stakeholder pressures, and societal expectations surrounding disclosure behavior.

2.1. Theoretical Background

Agency Theory

Agency Theory explains that information imbalance between shareholders and managers can create opportunities for managerial opportunism, making voluntary disclosure a tool for reducing agency costs and investor uncertainty (Jensen & Meckling, 1976). Empirical studies show that firm attributes such as auditor type and profitability help mitigate agency conflicts; Big Four auditors enhance reporting quality, while profitable firms disclose more to signal efficiency and lower risk (Simnett, 2012; Reverte, 2009). However, findings remain inconsistent across industries, indicating the need for further research, especially in sensitive sectors like oil and gas where agency pressures are heightened.

Stakeholder Theory

Stakeholder Theory argues that firms operate within a network of stakeholders whose expectations shape corporate actions (Fifka, 2013; De Villiers & van Staden, 2020). VNID serves as a strategic tool for demonstrating responsiveness and securing essential resources. Larger firms disclose more due to heightened scrutiny, while highly leveraged firms may increase disclosure to reassure creditors. However, empirical results on firm size and leverage remain mixed across contexts, highlighting the need for industry-specific research, especially in Nigeria’s oil and gas sector, where stakeholder pressures are particularly strong and often contentious.

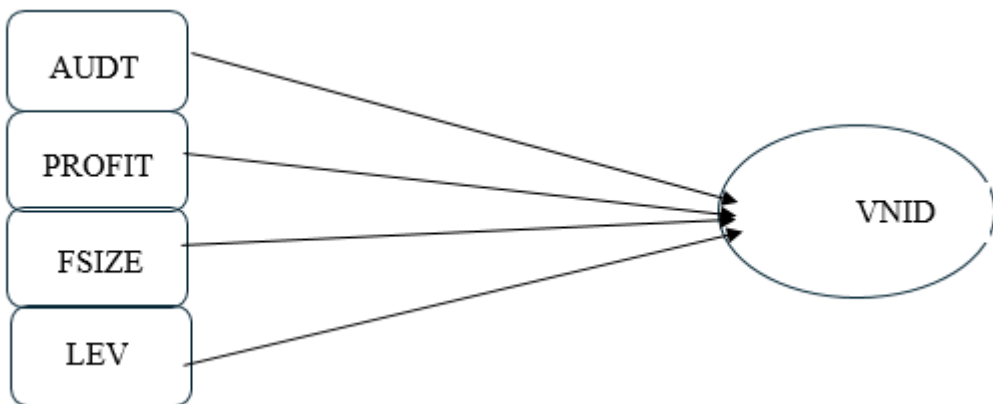
Legitimacy Theory

Legitimacy Theory posits that firms must align their actions with societal norms to maintain a “social contract” and sustain their license to operate (Suchman, 1995). In high-risk sectors like oil and gas, voluntary non-financial disclosure helps manage reputational risk and demonstrate accountability. Corporate attributes such as auditor type and profitability enhance legitimacy by improving the credibility and quality of disclosures. However, many indigenous firms in developing economies still disclose inadequately, suggesting legitimacy pressures vary across regulatory and cultural contexts. This highlights the need for empirical studies on how firm attributes shape VNID where legitimacy is fragile and stakeholder trust is low.

Taken together, these theories provide complementary explanations for VNID:

- Agency Theory highlights the governance and monitoring motivations for disclosure.
- Stakeholder Theory emphasizes the firm’s need to respond to diverse stakeholder pressures.
- Legitimacy Theory underscores the societal and reputational drivers of disclosure practices.

By integrating these perspectives, the study recognizes that corporate attributes (auditor type, profitability, firm size, and leverage) are not merely financial or structural characteristics, they are proxies for governance quality, visibility, resource availability, and institutional pressure. These attributes shape firms’ disclosure behaviour through different theoretical pathways, explaining why their relationships with VNID warrant further empirical investigation.



Corporate Attributes and Disclosure

Corporate attributes refer to internal firm characteristics that shape managerial decision-making and influence the extent and quality of voluntary non-financial information disclosure. In the disclosure literature, four key attributes; **auditor type**, **profitability**, **firm size**, and **leverage** are commonly examined. These attributes capture essential dimensions of governance quality, financial performance, organizational visibility, and capital structure.

2.2. Hypotheses Statement

Auditor Type

Auditors play a crucial role in shaping disclosure practices. Firms audited by international “Big 4” firms are generally expected to disclose more information, given the auditors’ emphasis on quality reporting, reputational considerations, and adherence to international standards. Al-Shammari (2020) found that Big 4 auditors in Kuwait were associated with higher levels of voluntary disclosure, while Adegbie et al. (2022) reported similar evidence in Sub-Saharan Africa. In Nigeria, Ude (2018) observed that firms engaging top-tier auditors tended to adopt broader disclosure practices, as these auditors insist on transparency to protect their credibility.

Thus, auditor type functions both as a monitoring mechanism and as a driver of voluntary non-financial reporting.

H1: Auditor type has no positive relationship with the voluntary nonfinancial information disclosure of oil and gas companies in Nigeria.

Profitability

Profitability is another critical determinant of disclosure. According to signaling theory, profitable firms may disclose more to highlight their financial strength and attract investors. Empirical results, however, remain mixed. Rahman et al. (2022) found profitability positively related to voluntary disclosure in Malaysia, while Onyekwelu and Ubesie (2016) reported similar findings in Nigerian banks. Yet, Ofoegbu and Megwai (2021) found no significant effect of profitability in Nigerian manufacturing firms. These inconsistencies suggest that the relationship may depend on industry dynamics. In the oil and gas sector, profitability could encourage firms to disclose more in order to manage legitimacy pressures and highlight corporate responsibility initiatives.

H2: Profitability has no positive relationship with the voluntary nonfinancial information disclosure of oil and gas companies in Nigeria.

Firm Size

Firm size is often associated with disclosure, as larger firms face greater public visibility, regulatory oversight, and stakeholder demands. Agency and legitimacy theories predict that larger firms disclose more to manage political costs and maintain legitimacy. Empirical evidence has been supportive in many contexts (Agyemang & Castellini, 2021). However, in Nigeria, findings remain inconclusive. While Odoemelam and Okafor (2018) observed a positive relationship, Ude and Onogu (2020) found firm size to be insignificant. This contradiction highlights the need for sector-specific analysis, particularly in industries such as oil and gas where firm size is large, but disclosure incentives may vary.

H3: Leverage has no positive relationship with the voluntary nonfinancial information disclosure of oil and gas companies in Nigeria.

Leverage

Leverage reflects the extent of a firm's reliance on debt financing. Stakeholder and agency theories suggest that highly leveraged firms may disclose more information to reassure creditors and mitigate concerns about default risk. However, evidence has been inconsistent. Ofoegbu and Megwai (2021) found leverage to be unrelated to environmental disclosure in Nigerian manufacturing firms, while Aluwong and Fodio (2019) reported a weak positive association in oil and gas companies. The mixed results raise questions about the actual role of leverage in influencing voluntary disclosure, making it a variable of continuing interest.

H4: Firm size has no positive relationship with the voluntary nonfinancial information disclosure of oil and gas companies in Nigeria.

Taken together, these corporate attributes highlight the complexity of voluntary disclosure behavior. Their effects are not uniform across contexts, which underscores the importance of examining them within the Nigerian oil and gas sector.

3. Methodology

This study adopts an ex-post facto and longitudinal research design, relying on historical data extracted from firms’ annual reports. A census of all ten firms was conducted, ensuring full coverage of the sector’s largest, most visible, and environmentally sensitive entities. The study covers the period 2014-2023, a decade characterized by increased emphasis on sustainability and voluntary nonfinancial reporting in Nigeria and other emerging economies.

The focus on major oil and gas firms is justified by their significant environmental and social impact, as well as their exposure to public and regulatory scrutiny. Larger firms are generally more responsive to stakeholder pressure and are more likely to align with international sustainability reporting standards such as those advanced by the Global Reporting Initiative (GRI). Their prominence and societal relevance make them suitable for examining the determinants of voluntary nonfinancial information disclosure (VNID).

The study relies exclusively on secondary data obtained through content analysis of annual reports sourced from the NGX website. Data on VNID and firm-specific attributes including profitability, firm size, leverage, and auditor type, were extracted from these reports. Panel data analysis was employed, incorporating descriptive statistics, correlation analysis, and panel regression techniques. Diagnostic tests for multicollinearity, heteroskedasticity, and autocorrelation were conducted to ensure the robustness and reliability of the empirical results.

3.1. Measurement of Variables

- **Dependent Variable:**

VNID was measured through content analysis, scoring annual reports against a disclosure index covering environmental, social, governance, and risk items. Each disclosed item scored “1” and undisclosed “0,” with the VNID index computed as the proportion of items disclosed.

- **Independent Variables:**

1. **Auditor Type (AUD):** A dummy variable coded 1 if the firm was audited by a Big 4 auditor and 0 otherwise.
2. **Profitability (PROF):** Measured as return on assets (ROA), computed as profit after tax divided by total assets.
3. **Firm Size (FSIZE):** Proxied by the natural logarithm of total assets.
4. **Leverage (LEV):** Calculated as the ratio of total debt to total assets.

Table 1

Explanation and Measurement of Variables

Variable	Type	Measurement
VNID	Dependent	VNID - voluntary nonfinancial information disclosure. It consists of environmental, social, and economic/governance disclosures

		measured as 1 if an item is disclosed and 0 if otherwise.
Auditor Type (AUDT)	Independent	Auditor type - the choice of the Big4 (EY, Deloitte, KPMG, and PwC) as the external auditor. It is measured as a dummy variable that equals 1 if the firm is audited by any of the Big4 audit firms, otherwise 0.
Profitability (ROE)	Independent	Profitability - proxied with Return on Equity (ROE). It is measured as a ratio of net income to shareholders' equity.
Firm Size (FSIZE)	Independent	Firm size. The measurement is the company's year-end total assets.
Leverage (LEV)	Independent	Leverage is measured as the ratio of total liabilities to total assets. It reflects the firm's financial risk and the extent to which creditors may expect more disclosure.

3.2. Model Specification

This study estimates the following panel regression model to enable it to test the hypotheses regarding the relationship between corporate attributes (auditor type, profitability, leverage, and firm size) and the disclosure of voluntary nonfinancial information. The model is adapted from Talab et al. (2023), who examined the relationship between governance attributes and sustainability performance quality in Malaysia.

$$VNID = f(\text{AUDT} + \text{PROFITA} + \text{LEV} + \text{FSIZE}) .$$

$$VNID_{it} = \beta_0 + \beta_1 \text{AUDT}_{it} + \beta_2 \text{PROFITA}_{it} + \beta_3 \text{FSIZE}_{it} + \beta_4 \text{LEV}_{it} + \beta_4 \text{YEARDUM}_{it} \cdot \varepsilon_{it}$$

3.3. Methods of Data Analysis

The study employed descriptive statistics, correlation analysis, and multiple regression to assess relationships and test hypotheses. Diagnostic checks for normality, heteroskedasticity, and multicollinearity validated model assumptions, and statistical significance were determined at the 5% level.

4. Results And Discussion

4.1. Descriptive Statistics

Table 2 summarizes the descriptive statistics of the entire data set.

Table 2

Descriptive Statistics

Variables	Observations	Mean	Std. Dev.	Min	Max
VNID	100	30.00	0.09	0.02	0.5
AUDT	100	0.72	0.45	0	1
PROFITA	100	17.50	18.13	-23.86	68.54
FSIZE'LOG	100	7.15	0.66	5.22	8.34
LEV	100	30.78	17.93	0.47	67.36

Source: Author's computation from annual reports (2014–2023)

The descriptive statistics reveal important patterns in VNID among Nigeria's top oil and gas firms and align with earlier sustainability studies. The average VNID score is 30%, with disclosures ranging from 2% to 50%, indicating low but gradually improving reporting levels, consistent with prior findings in the Nigerian oil and gas sector (Abdulsalam & Babangida, 2020; Aluwong & Fodio, 2019; Ofoegbu et al., 2018; Sanusi & Sanusi, 2019; Sulaiman et al., 2018). Profitability (ROE) varies widely, from -23.86% to 68.54%, reflecting differing financial performance across firms. Firm size, with asset values logged between 5.22 and 8.34, mirrors earlier results (Aluwong & Fodio, 2019; Abdulsalam & Babangida, 2020), confirming the dominance of large firms whose size shows a positive but insignificant link to VNID. Leverage also exhibits substantial variation (0.47%–67.36%), consistent with related literature (Aluwong et al., 2019; Manning et al., 2019), yet remains insignificant in explaining VNID. Overall, these descriptive patterns support regression results showing that profitability and auditor quality meaningfully influence VNID, while sector-wide disclosure remains uneven.

4.2. Pearson Correlation

Table 3 below is the correlation matrix for the data set to show the extent of associations between the variables of interest.

Table 3

Pearson Correlation Matrix

VARIABLES	VNID	AUDT	PROFITA	FSIZELOG	LEV
VNID	1.000				
AUDT	0.0047	1.000			
PROFITA	0.20**	0.078	1.000		
FSIZELOG	0.0189	0.266***	0.3281***	1.000	

LEV	0.0212	0.085***	0.3612***	0.0818	1.000
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Note: Significant at * = $p \leq 0.10$, ** = $p \leq 0.05$, and *** = $p \leq 0.01$. VNID - Voluntary Nonfinancial Information Disclosure, AUDT is the auditor type, PROFITA represents Profitability, FSIZE is the company size, and LEV is leverage.

The Pearson correlation results show that VNID has generally weak associations with all independent variables. Profitability exhibits the strongest positive relationship with VNID ($r = 0.20$, $p \leq 0.05$), indicating that more profitable firms disclose slightly more non-financial information. Auditor type, firm size, and leverage show very weak and insignificant correlations with VNID. Among the independent variables, moderate correlations appear, firm size relates positively to profitability ($r = 0.3281$, $p \leq 0.01$) and auditor type ($r = 0.266$, $p \leq 0.01$), while profitability correlates with leverage ($r = 0.3612$, $p \leq 0.01$). None of the coefficients approach the 0.80 multicollinearity threshold.

4.3. Variance Inflation Factor

Table 4 shows the result of the VIF to confirm the absence of multicollinearity as indicated by the correlation matrix.

Table 4

Variance Inflation Factor

VARIABLE	VIF	1/VIF
PROFITTA	1.44	0.69
LEV	1.27	0.78
BIG4	1.16	0.85
FSIZELOG	1.35	0.74
MEAN VIF	1.31	

AUDT is auditor type, PROFITA is measured by return on equity, FSIZE is firm size, and LEV is leverage.

The Variance Inflation Factor (VIF) at 1.31 portrays the absence of multicollinearity as indicated by the Pearson correlation matrix.

The Variance Inflation Factor (VIF) results show values between 1.16 and 1.44, with a mean of 1.31, all well below the common multicollinearity thresholds of 5 or 10. This indicates that the independent variables, i.e. auditor type, profitability, firm size, and leverage are not highly correlated, confirming the Pearson correlation findings. The absence of multicollinearity ensures that each variable contributes distinct explanatory power, producing stable and reliable regression estimates. Overall, the VIF results support the inclusion of all four corporate attributes in analyzing their relationship with voluntary non-financial information disclosure.

4.4. Serial Correlation (Autocorrelation)

Table 5 presents the result of the Wooldridge test for serial correlation.

Table 5

Test for Autocorrelation

Wooldridge test for autocorrelation in panel data (xtserial roe fsizelev)	
H0 =	no first-order autocorrelation
F(1, 9) =	1262.590
Prob > F =	0.0000

Source: STATA 14 Output

The Wooldridge test for serial correlation is significant at 0.000, indicating the presence of first-order autocorrelation as shown in Table 5 above.

The significant Wooldridge test result indicates the presence of first-order autocorrelation, meaning the disclosure behavior of oil and gas firms is correlated across years and influenced by past reporting patterns. This violates a key OLS assumption, making OLS standard errors unreliable if used alone. Consequently, the study appropriately employed FGLS and PCSE techniques, which correct for autocorrelation and produce more robust estimates. This enhances the credibility of the regression results and reflects the realistic persistence of VNID practices within Nigeria’s oil and gas sector over the 10-year period.

4.5. Test for Heteroscedasticity

Table 6

Test for heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity (Hetttest)	
Ho:	Constant variance
Variables:	Fitted values of VNID
chi2(1) =	0.07
Prob > chi2 =	0.7855

Source: STATA 14 Output

Heteroscedasticity is not an issue as the Breusch-Pagan/Cook-Weisberg test is insignificant at the 0.7855 level as indicated by Table 6 above.

The Breusch-Pagan/Cook-Weisberg test yields a chi-square value of 0.07 with a corresponding p-value of 0.7855, which is far above the conventional significance levels (1%, 5%, or 10%). This means the null hypothesis of constant variance is accepted. Therefore, the model does not

suffer from heteroscedasticity, and the error terms maintain constant variance. As a result, the regression estimates and standard errors are reliable and valid, supporting the robustness of the study's findings.

4.6. Breusch and Pagan Lagrangian Multiplier Test for Random Effects

Table 7

Lagrangian Multiplier Test for Random Effects (hettest0)

Breusch and Pagan Lagrangian multiplier test for random effects

$$tsrqi[id,t] = Xb + u[id] + e[id,t]$$

Estimated results:

	Var	sd = sqrt (Var)
VNID	0.0088409	0.0940262
E	0.0086178	0.0928322
U	0.0003554	0.0188526

Test: Var (u) = 0
 chibar2(01) = 0.10
 Prob > chibar2 = 0.3786

Source: STATA 14 Output

The result of the Lagrangian Multiplier test (Breusch & Pagan, 1980) for the VNID Model is insignificant at 0.3786 level as presented in Table 7, indicating that the Pooled Effect Model is more appropriate. Moreover, as indicated by Table 5 above, autocorrelation constitutes a threat, thereby rendering the OLS not a completely appropriate estimation technique. Consequently, the study ran further regressions using generalized least squares (GLS) and panel-corrected standard errors (PCSEs) to check the robustness of the result of the main model (Elaigwu *et al.*, 2024; Katmon *et al.*, 2019).

4.7. Regression Results for VNID Model

Table 8

OLS, GLS, and PCSE Regression Results for NFID Model

VARIABLES	OLS	GLS	PCSE
AUDT	0.02 (1.10)**	0.02 (1.15)**	0.02 (1.24)***
PROFITA	0.00	0.00	0.00

	(2.81)***	(2.95)***	(2.48)**
FSIZE	0.02 (1.47)	0.02 (1.54)	0.02 (1.92)**
LEV	0.00 (1.27)	0.00 (1.33)	0.00 (1.37)
_cons	0.40 (4.43)***	0.46 (5.41)***	0.40 (5.68)***
<i>Number of obs</i>	100	100	100
<i>Prob > chi2</i>	0.000	0.000	0.000
<i>Panels</i>	-	homoskedastic	homoskedastic
<i>Correlation</i>	-	no autocorrelation	no autocorrelation

Note: * = $p \leq 0.10$, ** = $p \leq 0.05$, and *** = $p \leq 0.01$. AUDT stands for auditor type, PROFITA is measured by ROE, which is the return on equity, CSIZE stands for company size, LEV is leverage, and YEARDUM is a year dummy.

Table 8 shows the regression results using Ordinary Least Square (Pooled Effect), integrated with the Feasible Generalized Least Square (FGLS) and the Panel Corrected Standard Errors (PCSEs) to check the robustness of the results of the study following Zhuang et al. (2018).

4.8. Further Analysis of the Three Themes of VNID

Table 9

Regression Results for the Separate Dimensions of the VNID Model

Variables	Evnid	Envnid	Svnid
AUDT	0.00 (0.34)*	0.00 (0.73)***	0.01 (1.47)***
PROFITAB	0.00 (2.58)***	0.00 (1.25)**	0.00 (3.18)***
FSIZE	0.00 (0.54)	0.00 (1.37)	0.01 (1.90)**
LEV	0.00 (1.95)**	0.00 (0.31)	0.00 (1.38)

<i>_cons</i>	0.10 (3.76)***	0.10 (3.02)***	0.18 (4.70)***
<i>Number of obs</i>	100	100	100
<i>Prob > chi2</i>	0.000	0.000	0.000
<i>Panels</i>	-	-	-
<i>Correlation</i>	-	-	-

Note: * = $p \leq 0.10$, ** = $p \leq 0.05$, and *** = $p \leq 0.01$. VNID is nonfinancial information disclosure, EVNID is Economic VNID, ENVNID is Environmental VNID, SVNID is Social VNID, AUDT stands for auditor type, PROFITAB is measured by ROE, which is return on equity, CSIZE stands for company size, LEV is leverage, YEARDUM Year dummy.

Table 9 above reports how auditor type, profitability, firm size, and leverage relate to the economic (EVNID), environmental (ENVNID), and social (SVNID) components of VNID. In all models, Prob > $\chi^2 = 0.000$, showing the regressors jointly explain each disclosure dimension significantly.

Auditor type (AUDT) shows positive relationships across all VNID dimensions, being weakly significant for EVNID (0.00; $t = 0.34$, $p \leq 0.10$) and strongly significant for ENVNID (0.00; $t = 0.73$, $p \leq 0.01$) and SVNID (0.01; $t = 1.47$, $p \leq 0.01$), indicating that Big Four auditors consistently enhance disclosure quality.

Profitability (PROFITAB) is also positive and highly significant for EVNID (0.00; $t = 2.58$, $p \leq 0.01$), ENVNID (0.00; $t = 1.25$, $p \leq 0.05$), and SVNID (0.00; $t = 3.18$, $p \leq 0.01$), confirming it as a strong and consistent driver of all disclosure dimensions.

Firm size (FSIZE) remains positive but insignificant for EVNID (0.00; $t = 0.54$) and ENVNID (0.00; $t = 1.37$), becoming significant only for SVNID (0.01; $t = 1.90$, $p \leq 0.05$), suggesting that larger firms disclose more social information due to stakeholder scrutiny. Leverage (LEV) is positive and significant only for EVNID (0.00; $t = 1.95$, $p \leq 0.05$), but insignificant for ENVNID (0.00; $t = 0.31$) and SVNID (0.00; $t = 1.38$), indicating that creditors primarily influence economic rather than environmental or social disclosures.

4.9.1 Test of Hypotheses

The study examines how auditor type, profitability, firm size, and leverage relate to VNID using panel data (2014–2023) analysed through OLS, GLS, and PCSE. Auditor type and profitability exhibit significant positive relationships with VNID, leading to the rejection of H1 and H2. In contrast, firm size and leverage display positive but insignificant relationships, resulting in the acceptance of H3 and H4. Consequently, H1 and H2 were not supported, while H3 and H4 were validated. Overall, the findings show that auditor type and profitability are

significantly related to higher VNID, whereas firm size and leverage are only marginally related to VNID.

4.9.2 Discussion of Findings

The findings indicate that auditor type and profitability each show a positive and statistically significant relationship with VNID, whereas firm size and leverage demonstrate positive but statistically insignificant associations. Consequently, Hypotheses 1 and 2 were not supported, while Hypotheses 3 and 4 were upheld. Overall, the results suggest that auditor type, profitability, firm size, and leverage are relevant firm attributes related to voluntary non-financial information disclosure, with auditor quality and profitability exhibiting the strongest associations.

Auditor Type and VNID

The study shows a positive, significant relationship between auditor type and VNID, with Big Four auditors enhancing disclosure quality (Elaigwu et al., 2023; Katmon et al., 2019). This supports Agency Theory through reduced information asymmetry (Jensen & Meckling, 1976), Legitimacy Theory via strengthened credibility (Suchman, 1995), and Stakeholder Theory through improved accountability (Freeman, 1984).

Profitability and VNID

Profitability shows a positive, significant relationship with VNID, indicating that more profitable firms disclose more sustainability information (Aliyu, 2019; Aluwong & Fodio, 2019). This supports Legitimacy Theory, as firms signal strength, and Stakeholder Theory, as stronger performance attracts greater disclosure pressure.

Firm Size and VNID

Firm size shows a positive but insignificant relationship with VNID, consistent with earlier findings (Aluwong & Fodio, 2019; Osemene & Fagbemi, 2019; Abdulsalam & Babangida, 2020), suggesting that disclosure practices in Nigerian oil and gas firms are not primarily driven by organizational scale.

Leverage and VNID

Leverage exhibits a positive but insignificant relationship with VNID. This finding is similar to studies such as Elaigwu et al. (2022), who report a non-significant link, but contrasts with others recording significant outcomes (Abdulsalam & Babangida, 2020; Aluwong & Fodio, 2019). The mixed empirical evidence reflects theoretical ambivalence: leveraged firms may provide more disclosure to reassure creditors (Stakeholder Theory) yet may also limit disclosure to avoid revealing financial vulnerability (Agency Theory).

5. Conclusion, Implications, Recommendations, And Limitations

5.1. Conclusion

The study finds that auditor type and profitability significantly enhance voluntary non-financial information disclosure (VNID) among Nigeria's top oil and gas firms, while firm size and leverage show positive but insignificant effects. Although these attributes influence disclosure behaviour, overall VNID levels remain low, revealing a persistent transparency gap. The study

recommends stronger national sustainability reporting frameworks, improved ESG data systems, high-quality external assurance, and capacity-building for indigenous firms. Overall, the study concludes that, while auditor quality and profitability are key drivers of VNID, substantial improvements in disclosure depth and credibility are needed to meet global reporting expectations.

5.2. Implications and Recommendations

The study offers practical and theoretical insights for Nigeria's oil and gas sector. Practically, it shows that firms can strengthen transparency and stakeholder trust by engaging high-quality auditors, leveraging profitability to improve ESG reporting, and maintaining prudent leverage, while regulators can develop sector-specific guidelines and promote alignment with global standards such as the GRI. Theoretically, the findings reinforce agency, stakeholder, and legitimacy theories, highlighting auditor quality and profitability as key drivers of VNID, while firm size and leverage play lesser roles, indicating opportunities for further research.

Accordingly, the study proposes the following recommendations:

i. Encouraging the Engagement of High-Quality Auditors

Regulators should encourage firms to engage reputable, high-quality auditors, as stronger audit assurance enhances VNID, improves transparency, and boosts stakeholder confidence through more credible and reliable sustainability reporting.

ii. Promoting Profitability-Driven Transparency

Profitable firms should use their financial strength to enhance ESG reporting, while regulators provide incentives and frameworks encouraging expanded, transparent voluntary disclosure.

iii. Improving Disclosure Practices Among Large Firms

Larger firms should enhance non-financial reporting due to their visibility and impact, and policymakers should introduce sector-specific guidelines aligned with global standards like GRI.

iv. Aligning Leverage with Transparency Objectives

Firms should maintain balanced leverage to support transparent reporting, while lenders incorporate ESG disclosure expectations into credit decisions to ensure continued accountability.

v. Strengthening Regulatory and Policy Support

Regulators should strengthen policies and incentives such as tax benefits and recognition schemes, to encourage firms of all sizes to enhance transparency and voluntary sustainability disclosure.

5.3. Limitations of the Study

This study is limited by its focus on only the top ten NGX-listed oil and gas firms, which restricts the generalizability of findings to smaller or unlisted firms. VNID measurement is based solely on annual report content, potentially overlooking disclosures made through other

channels. The 2014–2023 timeframe also means post-2023 regulatory, or sustainability developments are not captured. Finally, the study’s associational design identifies relationships not causality between firm attributes and VNID, despite the robustness checks employed.

5.4. Suggestions for Further Studies

Future studies should extend beyond top oil and gas firms by including multiple NGX sectors to improve generalizability. Researchers should also examine additional attributes such as firm age, ownership structure, gender diversity, and governance mechanisms. Extending the study period beyond 2023 would capture new regulatory and global sustainability developments. Moreover, adopting qualitative or mixed-methods approaches would provide deeper insights into managerial motivations, stakeholder pressures, and institutional factors influencing VNID practices.

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