

IMPACT OF BOARD CHARACTERISTICS ON SUSTAINABILITY PERFORMANCE IN NIGERIAN OIL AND GAS COMPANIES**^{1,*} Ajibua Gbenga and ²Ropheka Emerson Bot**¹Department of Business Administration, Grace Bay, Charisma University, Turks & Caicos Island²Department of Economics Bingham University, Karu, Nasarawa State, Nigeria**Received 20th May 2025; Accepted 25th June 2025; Published online 31st July 2025**

Abstract

This study investigates the role of board characteristics in driving corporate social responsibility (CSR) performance among listed oil and gas companies in Nigeria. Specifically, it examines the impact of board size, board independence, and board gender diversity on CSR expenditure, while controlling for firm profitability and firm size. The study employs a quantitative research design, utilizing secondary panel data collected from six listed oil and gas firms over a ten-year period (2015–2024). Data were analyzed using the Panel Corrected Standard Error (PCSE) regression method in STATA 16 to account for heteroscedasticity and contemporaneous correlation across firms. The findings reveal that board gender diversity, profitability, and firm size each exert a statistically significant and positive influence on CSR, whereas board independence shows a marginal effect and board size has no significant impact. These results highlight the importance of board diversity and firm-level resources in shaping CSR strategies within Nigeria's oil and gas sector. The study recommends stronger regulatory emphasis on gender representation and independent oversight within corporate boards, as well as policy incentives to encourage socially responsible behavior among profitable and large-scale firms. These insights contribute to the evolving discourse on corporate governance and sustainability in emerging economies.

Keywords: Corporate Social Responsibility, Board Characteristics, Gender Diversity, Profitability, Oil and Gas Sector, Nigeria.

INTRODUCTION

Corporate governance has garnered significant attention globally, particularly concerning the composition and attributes of boards of directors. Board characteristics such as size, independence, diversity, and expertise are pivotal in shaping strategic decisions and ensuring effective oversight. Research indicates that diverse and independent boards enhance decision-making processes, mitigate agency problems, and align corporate actions with stakeholder interests (Beji *et al.*, 2021). Moreover, the integration of sustainability expertise within boards is increasingly recognized as essential for navigating complex environmental and social challenges (Reuters, 2024). Despite this recognition, a notable gap persists in the presence of sustainability competencies among board members, with only a minority possessing the requisite knowledge to address pressing sustainability issues effectively. Concurrently, sustainability has evolved from a peripheral concern to a central component of corporate strategy worldwide. The adoption of Environmental, Social, and Governance (ESG) frameworks underscores the imperative for companies to operate responsibly and transparently. Global initiatives, such as the International Sustainability Standards Board (ISSB), aim to standardize sustainability reporting, facilitating comparability and accountability (Financial Times, 2024). Empirical studies have demonstrated that robust sustainability practices not only enhance corporate reputation but also contribute to long-term financial performance (Investopedia, 2024). As stakeholders increasingly demand corporate accountability, the integration of sustainability into core business operations has become indispensable.

In Nigeria, the oil and gas sector plays a critical role in the nation's economy but faces significant sustainability challenges. Environmental degradation, particularly in the Niger Delta region, has raised concerns about the industry's commitment to sustainable practices. Despite regulatory frameworks aimed at promoting corporate responsibility, enforcement remains inconsistent, and transparency in sustainability reporting is limited (Ajepe *et al.*, 2021). Studies focusing on Nigerian oil and gas companies have revealed that board characteristics, including diversity and independence, influence the extent of sustainability disclosures and corporate social responsibility initiatives (Abubakar *et al.*, 2024). However, the effectiveness of these board attributes in driving substantive sustainability performance requires further investigation. In recent years, corporate governance and sustainability have emerged as central issues in strategic management and accountability discourse, particularly in sectors with high environmental and social footprints such as the oil and gas industry. Globally, board characteristics including board independence, size, gender diversity, and the presence of sustainability committees have been shown to significantly influence firm outcomes in terms of transparency, corporate social responsibility (CSR), and overall sustainability performance (Atan *et al.*, 2023; Dienes *et al.*, 2022). Despite these global insights, the effective translation of these board features into measurable sustainability performance remains inconsistent across developing economies, especially in resource-dependent nations. In Nigeria, where the oil and gas sector contributes over 70% of government revenue and nearly 90% of export earnings (National Bureau of Statistics [NBS], 2023), sustainability concerns remain acute. Environmental degradation, oil spills, gas flaring, and community unrest are persistent challenges. Although the Nigerian Code of Corporate Governance (2018)

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mandates sustainability disclosures, there remains a significant gap between regulatory requirements and actual board-driven sustainability implementation (Okere *et al.*, 2023). Empirical studies suggest that while some Nigerian oil and gas companies have adopted sustainability frameworks, the level of commitment and strategic integration of such practices varies significantly and is often superficial (Egbunike & Okoye, 2022). Furthermore, the relationship between board characteristics and sustainability performance in the Nigerian context remains underexplored, especially with the limited application of robust empirical techniques that can account for sector-specific governance dynamics. Most studies in the Nigerian setting focus broadly on corporate governance without disaggregating the unique contributions of specific board attributes to sustainability outcomes (Agbi & Ajepe, 2022). The lack of comprehensive, evidence-based understanding of how board dynamics influence sustainability in this critical sector hinders informed policymaking and strategic reforms in corporate governance. This study, therefore, seeks to fill this empirical gap by systematically analyzing the influence of board characteristics on sustainability performance in Nigerian oil and gas companies. It responds to calls for context-specific research that not only aligns with global governance and sustainability standards but also reflects the socio-economic and institutional realities of developing economies like Nigeria.

Drawing from the identified research problem, the overarching aim of this study is to assess how board characteristics influence sustainability performance in Nigerian oil and gas companies. To achieve this, the study is guided by the following specific objectives:

To examine the effect of board size on the sustainability performance of listed oil and gas companies in Nigeria.

To determine the impact of board independence on the sustainability performance of listed oil and gas companies in Nigeria.

To assess the influence of board gender diversity on the sustainability performance of listed oil and gas companies in Nigeria.

Based on the research objectives, the following null hypotheses are formulated:

H₀₁: Board size has no significant effect on the sustainability performance of listed oil and gas companies in Nigeria.

H₀₂: Board independence has no significant effect on the sustainability performance of listed oil and gas companies in Nigeria.

H₀₃: Board gender diversity has no significant effect on the sustainability performance of listed oil and gas companies in Nigeria.

LITERATURE REVIEW

Board Characteristics

Board characteristics refer to the structural and demographic attributes of a company's board of directors, which collectively influence its decision-making, oversight functions, and strategic direction. These characteristics are pivotal to corporate governance, as the board serves as a key mechanism through which shareholders monitor management and ensure accountability, transparency, and alignment with

organizational goals (Fama & Jensen, 1983). The effectiveness of the board in fulfilling these responsibilities often depends on its composition, structure, and diversity, which can affect both financial and non-financial outcomes, including sustainability performance. Key dimensions of board characteristics commonly examined in corporate governance literature include board size, board independence, and board diversity. Board size refers to the total number of directors on a company's board. While larger boards may bring a broader range of expertise and perspectives, excessively large boards can hinder effective communication and decision-making (Yermack, 1996). Conversely, smaller boards are often associated with quicker decision-making but may suffer from limited diversity and experience.

Board independence is another crucial aspect, typically measured by the proportion of non-executive or independent directors on the board. Independent directors are presumed to be better positioned to monitor executive actions objectively and act in the interest of shareholders and other stakeholders. Prior studies have suggested that board independence is positively related to firm performance and enhanced disclosures, including environmental and social reports (Boone *et al.*, 2007; Hussain *et al.*, 2018).

Board diversity, particularly in terms of gender and expertise, is increasingly emphasized in the governance literature. Gender-diverse boards are believed to enhance corporate accountability, stakeholder engagement, and social responsibility due to varied perspectives and ethical orientations (Adams & Ferreira, 2009). Furthermore, the presence of directors with sustainability or environmental expertise can significantly influence the board's capacity to integrate sustainability goals into corporate strategy.

In sum, board characteristics are not only vital for improving financial outcomes but also play a strategic role in promoting corporate sustainability. The configuration of the board how many members it includes, how many are independent, and how diverse the members are affects its ability to respond to sustainability demands from regulators, investors, and the broader society. Given the increasing emphasis on ESG criteria globally, examining the role of board characteristics in driving sustainability is both timely and essential, especially in environmentally sensitive sectors like oil and gas.

Empirical Review

Abubakar, Nasiru, and Abubakar (2024) empirically examined the impact of six board characteristics board size, independence, gender diversity, activity, professionalism, and equity ownership on CSR expenditures among listed Nigerian oil and gas companies. Utilizing data from five firms consistently reporting between 2007 and 2022, and employing panel corrected standard error regression, the results showed that board independence, gender diversity, professionalism, and equity ownership significantly influenced CSR. However, board size and activity were found to be insignificant. The authors concluded that independent directors, professional qualifications, and female representation on boards enhance CSR engagement, while increased board ownership may reduce CSR efforts. The study is methodologically robust with a long panel (2007–2022), but the limited sample size (five firms) could constrain generalizability. Additionally, it focuses primarily on CSR expenditure rather than disclosure or

qualitative CSR performance, potentially overlooking broader sustainability practices.

Awodiran and Jimba (2019) explored the influence of gender diversity on CSR among listed industrial goods companies in Nigeria over a 10-year period (2008–2017). The findings revealed that board gender diversity, tenure, and size had significant positive effects on CSR, whereas board independence had no significant influence. They recommended increased inclusion of women on boards due to their greater likelihood to support ethical and philanthropic initiatives. The study highlights the gender perspective on governance and CSR. However, the exclusion of other variables such as professionalism or equity ownership limits the scope of governance insights.

Rao and Tilt (2016) analyzed Australia's top 150 publicly listed companies from 2009–2011, this study investigated board gender diversity and its effect on CSR reporting. Using panel regression, the study found a significant influence of gender and tenure on CSR disclosure, but no significant relationship for board size and independence. While informative and well-designed, the study's findings may have limited applicability in the Nigerian context due to differences in regulatory, institutional, and cultural frameworks.

Zhuang *et al.* (2018) analyzed 839 firms (2008–2016) using the upper echelon theory and generalized least squares. It established a strong positive relationship between directors' academic qualifications (professionalism) and CSR performance. It emphasized that qualified directors bring cognitive diversity that supports sustainable decisions. Though based outside Nigeria, the study's insight into the role of professionalism complements the Nigerian study's findings and provides strong justification for including board expertise in CSR evaluations.

Carpenter and Wade (2002) in the U.S.-based research found a positive correlation between board equity ownership and CSR activities. Firms where directors held substantial shares were more likely to engage in CSR, suggesting that financial alignment can promote long-term sustainability thinking. This contrasts with the Nigerian findings by Abubakar *et al.* (2024), which indicated a negative impact of board equity ownership on CSR. This divergence highlights potential context-specific dynamics in corporate governance behavior and necessitates further local research.

Riyadh *et al.* (2019) analyzed the impact of CSR reporting and board composition specifically board size, independence, and gender on firm performance among multinational energy companies (from the top 250 global corporations) over the years 2016 to 2018. Using ordinary least squares regression, the results showed that while board independence did not significantly affect CSR, both board size and gender diversity significantly impacted firm performance positively. Although insightful for international comparisons, the study focuses more on performance outcomes rather than direct CSR expenditures or programs. The use of large multinational firms may limit direct relevance for smaller or locally listed Nigerian companies.

Fuente *et al.* (2016), a Spanish study assessed 98 publicly listed companies (2004–2010) to explore the role of board structure in adopting Global Reporting Initiative (GRI)

standards for CSR disclosure. The findings showed that board independence, gender diversity, and the presence of a dedicated CSR committee significantly improved sustainability disclosures. Though outside Nigeria, this study supports the idea that board independence and diversity foster strategic CSR reporting. Its focus on GRI adoption enhances global relevance but doesn't account for actual CSR expenditures or impact, which limits its scope.

Giannarakis (2014) Investigating 100 listed U.S. firms for the 2011 financial year, this study analyzed board activity, size, gender diversity, and independence. It found that frequent board meetings positively impacted CSR disclosure, while other variables showed mixed effects. The study adds value by emphasizing board activeness, but is limited by a short one-year time frame. Its results contrast with findings by Ahmad *et al.* (2017) in Malaysia and Abubakar *et al.* (2024), both of which found no significant effect of board activity on CSR.

Muttakin (2016) focused on 116 publicly listed non-financial firms in Bangladesh (2005–2009), this study examined the impact of board diversity on CSR disclosure. Using multiple regression, the results revealed a negative relationship between female board presence and CSR, contrary to expectations. Foreign board membership, however, had a positive effect. While insightful, the negative influence of gender diversity on CSR suggests that context matters greatly. Cultural and institutional environments can mediate board influence on CSR, thus caution should be taken when generalizing these findings to the Nigerian context.

Ghabayen *et al.* (2016), a Jordanian study explored the link between board composition and CSR disclosure in the banking sector over a 10-year period (2004–2013). The findings indicated that a larger board size positively influenced CSR transparency, while the presence of independent or female directors had a negative or no significant effect. This study challenges conventional assumptions about board independence and gender diversity in CSR promotion. However, the specific focus on banks and cultural context in Jordan may explain the contradictory results compared to other literature.

Theoretical Review

To provide a conceptual foundation for understanding the relationship between board characteristics and sustainability performance in the Nigerian oil and gas sector, this study is anchored on two key theories: Agency Theory and Stakeholder Theory. These theories offer complementary insights into how corporate boards influence organizational outcomes and sustainability practices.

Agency Theory

Agency theory, first developed by Jensen and Meckling (1976), explores the relationship between principals (shareholders) and agents (managers). It posits that because agents may pursue personal interests at the expense of principals, there is a need for governance mechanisms such as the board of directors to monitor and align managerial actions with shareholder objectives. Within this framework, board characteristics such as independence, size, and diversity are critical control tools for mitigating agency conflicts and ensuring transparency, accountability, and performance

alignment. In relation to sustainability, agency theory suggests that independent and diverse boards are more likely to challenge management decisions and advocate for long-term strategic goals, including environmental and social responsibility, which may not offer immediate financial returns but are beneficial in the long run (Hillman & Dalziel, 2003). Independent directors, for instance, may prioritize disclosure and ethical standards that reduce environmental risks and enhance public reputation. This study leverages agency theory to explain how specific board characteristics such as independence, size, and gender diversity can serve as mechanisms for aligning managerial behavior with broader sustainability goals in Nigerian oil and gas companies. By empirically examining the impact of these characteristics on sustainability performance, the study tests the assertion that stronger governance leads to better sustainability outcomes in high-risk, high-impact industries.

Stakeholder Theory

Stakeholder theory, popularized by Freeman (1984), expands the scope of corporate responsibility beyond shareholders to include a wide array of stakeholders employees, customers, communities, regulators, and the environment. The theory emphasizes that businesses should create value for all stakeholders, not just those with a financial interest, and that long-term success depends on satisfying diverse and sometimes competing stakeholder interests. In this context, board diversity and sustainability expertise are seen as means of representing multiple stakeholder voices within the firm's strategic decisions. Gender-diverse and socially conscious boards are more likely to consider the environmental and social implications of their operations and to implement policies that reflect the expectations of broader stakeholder groups (Jo & Harjoto, 2011). This inclusive governance approach is particularly vital in the Nigerian oil and gas sector, where community relations and environmental issues are highly sensitive. Stakeholder theory underpins this study's investigation into how board characteristics particularly gender diversity and board independence contribute to sustainability performance. By applying this theory, the study recognizes the need for Nigerian oil and gas firms to be accountable to a broad range of stakeholders, and posits that board composition plays a key role in translating stakeholder interests into actionable and sustainable business practices.

METHODOLOGY

This study adopts a quantitative research design to empirically investigate the role of board characteristics in driving sustainability performance among listed oil and gas companies in Nigeria. The quantitative approach is appropriate for the study due to its focus on numerical data, objective measurements, and the use of statistical techniques to test hypotheses and identify relationships between variables. This design enables generalizability of findings and supports inferential conclusions, especially where panel data and regression analysis are involved.

Data for the study were sourced from secondary sources, specifically from the published annual financial and sustainability reports of six (6) oil and gas companies listed on the Nigerian Exchange Group (NGX). These firms were selected based on the consistency of their annual reporting and the availability of data across the study period. The period

under review spans ten years, from 2015 to 2024, which provides a robust longitudinal framework for assessing variations and trends in board characteristics and their effects on sustainability performance over time. The dependent variable sustainability performance was proxied using CSR expenditure, as reported in the firms' financial statements. The independent variables include board size, board independence, and board gender diversity, all of which were extracted and quantified based on board composition disclosures. Control variables such as firm size and profitability were also included to isolate the effects of board characteristics on CSR engagement.

The data were analyzed using STATA 16, which is suitable for handling panel data regression techniques. The panel nature of the data allows for controlling both cross-sectional and time-series variations, making the results more reliable and reflective of dynamic changes over the years. Panel diagnostic tests such as multicollinearity (VIF), heteroscedasticity, and Hausman specification tests were conducted to ensure the validity of the regression estimates. The study employed panel corrected standard error (PCSE) regression, which is appropriate when the panel exhibits heteroscedasticity and cross-sectional dependence common features in firm-level financial data.

Model Specification: To examine the impact of board characteristics on sustainability performance, this study specifies a panel regression model. The model is designed to capture both cross-sectional (firm-level) and time-series (yearly) variations in the data collected from six Nigerian oil and gas companies over the ten-year period (2015–2024). The dependent variable is sustainability performance (proxied by CSR expenditure), while the independent variables include board size, board independence, and board gender diversity. Control variables such as profitability and firm size are also incorporated to enhance model robustness.

The functional form of the model is specified as:

$$CSR_{it} = \beta_0 + \beta_1 BSIZE_{it} + \beta_2 BIND_{it} + \beta_3 BGD_{it} + \beta_4 PROF_{it} + \beta_5 FSIZE_{it} + \varepsilon_{it}$$

Where:

CSR_{it} = Sustainability performance (measured by CSR expenditure) of firm i in year t

$BFSIZE_{it}$ = Board size (number of directors)

$BIND_{it}$ = Board independence (proportion of independent non-executive directors)

BGD_{it} = Board gender diversity (proportion of female directors)

$PROF_{it}$ = Profitability (measured by profit before tax to total assets)

$FSIZE_{it}$ = Firm size (natural logarithm of total assets)

β_0 = Constant term

$\beta_1 - \beta_5$ = Coefficients of the explanatory variables

ε_{it} = Error term capturing unobserved influences

The model is estimated using panel corrected standard error (PCSE) regression technique in EViews. This approach adjusts for heteroscedasticity and contemporaneous correlation across entities, which is particularly suitable for a small number of cross-sections (firms) with relatively longer time series data.

This model provides the empirical basis for testing the study's hypotheses and evaluating the direction and magnitude of the relationships between board characteristics and sustainability performance within Nigeria's oil and gas sector.

DATA ANALYSIS AND DISCUSSION

Descriptive Result

Table 1. Descriptive Result

	CSR	BFSIZE	BIND	BGD	PROF	FSIZE
Mean	25837	7.2855	0.0752	0.1244	0.0118	87785
Maximum	158336	11.0361	0.6682	0.3833	0.1322	169155
Minimum	0.0000	4.0000	0.0000	0.000	-0.6581	22375
Std. Dev.	45559	2.0634	0.1425	0.07889	0.2543	54915
Skewness	1.2363	0.4589	1.8985	0.7785	-0.5645	0.9525
Kurtosis	3.5411	2.7021	5.1002	2.836	3.7223	3.000
Jarque-Bera	6.3223	1.4563	15.2112	2.3412	4.5678	5.3285
Probability	0.0425	0.4845	0.0016	0.3185	0.1022	0.0712
Observations	60	60	60	60	60	60

Source: Eviews 12. 2025

The descriptive statistics reveal a complex distribution of board characteristics and corporate performance indicators among Nigerian oil and gas firms. On average, firms spent ₦25,837 million on corporate social responsibility (CSR), though this figure ranges widely from zero to as high as ₦158,336 million indicating substantial variation in CSR commitment across companies. The standard deviation of ₦45,559 million suggests that these expenditures are not clustered around the mean, but rather show a high degree of dispersion. The skewness value of 1.23 and a kurtosis of 3.5 confirm this distribution is right-skewed with heavier tails, and the Jarque-Bera probability of 0.042 further indicates non-normality at the 5% level.

Board size among the firms averages approximately 7 members, with a range between 4 and 11. The moderate standard deviation of 2.06 indicates some variability, though not extreme. The skewness and kurtosis statistics, 0.45 and 2.7 respectively, suggest a nearly normal distribution. The Jarque-Bera probability of 0.484 supports this, implying no significant departure from normality in board size distribution. This reflects a relatively consistent governance structure in terms of board composition.

Board independence, however, is considerably less uniform. With a mean of just 0.075, many firms have few or no independent directors, though the maximum value of 0.668 shows some outliers with stronger independent oversight. The standard deviation of 0.142 indicates high variability, and the skewness of 1.89 and kurtosis of 5.1 highlight a distribution that is both heavily skewed and peaked. The Jarque-Bera statistic confirms strong non-normality with a probability of 0.001, suggesting that independent governance is not yet a widespread practice among these firms.

Board gender diversity shows a modest mean of 0.124, pointing to low but present female representation. With a maximum of 0.383 and standard deviation of 0.078, the data implies limited but varied inclusion of women on boards. The skewness of 0.77 and kurtosis of 2.8 suggest a slightly right-skewed distribution, and the Jarque-Bera probability of 0.31 indicates that the distribution does not significantly deviate from normality. This implies some progress in gender diversity, albeit slow and inconsistent. Profitability presents a mean of 0.011, with firms experiencing both positive and negative performance during the period under review ranging from -0.658 to 0.132. The standard deviation of 0.254 signals moderate dispersion. A negative skewness of -0.56 implies that most firms have profitability values clustered towards the

higher end, with a few experiencing substantial losses. The Jarque-Bera test suggests near-normality ($p = 0.102$), although the deviation is not statistically significant. Firm size, measured in total assets, shows a wide spread with an average of ₦87,785 million, stretching from ₦22,375 million to ₦169,155 million. The standard deviation of ₦54,915 million confirms the broad asset base across firms. The skewness value of 0.95 and a kurtosis of 3.0 suggest a right-skewed but nearly mesokurtic distribution. With a Jarque-Bera probability of 0.07, firm size is close to normally distributed, albeit with slight deviation.

Correlation Matrix

Table 2. Correlation Result

	CSR	BFSIZE	BIND	BGD	PROF	FSIZE
CSR	1					
BFSIZE	0.235	1				
BIND	0.298	0.175	1			
BGD	0.322	0.194	0.156	1		
PROF	0.41	0.101	0.21	0.188	1	
FSIZE	0.512	0.285	0.263	0.3	0.435	1

Source: STATA 16 2025

Based on the correlation matrix, the relationships between the dependent variable (CSR) and the independent variables (BFSIZE, BIND, BGD, PROF, FSIZE) reveal varying degrees of positive associations, all of which are moderate but meaningful in the context of corporate governance and sustainability performance. Starting with board size (BFSIZE), the correlation coefficient of 0.235 suggests a positive but weak linear relationship with CSR expenditure. This implies that as the number of directors on a company's board increases, there is a slight tendency for CSR spending to rise. Larger boards may offer more diverse perspectives, which could enhance attention to social and environmental responsibilities, although the strength of this influence appears modest. For board independence (BIND), the correlation with CSR is slightly stronger at 0.298. This moderate positive relationship indicates that companies with a higher proportion of independent directors are more likely to engage in CSR activities. Independent directors are expected to represent broader stakeholder interests and bring objectivity to board decisions, which often translates into improved social responsibility practices.

The correlation between board gender diversity (BGD) and CSR stands at 0.322, suggesting a moderate and positive relationship. This reinforces the growing body of literature that associates increased female representation on boards with greater emphasis on ethical, community, and sustainability issues. The result implies that gender-diverse boards may be more sensitive to social concerns, encouraging more consistent CSR engagement. Profitability (PROF) shows a moderate positive correlation with CSR at 0.410, the second-highest among the independent variables. This suggests that financially healthy firms are more inclined or more capable to invest in CSR initiatives. It reflects the resource-based view that profitable companies are better positioned to address social and environmental concerns beyond their core operational mandates. Finally, firm size (FSIZE) exhibits the strongest correlation with CSR, at 0.512, indicating a moderate to strong positive relationship. Larger firms tend to have more public visibility and regulatory scrutiny, which likely drives greater commitment to CSR. Additionally, these firms often have

more resources to allocate toward social investments, making CSR a strategic tool for reputation management and stakeholder engagement. All independent variables exhibit positive associations with CSR, with firm size and profitability standing out as the most influential, followed by gender diversity and board independence. While board size shows the weakest correlation, it still aligns positively, suggesting that board composition remains relevant to sustainability performance in Nigerian oil and gas companies. These patterns provide preliminary support for the hypothesized influence of board characteristics on CSR, justifying further examination through regression analysis.

Panel Corrected Standard Error

Table 3. Panel corrected standard error result

CSR	Coef.	St.Err.	z-value	p-value	VIF
BFSIZE	-0.0161	1.223	-2.14	0.489	1.142
BIND	0.1016	1.845	1.79	0.068	1.181
BGD	1.0415	0.025	3.49	0.001	1.147
PROF	0.0049	2.072	3.45	0.034	1.228
FSIZE	0.0123	1.119	3.87	0.023	1.553
Constant	-0.1366	3.822	-1.87	0.029	
Number of Obs	60		Mean		
R-Square	0.452		VIF	1.182	
Wald Chi	69.52		Hottest	0.000	
Prob>Chi	0.000		Hausman	0.000	

Source: STATA 16 2025

The regression analysis was conducted using Panel Corrected Standard Error (PCSE) estimation to assess the impact of selected board characteristics on corporate social responsibility (CSR) expenditure among Nigerian oil and gas companies. The model includes five independent variables: Board Size (BFSIZE), Board Independence (BIND), Board Gender Diversity (BGD), Profitability (PROF), and Firm Size (FSIZE). The model is robust, with a Wald Chi-square value of 69.52 ($p < 0.01$), indicating that the explanatory variables jointly have a statistically significant effect on CSR. The R-squared value of 0.452 implies that approximately 45.2% of the variation in CSR expenditure is explained by the model.

The coefficient for BFSIZE is -0.0161 with a p-value of 0.489, suggesting a negative but statistically insignificant relationship with CSR. This implies that larger boards do not necessarily translate into higher CSR spending in this study. The negative sign might reflect coordination or accountability issues in overly large boards. Board Independence has a positive coefficient of 0.1016 and a p-value of 0.068, making it marginally significant at the 10% level. This suggests that firms with more independent directors are slightly more inclined to spend on CSR, aligning with agency theory, which argues that independent directors enhance stakeholder representation and ethical accountability. Board Gender Diversity shows a strong positive and statistically significant effect on CSR (coef. = 1.0415, p-value = 0.001). This result supports the assertion that female representation on boards leads to higher social sensitivity and ethical investment. The statistical significance at the 1% level confirms the consistency and strength of this relationship. The coefficient for PROF is 0.0049, with a p-value of 0.034, indicating a positive and significant effect at the 5% level. This supports the hypothesis that more profitable firms have greater capacity and incentive to engage in CSR. It confirms the resource-based view that firms with stronger financial performance are better able to allocate funds toward discretionary social investments. Firm

Size is positively associated with CSR (coef. = 0.0123) and is statistically significant (p-value = 0.023). This result suggests that larger firms tend to spend more on CSR, likely due to greater visibility, higher public scrutiny, and more substantial resources. It reinforces the legitimacy and stakeholder pressure theories of CSR engagement. All Variance Inflation Factor (VIF) values are below 2.0, indicating no evidence of multicollinearity among the explanatory variables. This confirms the reliability of the estimated coefficients.

Summary of Hypotheses Testing

Hypothesis	Statement	Result
H ₀₁	Board size has no significant effect on CSR.	Not Rejected (p = 0.489)
H ₀₂	Board independence has no significant effect on CSR.	Marginally Rejected (p = 0.068)
H ₀₃	Board gender diversity has no significant effect on CSR.	Rejected (p = 0.001)
H ₀₄	Profitability has no significant effect on CSR.	Rejected (p = 0.034)
H ₀₅	Firm size has no significant effect on CSR.	Rejected (p = 0.023)

Source: Computed by the Researcher 2025

The hypothesis testing table presents the relationship between board characteristics and CSR expenditure. The results indicate that board gender diversity, profitability, and firm size each have a statistically significant positive effect on CSR, leading to the rejection of their respective null hypotheses. Board independence is marginally significant at the 10% level, suggesting a weak positive influence, while board size has no significant impact, implying that simply increasing the number of directors does not necessarily enhance CSR engagement. These outcomes highlight the importance of board quality and financial capacity over board quantity in driving sustainability initiatives.

Discussion of findings

The regression analysis revealed varied effects of board characteristics and firm-specific variables on Corporate Social Responsibility (CSR) in Nigerian listed oil and gas companies. Beginning with board size, the study found a negative and statistically insignificant coefficient (Coef = -0.0161, $p = 0.489$), suggesting that an increase in board members does not meaningfully affect CSR engagement. This aligns with the findings of Rao and Tilt (2016), who similarly reported no significant association between board size and CSR in Australian firms. However, it contrasts with Kurawa and Abdulrahman (2014), who found a significant influence of board size on CSR activities in Nigeria.

Board independence, on the other hand, had a positive coefficient (0.1016) and was marginally significant ($p = 0.068$), indicating that increased presence of independent directors may enhance CSR commitment. This result corroborates the findings of Fuente *et al.* (2016), who demonstrated a strong link between board independence and CSR disclosures in Spanish firms. Yet, it contradicts the studies by Awodiran and Jimba (2019) and Rao and Tilt (2016), who found no significant effect of board independence on CSR. For board gender diversity, the coefficient (1.0415) was positive and statistically significant at the 1% level ($p = 0.001$), indicating that a higher proportion of female directors leads to greater CSR efforts. This is consistent with the findings of Awodiran and Jimba (2019), Riyadh *et al.* (2019),

and Fuente *et al.* (2016), who collectively asserted that gender-diverse boards are more empathetic toward social responsibility and drive CSR more robustly. The profitability variable (PROF), used as a control, showed a positive and significant influence on CSR ($p = 0.034$). This implies that more profitable firms are better positioned to allocate resources toward social responsibility. This is in line with prior studies such as Selcuk and Kiymaz (2017), who found that profitability is often a driver of CSR investments in firms listed on the Istanbul Stock Exchange. Firm size (FSIZE) was also positively and significantly related to CSR ($p = 0.023$), reinforcing the notion that larger firms, due to their visibility and resource availability, are more inclined toward CSR activities. This aligns with the findings of Sanan (2018) and Harjoto *et al.* (2015), who observed a positive relationship between firm size and CSR practices.

Conclusion and Policy Recommendation

This study examined the influence of board characteristics specifically board size, independence, and gender diversity alongside profitability and firm size, on corporate social responsibility (CSR) expenditure in Nigerian oil and gas firms using panel corrected standard error (PCSE) regression over a 10-year period. The findings revealed that while board size had no significant influence on CSR, both board gender diversity and firm size had significant positive effects, with profitability also positively related to CSR investment. Board independence showed a marginally significant positive influence, suggesting it plays a role in promoting ethical and social engagement. These results underscore the importance of qualitative attributes of corporate boards such as gender inclusivity and independence alongside firm capacity (size and profitability) in driving CSR performance.

Policy Recommendations

1. Regulatory bodies such as the Financial Reporting Council of Nigeria and the Nigerian Exchange Group should encourage listed companies to adopt minimum gender quotas for board representation. The significant effect of board gender diversity on CSR suggests that enhancing female presence on boards can strengthen firms' commitment to social responsibility.
2. Policymakers should reinforce guidelines mandating a higher proportion of independent non-executive directors. Although marginally significant, board independence was positively related to CSR, indicating its potential role in promoting ethical oversight and stakeholder-focused governance.
3. Government agencies such as the Federal Inland Revenue Service (FIRS) and the Ministry of Finance could introduce tax rebates or recognition awards for profitable companies that consistently invest in CSR. This could enhance corporate accountability and broaden the scope of social investments among firms with financial capacity.
4. Given the positive relationship between firm size and CSR, the Nigerian Exchange Group could integrate more stringent CSR disclosure requirements into the listing or sustainability reporting framework, especially for large-cap oil and gas firms. This would institutionalize CSR as a core element of business operations.

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