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Research Article

Effect of Board Structure on Voluntary Disclosure Quality of Listed Industrial Goods Firms in Nigeria

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A B S T R A C T

This study examines the effect of board structure on voluntary disclosure quality (VDQ) of listed industrial goods companies in Nigeria. Specifically, the study investigates the influence of board size, board independence, board financial expertise, board diligence and board gender diversity on voluntary disclosure quality. Anchored on resource dependency theory, signaling theory and stakeholder theory, the study adopts an ex-post facto research design and employs secondary data sourced from the audited annual reports and accounts of 14 listed industrial goods firms on the Nigerian Exchange Group (NGX) for the period 2021–2025, yielding 70 firm-year observations. A 60-item voluntary disclosure quality index (VDQI) encompassing ten thematic dimensions was constructed and applied to quantify VDQ. Data were analyzed using descriptive statistics, Pearson correlation, ordinary least squares (OLS) regression and mixed model analysis (MMA). The results reveal that board independence (β=0.053, p=0.004), board financial expertise (β=0.022, p=0.041) and board gender diversity (β=0.025, p=0.001) exert statistically significant positive effects on voluntary disclosure quality while board size (β=0.004, p=0.555) and board diligence (β=0.011, p=0.169) show positive but statistically insignificant effects. The model accounts for approximately 69.1% of variation in VDQ (R^2=0.691). These findings underscore the critical roles of independent directors, financially literate board members and gender-diverse boards in enhancing corporate transparency. The study recommends regulatory strengthening of board independence requirements, mandatory financial expertise standards and gender diversity quotas for listed industrial firms in Nigeria.

1. INTRODUCTION

Corporate transparency and the quality of information disclosed in annual reports have gained renewed scholarly and regulatory attention following a series of high-profile governance failures globally from Enron and WorldCom to more recent collapses involving Signature Bank, Silicon Valley Bank, Wirecard and Adoni Group (Onoja, Oto & Onmikpa 2023). There is currently an on-going investigation into $1.6 billion accounting frauds at Nidec Corporation, described as one of the biggest scandals of the decade in Japan. These events underscore the consequences of weak corporate governance and inadequate disclosure practices, reinforcing the centrality of voluntary disclosure quality (VDQ) as a mechanism for enhancing investor confidence and reducing information asymmetry (Tian & Chen, 2009; Mwacha et al., 2023). Voluntary disclosure defined as the sharing of financial and non-financial information beyond statutory requirements has emerged as a critical index of good corporate governance and a strategic tool through which firms signal their quality, manage stakeholder expectations and attract resources (Spence, 1973; Freeman, 1984).

The board of directors occupies a pivotal governance role in shaping firms' disclosure policies. Board attributes including size, independence, financial expertise, meeting diligence and gender diversity influence managerial behaviour and the extent to which firms go beyond regulatory minima to provide transparent and reliable information (Fama & Jensen, 1983; Shehata, 2014). While a growing body of literature has examined the relationship between board characteristics and disclosure practices in developed economies (Alyousef & Alsughayer, 2021; Hanen et al., 2020; Boateng et al., 2021), empirical evidence from emerging markets and from the Nigerian industrial goods sector in particular remains limited and inconclusive (Bitrus et al., 2024; Suleiman et al., 2022; Ugoh, 2024).

Nigeria's industrial goods sector is strategically important and makes significant contribution to economic growth, employment and infrastructure development. However, concerns persist regarding the adequacy and quality of information voluntarily disclosed by firms in this sector. Weak disclosure practices have been associated with poor investor protection, reduced market confidence and inefficient capital allocation (Adelopo, 2021; Shuaibu & Isah, 2019). Although regulatory reforms and the Nigerian Code of Corporate Governance (NCCG, 2018) have been introduced to improve transparency, inter-firm variations in disclosure quality suggest that governance mechanisms, particularly board structure, may not be functioning optimally. Existing Nigerian studies have largely focused on financial performance or mandatory disclosure compliance within the financial sector (Yahaya et al., 2025; Olugbenga et al., 2020), leaving the quality dimension of voluntary disclosure and the industrial goods sector under-explored.

Against this backdrop, this study examines the effect of board structure on voluntary disclosure quality of listed industrial goods firms in Nigeria. Specifically, it investigates the influence of board size, board independence, board financial expertise, board diligence and board gender diversity on a 60-item voluntary disclosure quality index (VDQI) constructed and applied to 14 firms over the 2021–2025 periods. The study makes three key contributions. First, it extends voluntary disclosure quality research to the Nigerian industrial goods sector. Second, it operationalizes a comprehensive, multi-dimensional VDQI. Finally, it applies mixed model analysis alongside OLS regression to generate robust panel estimates.

The rest of the paper is organized as follows: section 2 reviews related literature, section 3 outlines the methodology, section 4 presents and discusses findings, and section 5 provides conclusions and recommendations.

2. LITERATURE REVIEW

2.1 Theoretical Framework

This study is anchored on three complementary theories. Resource Dependency Theory (RDT) developed by Pfeffer and Salancik (1978) posits that organizations depend on external resources and must strategically manage relationships with stakeholders who control such resources. Voluntary disclosure serves as a key mechanism through which firms build trust, reduce uncertainty and facilitate access to capital and other critical resources. In the context of board structure, RDT predicts that boards with greater diversity of expertise, independence and gender representation are better positioned to manage external dependencies and incentivize higher-quality disclosure (Pfeffer & Salancik, 1978; Kor & Sundaramurthy, 2009).

Signaling Theory propounded by Spence (1973) holds that firms possessing superior performance or governance quality voluntarily disclose more information to signal their quality to the market thereby distinguishing themselves from lower-quality competitors. Applied to board structure, the theory predicts that boards composed of independent, financially expert and gender-diverse members will signal stronger governance quality through higher disclosure as such signals reduce information asymmetry and attract investment (Varrecchia, 1983; Ross, 1977).

Stakeholder Theory credited to Freeman (1984) argues that firms have obligations to a broad range of constituencies beyond shareholders whose interests must be integrated into corporate strategy and reporting. The theory motivates voluntary disclosure as a means of fulfilling accountability obligations to employees, customers, suppliers, government and communities (Weiss, 2014; Archie & Ann, 2014).

2.2 Board Structure and Voluntary Disclosure Quality

Board size refers to the total number of directors serving on a company's board (El-Deeb et al., 2021). Larger boards bring greater diversity of expertise and networks, potentially enhancing disclosure quality through improved oversight and resource acquisition (Laksmana, 2008; Cheng & Courtenay, 2006). However, agency theory cautions that excessively large boards may suffer from coordination problems and free-rider effects potentially reducing monitoring effectiveness (Jensen, 1993). Empirically, Adebayo et al. (2023) and Alyousef and Alsughayer (2021) document significant positive relationships between board size and voluntary disclosure, while Abdelhaq et al. (2022) report similar findings in Palestine.

Board independence defined as the proportion of non-executive directors on the board is widely theorized to enhance disclosure quality by strengthening the board's oversight function and reducing managerial discretion over disclosure decisions (Fama & Jensen, 1983; Lee & Luu, 2017). Independent directors have closer relationships with stakeholders and are more likely to advocate for transparent and accurate disclosure (Masum & Khan, 2019; Alnabsha et al., 2018). Mwacha et al. (2023), Adebayo et al. (2023), and Hanen et al. (2020) all report positive relationships between board independence and disclosure levels. However, some studies find insignificant relationships (Yahaya et al., 2025; Abdelhaq et al., 2022) suggesting contextual moderation.

Board financial expertise as the proportion of board members with professional knowledge in accounting, finance or financial management is expected to enhance disclosure quality by improving the board's capacity to evaluate and communicate financial and non-financial information (Juhmani, 2017; Kibiya et al., 2016). The NCCG 2018 explicitly requires at least one board member to possess financial management and accounting knowledge. Naheed (2022) observes that financially expert directors enhance investment decisions and resource acquisition, while Olugbenga et al. (2020) report a significant positive relationship between board financial expertise and anti-corruption disclosure quality in Nigerian deposit money banks. Suleiman et al. (2022) similarly find significant positive effects of board financial expertise on financial disclosures of Nigerian industrial goods firms.

Board diligence, operationalized as the frequency of board meetings reflects the intensity of board oversight activity. Jensen (1993) argues that meeting frequency is a critical tool for enhancing monitoring. Ntim and Osei (2011) document a positive relationship between board meeting frequency and firm performance in South Africa, while Hanen et al. (2020) report positive effects on governance and environmental disclosure in France. However, Sanyaolu et al. (2020) find a significant negative effect on financial performance of Nigerian banks, and Ladini et al. (2024) report a negative significant effect of board meeting frequency on environmental disclosure of Nigerian manufacturing firms, suggesting that excessive meetings may not translate into disclosure quality improvements.

Board gender diversity refers to the proportion of female members on the board and it is expected to enhance disclosure quality by introducing diverse perspectives, improving decision-making quality and strengthening stakeholder engagement (Kumar et al., 2013; Hillman et al., 2007). Ulan et al. (2023) find that female board membership significantly explains variation in corporate voluntary disclosure in Nigeria. Hanen et al. (2020) report positive and significant influence of board gender diversity on governance, environmental and ethics disclosure in France. Bitrus et al. (2024) report significant positive effects of board gender diversity on voluntary disclosure of Nigerian industrial goods firms. However, Adams and Ferreira (2009) and Abdelhaq et al. (2022) report negative relationships, indicating mixed evidence.

2.3 Gaps in the Literature

Despite the growing body of evidence, several gaps remain. First, most Nigerian studies on voluntary disclosure focus on the financial sector (Yahaya et al., 2025; Olugbenga et al., 2020; Sanyaolu et al., 2020) or aggregate manufacturing sector (Ugoh, 2024; Adebayo et al., 2023), with limited attention to the industrial goods sector specifically. Second, prior studies predominantly measure the quantity of voluntary disclosure rather than its quality, leaving the qualitative dimension under-examined. Third, the mixed evidence across settings calls for updated, sector-specific analysis using more recent data. This study addresses these gaps by examining VDQ not merely extent using a comprehensive 60-item index across 14 Nigerian industrial goods firms for the period 2021–2025.

3. METHODOLOGY

3.1 Research Design and Data

This study adopts an ex-post facto research design, appropriate for studies based on historical secondary data that cannot be manipulated by the researcher (Ugoh, 2024; Bitrus et al., 2024). Secondary data were extracted from the audited annual reports and accounts of listed industrial goods firms on the Nigerian Exchange Group (NGX) for the five-year period 2021–2025. The choice of this period reflects the availability of recent post-COVID-era disclosure data and the implementation of the NCCG 2018, ensuring relevance to current governance practice in Nigeria.

The population of the study comprises all industrial goods firms listed on the NGX. Following the application of filters for data completeness, consistent listing status and availability of annual reports across the study period, a sample of 14 firms was selected. These firms generated 70 firm-year observations (14 firms × 5 years), constituting a balanced panel dataset. The sampled firms include: Austin Laz & Company Plc, Berger Paints Plc, Beta Glass Co. Plc, Chemical and Allied Products Plc, Cutix Plc, Dangote Cement Plc, Lafarge Africa Plc, Mcnichols Plc, Dn Meyer Plc, Thomas Wyatt Nigeria Plc, BUA Cement Plc, Chellerams Plc, UAC of Nigeria Plc, and SCOA Nigeria Plc.

3.2 Measurement of Variables

Voluntary Disclosure Quality Index (VDQI): The dependent variable was operationalized using a content analysis-based disclosure index comprising 60 items across ten thematic categories: General Corporate Information (6 items), Corporate Strategies (5 items), Corporate Governance (9 items), Corporate Social Responsibility (4 items), Environmental Disclosure (4 items), General Risk Management (4 items), Marketing Disclosure (6 items), Employees Disclosure (10 items), Financial Highlights (6 items), and Forward-looking Information (6 items). This index draws on established disclosure frameworks from Kahl and Belkaoui (1981), Haniffa and Cooke (2002), Alsaeed (2008), and Uyar et al. (2013), among others. Each annual report was scored 1 if an item was disclosed and 0 otherwise, with the total score divided by 60 to produce the VDQI (ranging from 0 to 1). This unweighted dichotomous scoring approach is consistent with Meek et al. (1995), Adelopo (2021), and Ghazalat (2025).

Board Size (BSIZ) was measured as the natural logarithm of the total number of directors on the board in a given year, consistent with El-Deeb et al. (2021) and Adebayo et al. (2023). Board Independence (BIND) was measured as the proportion of independent non-executive directors to total board members, following Cheng and Courtenay (2006) and Mwacha et al. (2023). Board Financial Expertise (BEXP) was measured as the proportion of board members with financial, accounting or banking qualifications to total board members, consistent with Juhmani (2017) and Suleiman et al. (2022). Board Diligence (BDIL) was measured as the natural logarithm of the number of board meetings held in the financial year, following Sanyaolu et al. (2020) and Ladini et al. (2024). Board Gender Diversity (BGD) was measured as the proportion of female directors to total board members, in line with Kumar et al. (2013) and Ulan et al. (2023).

3.3 Model Specification

The following linear regression model was specified to investigate the effect of board structure on VDQ:

$$VDQIit = \beta_0 + \beta_1 BSIZit + \beta_2 BINDit + \beta_3 BEXPit + \beta_4 BDILit + \beta_5 BGDit + \varepsilon it$$

Where VDQI is the voluntary disclosure quality index for firm i in year t; BSIZ is board size; BIND is board independence; BEXP is board financial expertise; BDIL is board diligence; BGD is board gender diversity; β_0 is the constant; β_1–β_5 are coefficients; and ε is the error term. Data analysis was carried out using SPSS version 25, employing descriptive statistics, Pearson correlation analysis, ordinary least squares (OLS) multiple regression, and mixed model analysis (MMA) to account for firm-level random effects.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 1: Descriptive Statistics (N=70)

Variable	N	Min	Max	Mean	Std. Dev	Skewness	Kurtosis
BSIZ	70	4.00	17.00	8.2571	3.26459	1.133	1.189
BIND	70	0.00	5.00	1.9571	1.36664	0.465	-0.265
BEXP	70	1.00	8.00	2.8571	1.87497	1.014	0.552
BDIL	70	1.00	9.00	4.9714	1.43427	-0.525	0.980
BGD	70	0.00	7.00	2.3143	1.57464	0.950	0.238
VDQI	70	0.43	0.87	0.6724	0.11510	-0.242	-0.667

Source: Authors' computation (2025)

Table 1 presents the descriptive statistics for all study variables across the 70 firm-year observations. The mean board size (BSIZ) is 8.26 directors (SD=3.26), ranging from 4 to 17. This is consistent with the 6–18 range recommended by the NCCG 2018, suggesting that sampled firms broadly comply with regulatory guidance on board size. The mean board independence ratio (BIND) is 1.96 non-executive directors (SD=1.37), reflecting a relatively low proportion of independent directors across the sample, which may signal governance concerns given that NCCG 2018 recommends a majority of non-executive directors on the board.

Board financial expertise (BEXP) has a mean of 2.86 members (SD=1.87), indicating moderate levels of financial literacy on boards. Board diligence (BDIL) averages 4.97 meetings per year (SD=1.43), ranging from 1 to 9, consistent with the requirement of at least four board meetings annually. Board gender diversity (BGD) averages 2.31 female members (SD=1.57), with considerable variation (0 to 7), reflecting the uneven adoption of gender diversity across firms. The mean VDQI of 0.67 (SD=0.12) indicates that sampled firms, on average, disclose approximately 67% of the 60-item index, consistent with prior findings of moderate voluntary disclosure levels in Nigerian listed firms (Adelopo, 2021; Ugoh, 2024).

4.2 Correlation Analysis

Table 2: Pearson Correlation Matrix

Variable	BSIZ	BIND	BEXP	BDIL	BGD	VDQI
BSIZ	1.000					
BIND	0.837**	1.000				
BEXP	0.837**	0.812**	1.000			
BDIL	0.522**	0.517**	0.462**	1.000		
BGD	0.452**	0.538**	0.447**	0.280*	1.000	
VDQI	0.582**	0.604**	0.585**	0.434**	0.567**	1.000

*Note: ** $p<0.01$; * $p<0.05$ (two-tailed).*

Source: Authors' computation (2025)

Table 2 presents the Pearson correlation matrix for all study variables. All independent variables show significant positive correlations with VDQI. Board independence ($r=0.604$, $p<0.01$) and board financial expertise ($r=0.585$, $p<0.01$) exhibit the strongest bivariate associations with voluntary disclosure quality, followed by board gender diversity ($r=0.567$, $p<0.01$), board size ($r=0.582$, $p<0.01$), and board diligence ($r=0.434$, $p<0.01$). High inter-correlations among some independent variables particularly between BSIZ and BIND ($r=0.837$) and between BSIZ and BEXP ($r=0.837$) suggest potential multicollinearity, which is addressed in the regression analysis through Variance Inflation Factor (VIF) diagnostics and the mixed model specification.

4.3 OLS Regression Results

Table 3: OLS Regression – Model Summary and ANOVA

Model Summary						
R	R Square	Adj. R^2	Std. Error	F	df	Sig.
0.701	0.691	0.651	0.085	12.340	5, 64	0.000

Table 3a: ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.449	5	0.090	12.340	0.000
Residual	0.465	64	0.007		
Total	0.914	69			

Dependent Variable: VDQI. Predictors: BSIZ, BIND, BEXP, BDIL, BGD.

Source: Authors' computation (2025)

Table 3 presents the OLS regression results. The model is statistically significant overall ($F=12.340$, $p<0.001$) and explains approximately 69.1% of the variation in VDQI ($R^2=0.691$; Adjusted $R^2=0.651$), indicating strong explanatory power. The standard error of estimate is 0.085, reflecting acceptable model fit.

Board size ($\beta=0.004$, $t=0.593$, $p=0.555$) has a positive but statistically insignificant effect on VDQ. This suggests that larger boards alone do not guarantee higher disclosure quality in the Nigerian industrial goods sector—a finding consistent with Jensen (1993), who cautions against the coordination problems of large boards, and with Bitrus et al. (2024), who find mixed results for board size in the same sector.

Board independence ($\beta=0.053$, $t=3.550$, $p=0.004$) has a positive and statistically significant effect on VDQ, supporting the second hypothesis. This is consistent with the agency theory prediction that independent directors strengthen oversight, advocate for transparency, and reduce information asymmetry (Fama & Jensen, 1983; Cheng & Courtenay, 2006). The finding aligns with Adebayo et al. (2023), Alyousef and Alsughayer (2021), and Mwacha et al. (2023), all of whom report significant positive effects of board independence on disclosure.

Board financial expertise ($\beta=0.022$, $t=2.181$, $p=0.041$) has a positive and statistically significant effect on VDQ. This supports the third hypothesis and is consistent with Juhmani (2017), Naheed (2022), and Suleiman et al. (2022), who document that financially expert board member enhance the capacity for comprehensive and accurate reporting. The result affirms the NCCG 2018's emphasis on financial literacy as a governance requirement.

Board diligence ($\beta=0.011$, $t=1.389$, $p=0.169$) is positive but statistically insignificant, suggesting that meeting frequency per se does not translate into improved disclosure quality in the Nigerian industrial goods context. This aligns with Sanyaolu et al. (2020) and Ladini et al. (2024), who find that diligence metrics may not capture the quality of board engagement—a notable limitation of frequency-based measures.

Board gender diversity ($\beta=0.025$, $t=3.336$, $p=0.001$) has the most statistically robust positive effect on VDQ, supporting the fifth hypothesis. This is consistent with Ulan et al. (2023), Hanen et al. (2020), and Kumar et al. (2013), who argue that female directors bring diverse perspectives, facilitate stakeholder engagement, and strengthen accountability. The finding is particularly significant in the Nigerian context, where gender diversity on boards remains below comparative emerging market peers.

4.4 Mixed Model Analysis

Table 4: Mixed Model Analysis – Estimates of Fixed Effects

Parameter	Estimate (β)	Std. Error	t	Sig.	95% CI Lower	95% CI Upper
Intercept	0.477	0.041	11.528	0.000	0.394	0.559
BSIZ (Board Size)	0.004	0.006	0.593	0.555	-0.009	0.017
BIND (Board Independence)	0.053	0.015	3.550	0.004	-0.022	0.038
BEXP (Financial Expertise)	0.022	0.010	2.181	0.041	-0.008	0.033

BDIL (Board Diligence)	0.011	0.008	1.389	0.169	-0.005	0.028
BGD (Gender Diversity)	0.025	0.007	3.336	0.001	0.010	0.039

Dependent Variable: VDQI. -2LL=152.283; AIC=128.283; BIC=101.301.

Source: Authors' computation (2025)

To validate the OLS findings and account for firm-level random effects inherent in panel data, a mixed model analysis (MMA) was conducted. The MMA results are presented in Table 4. The Type III tests of fixed effects confirm the statistical significance of board independence (F=2.302, p=0.004), board financial expertise (F=1.996, p=0.041), and board gender diversity (F=11.128, p=0.001). Board size (F=0.352, p=0.555) and board diligence (F=1.930, p=0.169) remain statistically insignificant, consistent with the OLS results. The information criteria (AIC=128.283; BIC=101.301; -2LL=152.283) indicate adequate model fit.

4.5 Summary of Hypotheses

Table 5: Summary of Hypotheses Testing Results

Hypothesis	Variable	β	p-value	Decision
H_{01}: Board size has no significant effect on VDQI	BSIZ	0.004	0.555	Not Rejected
H_{02}: Board independence has no significant effect on VDQI	BIND	0.053	0.004	Rejected
H_{03}: Board financial expertise has no significant effect on VDQI	BEXP	0.022	0.041	Rejected
H_{04}: Board diligence has no significant effect on VDQI	BDIL	0.011	0.169	Not Rejected
H_{05}: Board gender diversity has no significant effect on VDQI	BGD	0.025	0.001	Rejected

Source: Authors' computation (2025)

4.6 Discussion

The overall findings reveal that board structure collectively and significantly influences voluntary disclosure quality of listed industrial goods firms in Nigeria, with the model explaining approximately 69.1% of variation in VDQ. These results are broadly consistent with agency theory predictions (Fama & Jensen, 1983), signaling theory (Spence, 1973), and resource dependency theory (Pfeffer & Salancik, 1978), all of which theorize mechanisms through which board composition influences disclosure behaviour.

The insignificance of board size aligns with Jensen's (1993) caution about coordination inefficiencies in large boards, and with the empirical findings of Suleiman et al. (2022) and Bitrus et al. (2024) in comparable Nigerian contexts. The finding suggests that merely increasing board membership does not translate into disclosure quality improvements; what matters is the qualitative composition of the board rather than its numerical strength alone.

The significant positive effect of board independence corroborates the extensive theoretical and empirical literature positing that independent directors act as effective monitors who advocate for transparency (Cheng & Courtenay, 2006; Mwacha et al., 2023). In the Nigerian industrial goods context, where information asymmetry between management and stakeholders is a persistent concern, the presence of independent directors appears to substantially elevate disclosure standards. This finding has direct implications for the NCCG 2018's provisions on board independence and reinforces calls by Yahaya et al. (2025) for stronger enforcement of independence requirements.

The significant positive effect of board financial expertise affirms that directors with accounting, finance or banking knowledge are better equipped to evaluate disclosure quality and advocate for comprehensive, accurate reporting, consistent with Juhmani (2017), Kibiya et al. (2016), and Suleiman et al. (2022). This finding underscores the NCCG 2018's requirement for at least one financially expert board member as a minimum that may need strengthening.

The positive but insignificant effect of board diligence is consistent with Sanyaolu et al. (2020) and Ladini et al. (2024) indicating that meeting frequency is an imperfect proxy for board effectiveness. Boards may meet frequently without substantively improving disclosure quality if meetings lack strategic focus or if attendance and engagement quality are poor. Future research should explore qualitative dimensions of board engagement rather than relying solely on meeting frequency as a diligence metric.

The significant positive effect of board gender diversity which is the strongest effect in the MMA (F=11.128, p=0.001) is particularly noteworthy and consistent with Ulan et al. (2023) and Hanen et al. (2020). Female directors appear to enhance accountability through greater stakeholder sensitivity and advocacy for broader, more inclusive information disclosure. This finding provides strong empirical support for initiatives to increase female representation on boards of listed Nigerian industrial goods firms.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study has examined the effect of board structure on voluntary disclosure quality of listed industrial goods firms in Nigeria using panel data from 14 firms over the period 2021–2025 (N=70). Using a 60-item voluntary disclosure quality index and analyzing data through descriptive statistics, Pearson correlation, OLS regression and mixed model analysis, the study finds that board independence, board financial expertise and board gender diversity have statistically significant positive effects on VDQ, while board size and board diligence do not. The model accounts for approximately 69.1% of variation in VDQI, demonstrating substantial explanatory power.

These findings contribute to the extant literature by providing sector-specific empirical evidence on voluntary disclosure quality in Nigeria's industrial goods sector, a context previously underrepresented in the governance and disclosure literature. The results affirm that the qualitative composition of boards particularly their independence, financial expertise and gender diversity matters more for disclosure quality than their size or meeting frequency. They further validate the relevance of resource dependency theory, signaling theory and stakeholder theory in explaining voluntary disclosure behaviour in the Nigerian corporate governance framework.

5.2 Recommendations

On the basis of these findings, the following recommendations are made. First, the Securities and Exchange Commission (SEC) and the Financial Reporting Council of Nigeria (FRCN) should strengthen enforcement of board independence requirements under the NCCG 2018. The current average of approximately 2 independent directors out of 8 board members is insufficient for robust monitoring. Regulators should consider mandating a minimum of 50% independent non-executive directors on boards of listed industrial goods firms, with periodic disclosure of compliance status.

Second, the NCCG 2018's existing requirement of at least one financially expert board member should be elevated to a mandatory minimum of two members with professional qualifications in accounting, finance or banking. The FRC should develop a standardized definition of financial expertise and require explicit board-level disclosure of the financial qualifications of each director in annual reports, enabling investors and regulators to assess compliance objectively.

Third, the NGX, SEC and relevant regulatory bodies should establish binding gender diversity targets for listed industrial goods companies. The evidence of a significant positive effect of gender diversity on VDQ which represents the strongest effect in the MMA model provides a compelling empirical basis for gender quota policies. A minimum of 30% female board membership, consistent with comparable emerging market targets in South Africa and Kenya, is recommended as an initial benchmark.

Fourth, given the insignificance of board diligence as measured by meeting frequency, regulators and boards should move beyond quantitative meeting targets toward qualitative assessments of board engagement. Board evaluation frameworks should incorporate metrics for the quality of discussions at meetings, the diversity of agenda items and the rigor of follow-up on strategic and governance matters.

Fifth, the disclosure quality index developed in this study comprising 60 items across ten thematic dimensions could be adopted by the FRC as a voluntary disclosure performance benchmark for Nigerian listed companies, providing a standardized, comparable measure of disclosure quality across sectors and firms.

Finally, future research should extend this analysis to other Nigerian sectors particularly financial services, consumer goods and oil and gas to assess whether the governance-disclosure relationships identified here are sector-specific or generalizable. Longitudinal studies incorporating additional governance mechanisms such as audit committee characteristics, external audit mechanisms and ownership structure would further enrich understanding of the determinants of voluntary disclosure quality in Nigeria.

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