

Moderating Effect of Firm Size on the Relationship Between Board Structure and Environmental Disclosure of selected Listed Oil and Gas Companies in Nigeria

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Abstract

The study examined moderating effect of firm size on the relationship between board structure and environmental disclosure of oil and gas companies listed in Nigerian Exchange Group. Ex-post facto research design and content analysis were adopted, the population of the study was listed oil and gas companies in Nigeria. A sample of 20 companies was purposively selected for the period of five years, resulting in 100 observations. Data were collected from secondary sources, mainly from annual reports and corporate websites. Descriptive statistics, correlation and regression techniques were used to analyse the data. The results show that board independence, board size, and board gender diversity were statistically significant effect of corporate governance on environmental disclosure. Firm size significantly moderates the quantity of overall environmental disclosure of the sample oil and gas companies. The findings indicate that the level of environmental disclosure of oil and gas companies in Nigeria is quite insufficient at an average of 10 percent. The study also revealed that the environment the companies operate is institutionally and legally weak. The study recommends for an effective board structure in oil and gas companies which will lead to more robust environmental disclosures. Hence it calls for improvement on environmental law and implementation as well as harmonized environmental reporting infrastructure and standard to aid comparison.

Keywords: Board size, Board independent, Board gender diversity, Firm size, Environmental disclosure

1. Introduction

Environmentally conscious companies, like those in the oil and gas sector, are required to show their concern for the welfare of their constituents by promptly disclosing environmental information. Nevertheless, despite continuous criticism and demand from host communities, environmental disclosure in these organisations' annual reports is inadequate due to the detrimental environmental impact of oil and gas industries (Al-Matari, & Al-Arussi, 2016). Businesses that exploit the gaps in the traditional accounting system to downplay the significance of environmental disclosure. Companies have been avoiding disclosure due to the lack of required environmental disclosure because there are no guidelines requiring or recommending the disclosure. The failure and subsequent collapse of some of the world business organization were attributable to poor corporate governance mechanism which has arose the doubt of users of accounting information on the integrity of accounting profession

since these users rely solely on the financial statements issued by corporate organization to make certain economic decision. It is therefore imperative for organization to turn out an efficient, realistic and reliable report which can only be achieved through monitoring and independent audit by the board of directors.

Corporate governance is a system that stirs the company, it guides and direct the affairs of the company. The system is made up with the internal and external governance. Those that are control by the directors and those that fall outside, their control all have effect on how the company is being run. The system is used to set policies for the company that can enhance the value and performance of the company. It provides an atmosphere for the conduct of good business practices by selling values that benefit the company as a whole (Ndalun Ibanichuka & Ofurun, 2021). Research indicates that some factors, including firm characteristics, corporate governance, accounting standards or statutory requirements, and regulatory enforcement, influence the voluntary environmental disclosure practices of corporations. (Okafor, Amahulu, & Egbunike, 2022). Given that some stakeholders have expressed a need for environmental disclosure, it is expected that corporate governance would take this into account. By disclosing environmental information, corporations can benefit from it in addition to meeting stakeholder needs. These problems might be resolved by having members of the corporate governance board. The board of directors (corporate governance) may be able to facilitate the disclosure of environmental information because it is accountable for handling the corporation's jobs and overseeing the directors and internal staff who can advise the company on the advantages of disclosing ecological issues in their yearly reports or elsewhere.

Board structure is very important in the smooth running of a business. They are expected to perform different functions, such as monitoring of management in order to reduce agency costs, formulation of corporate policy, approval of strategic plans, recruiting of management, compensating and removal of management, arrangement for succession, provision and access to resources, determining the size of boards and nomination of new members subject to the approval of the shareholders. Agency theory is of the view that when ownership and control are separated, it leads to divergence in the pursuit of managerial interests and owner's interest (Jensen & Meckling, 1976), hence, the need for monitoring of managerial decisions by an independent board of directors in order to protect the shareholders' interests. Board structure is very important to the oil and gas sector in Nigeria because of the fraud, failures and questionable practice that have affected the stakeholders' confidence on the firm. Therefore, the effectiveness of the board of directors in monitoring and controlling the managers on behalf of the shareholders depends on certain factors such as the role of board size on the environmental disclosure, impact of board independence on environmental disclosure, the impact of board gender diversity on environmental disclosure.

Previous studies have examined corporate governance and environmental disclosure, including those by Ibrahim, Ibrahim and Hussaini (2023), Trireksani and Dajadikerta (2016), Iyafekhe, Osamagbe. Equayeon, & Nelson (2020), mainly in developed countries as opposed to underdeveloped countries and focused on quantitative approaches to measurement, such as content analysis, which looks for specific words, themes, or concepts in given qualitative data. In order to add to the body of knowledge and literature, the main objective of the study examines the moderating effect of firm size on the relationship between board structure and environmental disclosure of oil and gas companies in Nigeria. This study hypothetical that corporate governance which provide direction and control of the company is vested with the role to ensure that companies disclose environmental information. The study is concerned by the choice of explanatory variables; Board structure proxies by board size, board independence, board gender diversity while the dependent variable environmental disclosure is proxy by environmental disclosure index, and moderating variable is firm size.

2. Literature Review

2.1 Conceptual Framework

Environmental disclosure refers to the process by which companies demonstrate their resolve to eliminate the risks associated with their operations and notify relevant parties in order to gain their support. Environmental disclosure as the addition of environmental data to yearly reports as extra content, openness with regard to the environment. Environmental disclosure, according to Al-Jubouri and Chakraborti (2022), is a company strategy that tries to show how the environment affects society and potential solutions. Environmental disclosure is a data provided to assess a company's environmental actions and their financial implications. Environmental disclosure is defined as an annual public statement that describes a company's environmental actions, including its aims, environmental policies, and environmental impacts. Environmental disclosure, according to Dibia and Onwuchekwu (2015), helps companies understand how the public perceives them. It acts as a channel of communication between the shareholders and the business. Because of the value of the environment and the disastrous effects that business operations have on it, environmental disclosure is required (Abubakar, Moses & Inuwa 2017). According to the United Nations Department for Economic and Social Affairs (1992), environmental information disclosure entails making information about a polluter's environmental performance—such as emissions into the air, waste water discharge, waste, and standard compliance—clear to a wide range of audiences. The worthiness of disclosing environmental information, which is commonly hard to quantify, is still a topic of debate and interest in academic literature (Adams and Busola, 2017). There is no commonly accepted way to quantify the quality of disclosure. However, a number of academic publications have assessed environmental disclosure quality according to the goals of the study and the researchers' assessment. Two primary methods have been used to quantify environmental disclosure in the body of existing literature: qualitative and quantitative methods, often known as the use of content analysis and the environmental disclosure index, respectively.

Board structure refers to the composition, organization, and governance of a company's board of directors. It includes: Board size that is the number of directors on the board; Board composition which is the mix of skills, experience, and diversity among directors; Board leadership that is the role and authority of the board chair or chairperson; Committee structure that is the number and responsibilities of committees, such as audit, compensation, and nominating committees. Director roles and responsibilities that is the specific duties and expectations of each director; Board meetings and processes that is the frequency, format, and procedures for board meetings. Director independence that is the proportion of independent directors versus executive directors. Director tenure that is the length of time directors serve on the board. Board evaluation and assessment which is the process for evaluating board performance and effectiveness. An effective board structure is essential for good corporate governance, as it ensures that the board can provide strategic guidance, oversight, and accountability for the company's management. A well-structured board can help promote: better decision-making; improved risk management; enhanced accountability, increased transparency, and stronger stakeholder engagement. Optimizing board structure is a continuous process that requires regular assessment and refinement to ensure it remains effective and aligned with the company's evolving needs.

Board structure is one of the core issues in corporate governance. Board existed primarily to offer advice, monitor and discipline the managers. Agency theorists are of the view that for shareholder's interest to be protected, the board of director must assume an effective oversight function. It is believed that the performance of board monitoring duties is subject to the effectiveness of the board, which in turn is influenced by factors such as the size of the board,

board diversity, board independence, board financial expertise, information asymmetries and board culture (Brennan, 2006; Uadiale, 2010). The Nigerian Code of Corporate Governance (2018) recommends the establishment of a board which is responsible for nomination, remuneration, governance, risk management and audit. However, these responsibilities are avail to firm considering the size, needs and activities of the firm. The code goes further to stipulate that board responsible for nomination, remuneration, governance and audit should basically comprises of only the Independent non-executive directors. Arguments on what should constitute the optimum board structure and whether large firms should have large or smaller boards and vice versa, also, the number of inside executive directors and outside non-executive directors on boards and their independence is also questionable. The question of whether non-executive directors really independent is still lingering. The issue of board structure as a corporate governance mechanism continues to receive attention because theorists have diverse opinion as to the impact of board structure on firms' performance, while the empirical evidence as well is inconclusive. In most studies, it is often assumed that a company's environmental disclosure is mainly determined by the structure of the board of directors. For the purpose of this study, proxies for board structure are; board size, board independent and board gender diversity was used.

Board size, in the words of Setyawan and Kamila (2015), is the quantity of directors on a company's board. The directors conduct their business in line with the goals and purpose of the firm as well as for its profit. As a result, there is a higher exchange of ideas, experience, support, and managerial oversight among board members the larger the number of directors of the organisation. This idea was supported by Ajibolade and Uwuigbe (2013), who contended that a sizable board would be better equipped to maintain independence and encourage management to provide more details. Ovbiebo and Akpotor (2019) delineated size of board as the aggregate count of individuals comprising the directors within an organization. This definition emphasizes the numerical representation of board membership and explains the importance of understanding the size of the board as a fundamental characteristic within corporate governance analysis.

Board independence represents the degree to which the board consists of outside directors who are not affiliated with the company. Board independence also refers to as the freedom of the board members in expressing objective opinions in the running of the firms without undue interferences from the chairman, management and even block owners. It is measured by the percentage of independent non-executive directors on board and it has great influence on firm performance in that a highly independent board will be able to effectively reduce agency problem by effective monitoring of the managers to mitigate their opportunistic behaviour (Oyedokun, 2019; Uadiale, 2010). Anderson, et al. (2004) argue that a board comprising of mostly employees or employee related directors may be willing to conceal negative information in order to gain direct personal benefits and consequently hiding this dealing from stakeholders of the company. Independent board of directors is willing to serve both the management and stakeholders of the company through proper monitoring and full disclosure of both financial and non-financial information.

The concept of board diversity suggests that boards should reflect the structure of the society and appropriately represent the gender, ethnicity and professional backgrounds. Boards are concerned with having the right composition to provide diverse perspectives. Nevertheless, the implementation of gender diversity policy remains a challenge due to citizens' cultural beliefs across countries (Ramly et al., 2015). Sirnidi et al., (2011) opined that the best board is a mix of individuals with different skills, knowledge, information power and readily available to contribute his/her time professionally. Precisely, on gender diversity, the conventional make-up of the board globally does not easily support the linear relationship between gender diversity and environmental disclosure, as the male gender in the board room always supersedes the

number of their female counterparts (Ilaboya & Lodikero, 2017). This is evidenced in Europe legislation stipulating 40% of female gender in the board, and also in Nigeria where some government positions are design for female in the ministry of finance.

Firm size refers to the magnitude or scale of a business organization, typically measured by factors such as: number of employees, total assets, market capitalization (market value of outstanding shares), revenue or sales and profit or net income. Firm size can have various implications for a company's operations, strategy, and performance, including: Economies of scale, market power and influence, access to resources and financing, organizational complexity and bureaucracy, Innovation and adaptability, risk management and resilience. Firm size is one of the most acknowledged determinants of firm performance (Rehman, 2016). Akinyomi and Olagunju (2013) are of the opinion that in today's world firm size is very critical to performance due to the phenomenon of economies of scale. Essentially, it means larger entities can obtain cost leadership relative to smaller firms. Firms' size is seen as a resource in obtaining sustainable competitive advantage in terms of profit and market share. Firm size can be defined in form of total assets, total investment, net worth of the firm, and others. Brigham and Houston, (2016) believe that firm size has significant influence on firm's performance and firm's value directly or indirectly.

2.2 Theoretical Framework

There are various theories that explain the effect of corporate governance and environmental disclosure. For the purpose of this research, the focused is on agency theory, stakeholders' theory and legitimacy theory.

2.2.1 Agency Theory

This theory was postulated by Jensen and Meckling (1976) is of the view that when ownership and control are separated, it leads to divergence in the pursuit of managerial interests and owner's interest (Jensen & Meckling, 1976). As a result of this, monitoring of managerial decisions is crucial for the board of directors in order to protect the shareholders' interests. The fundamental premise of agency theory is that the managers' act out of self-interest and are self-centred, thereby given less attention to the shareholders' interest. The theory as well assumes that agency problem can be resolved with appropriate designed contracts by specifying the right of the both agent and principals. It is also of the view that agency problems will be more prevalent when the board is dominated by insiders (Nicholson & Kiel, 2007). Agency theory allocates a significant role to the board of directors in the organizational and governance structure of the corporation. Agency theorist argues that board with large number of outside directors is independent and may independently monitor and advise managers who can promote the shareholders' interest (Brickley & Zimmerman, 2010). The separation of role may enable boards to perform their oversight functions more effectively because such boards are considered to be independent.

2.2.2 Stakeholder Theory

This notion was developed in 1984 by Freeman. As per the stakeholder theory, the behaviour of enterprises is shaped by the demands exerted by different stakeholders on them (Husillo and Alvarez Gil, 2008). According to Freeman, the creator of stakeholder theory, businesses have stakeholders, or organisations and individuals who, as a result of their operations, have suffered harm or are benefiting from the enterprises; these people and groups should be considered because businesses don't exist in a vacuum. According to an expansion of Freeman's argument, the idea of stakeholder theory was created to generalise the idea that stockholders have unique claims to the company. Stakeholders have the right to make demands, which the organisation should honour. However, the concerns of stakeholders are not always shared by society at large; rather, they are of interest to one or more stakeholder groups (Kent & Cham, 2009). According

to Ofoegbu et al. (2018), stakeholder theory entails recognising and identifying the connection between a corporation's engagements and how they affect its participants. According to the stakeholder's hypothesis, agents are accountable to the shareholders, but companies are accountable to the stakeholders.

2.2.3 Legitimacy Theory

This theory was propounded by Suchman (1965), which characterises an organization's willingness to act freely and consider the society in which it operates, serves as the foundation for this study. The theory explains the study of corporate governance, which is also of a voluntary nature and is giving rise to a lot of debate and conflict over environmental safety. A legitimate theory contends that businesses should respond by increasing their legitimacy and value by providing customers with what they want, but not by coercing them. Legitimacy theory explains a company's battle to conduct its operations and activities in a way that does not negatively affect the community in which it operates, according to Acar, Caliyurt, and Zenin-Karaibrahimgt (2020). A social compact between a corporation and society is how Solikhah, Yulianto, and Suryani (2020) defined legitimate theory. Companies must uphold social norms and values, think about how their activities will benefit society as a whole, minimise any bad impacts, and take responsibility for any harm they may have caused in order to be considered legitimate, according to Jamang, Joseph, and Said (2020).

This study is based on the legitimacy theory, which describes the company's readiness to act freely and consider the society in which it works. The theory best explains the study of corporate governance, which is concerned with the company's decision-making, and environmental disclosure, which is generating a lot of discussion and conflict over the environment's safety and is likewise of a voluntary nature.

2.3 Empirical Review

A lot of researchers have conducted studies on the effect of environmental disclosure and corporate performance. The results from those research works indicated a mix result between corporate governance and environmental disclosure.

Gwar, Angahar and Iorpev. (2024), The study examined the moderating effect of board composition on the relationship between environmental disclosure and corporate performance. Secondary data collected from the published annual reports and accounts of the selected listed manufacturing companies in Nigeria. The study made use of forty-five (45) manufacturing quoted on the Nigerian Exchange Group (NGX) and covers a period of ten (10) years ranging from 2013-2022. Agency theory is used as the foundational theory. Descriptive statistics, correlation and regression techniques were used to analyse the data. The findings of the study show that there is a significant effect of environmental disclosure on ROA of listed manufacturing companies in Nigeria. The study further revealed that board composition significantly moderates the relationship between environmental disclosure and financial performance of the sampled manufacturing companies listed on the NGX.

Almashhadani & Almashhadani, (2023), This research focuses on the need to investigate the relationship between the characteristics of the board of directors and environmental disclosure in industrial companies in developing countries, considering the collection of data on companies listed on the stock exchange. The focus of the study should be on multiple variables of corporate governance mechanisms using a set of variables, for example: the role of the internal control committee in the company, the size of the board, foreign ownership, the independence of the board, in addition to taking the size of the company as a control variable, and to achieve the objectives of the study and its proposal, the current study recommends measuring environmental disclosure level. The current study relied on panel data to test the study's hypotheses. As most of the previous studies found that the level of environmental disclosure is still relatively low compared to developed countries.

Oladeji and Olutola (2022) evaluates social and environmental impact on financial performance of selected listed cement manufacturing firms in Nigeria. The study was for ten (10) years ranging from 2011 – 2020 and it made use of three (3) sample size of listed cement manufacturing firms in Nigeria. The results from the empirical findings indicated that there is a significant relationship between social and environmental disclosure (research and development disclosure) and financial performance.

Ndalu, Ibanichuka, and Ofurum (2021) conducted an analysis of the environmental disclosure and board characteristics within Nigerian listed oil and gas corporations, with a focus on the moderating effect of corporate size. Using correlational analysis on data from twelve organizations, the study discovered an inverse correlation between board independence and environmental disclosure among Nigerian oil and gas corporations.

Agyemang et al. (2020), undertook a study to assess the influence of board composition on environmental disclosure in Chinese mining industry. The findings of the study unveiled a notably direct correlation between board size and the extent of environmental disclosure practiced by these mining companies. Board meeting-based behavioural qualities were found to positively correlate with environmental disclosure. Environmental disclosure and foreign nationals and board members were found to be negatively correlated, although inadequately. Akbas's, (2019) the study focus was on investigative the link between specific board features and the degree of disclosing environmental policies within Turkish corporations' annual reports and accounts. Interestingly, the regression analysis revealed that only one variable displayed a positive and statistically significant correlation with the level of environmental disclosure: board size. This finding suggests that organizations with larger boards tend to disclose more environmental data compared to those with smaller boards.

In their study in Kenya, Sang, Kingori, Naibei, and Kipkosgei (2019) discovered that, while not as much as a board with greater independence, a board with comparably qualified financial directors released more information about the environment. In examining Jordanian industrial corporations, Rabi (2019) employed regression analysis to discover the influence of board size on disclosure of environmental information. The findings revealed a substantial effect of board size on environmental disclosure practices within the context of Jordan. It is worth noting that Jordan operates under a distinct regulatory framework compared to Nigeria and the study encompassed a potentially broader four-year timeframe.

3. Methodology

This study employed ex-post factor research design to examine the moderating effect of firm size on the relationship between board structure and environmental disclosure of selected oil and gas companies in Nigeria. The target population was fifty (50) oil and gas companies listed on the Nigerian Exchange Group (NGX) as at 31st December, 2023. Out of the 50 oil and gas companies, only 20 companies met the data requirements sought for computing the board structure and environmental disclosure index measures for the period 2019 to 2023. A quantitative strategy is employed for the study and secondary data was collected through content analysis of published annual reports and accounts of the selected listed oil and gas companies up to five (5) years ranging from 2019 to 2023.

Table 1. Variables Measurement

Variables	Symbol	Measurements
Dependent Variable		
Environmental Disclosure Index	ENDI	An index score of the extent of firm disclosure of environmental information based on GRI framework expressed in proportion (Abedalrazzak, Ghaleb, & Abdel, 2024).
Independent Variables		
Board side	BSIZ	The total number of directors on the board
Board Independent	BIND	Non-executive directors on the board divided by the total numbers of the directors
Board Gender Diversity	BGED	A score based on the proportion of female directors and other diversity factors
Moderating Variables		
Firm Size	FIZE	Natural log of total assets (Uyagu et al., 2017)

Source: The Authors (2024)

3.1 Model specification

The GRI-G4 framework was applied establish the scores. A total of 50 items of environmental disclosures under governance, social, environmental and economic pillars were identified. A binary scoring system was adopted. Each item of disclosure was given a dummy weight “0” indicating absence of the item in the report while weight of “1” indicated the presence of item of disclosure in the report. Total scores under each pillar were computed and expressed as percentages. Based on Baron and Kenny (1986) multiple regression models, three steps were utilized to test the moderation effect of firm size on the relationship between board structure and environmental disclosure. Correlation analysis was done to establish the relationships among the variables of the study, to reveal the direction as well as the extend of the relationships among the study variables. The Baron and Kenny (1986) models adopted were as follows: -

$$ENDI_{it} = \beta_0 + \beta_1 BDST_{it} + \varepsilon_{it} \dots \dots \dots (i)$$

$$ENDI_{it} = \beta_0 + \beta_1 BSIZ_{it} + \beta_2 BIND_{it} + \beta_3 BGED_{it} + \varepsilon_{it} \dots \dots \dots (ii)$$

$$ENDI_{it} = \beta_0 + \beta_1 BSIZ_{it} + \beta_2 BIND_{it} + \beta_3 BGED_{it} + \beta_4 FSIZ_{it} + \beta_5 (BDST \times FSIZ_{it}) + \varepsilon_{it} \dots \dots \dots (iii)$$

Where:

- ENDI = Environmental Disclosure Index
- BDST = Board Structure
- BSIZ = Board Size
- BIND = Board Independent
- BGED = Board Gender Diversity
- FSIZ = Firm Size
- β_0 = intercept or constant
- $\beta_1, \beta_2, \beta_3, \beta_4, \& \beta_5$: are regression coefficients
- ε : is the error term
- i: is Firms
- t: is time frame

4. Result and Discussions

This study makes use of descriptive statistics, correlation and regression analysis tools to carry out the analysis.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
EVDI	100	0.282	0.100	0.04	0.61
BSIZ	100	8.626	2.274	4	1
BIND	100	5.284	3.861	4	9
BGED	100	0.371	0.286	2	4
FSIZ	100	7.948	3.545	7.12	9.6

Source: STATA 14 Output (2024)

Table 2 shows the result of the descriptive statistics was pooled on yearly basis for the period 2019 to 2023 which is 5 years. Each variable was observed from 100 observations and 4,690 data points. The result of ENDI shows an average score of 0.282 which indicates the score for environmental information disclosed. The value 0.100 indicates the variation in environmental disclosure index. This has shown that deviation from the mean was low which could be due to low environmental disclosure in some oil and gas companies. The minimum value and maximum value of 0.04 and 0.61 respectively indicates the least score for information disclosed and the maximum score for information disclosed by the selected oil and gas companies in Nigeria. The descriptive statistics for board size (BSIZ) among the sampled oil and gas companies in Nigeria show a mean score of 8.626 indicates the average number of members on the board of directors, with a standard deviation of 2.274, there is relatively low variation among the sampled companies in terms of board size. Board independent (BIND), with mean score of 5.284 and the variation as indicated by the standard deviation value of 3.861 means there is less dispersion. The minimum value of 4 suggests that some companies have as few as four directors on their boards. The maximum score of 9 means that the least company had independent directors. Board gender diversity (BGED) which stands for a score based on the proportion of female directors and other diversity factors showed a mean score of 0.371. This means that on average, about 37.1% of the directors are females. The standard deviation of 0.286 means there is less variation around the mean. The minimum value of 2 shows that at least there was director that is female while maximum value of 4 signifies that during the period of the study, there was a proportion of female directors and other diversity factors.

The descriptive statistics in respect of the moderating variable of this study FSIZ showed a mean value of 7.948. The standard deviation of 3.545 implies that the companies’ size is distributed around the mean. The minimum log value of 7.12 indicates that the oil and gas company with least total assets was ₦7.12 billion and the log of the maximum total assets is 9.6, this means that at least a oil and gas companies has ₦9.6 trillion in total assets.

Table 3 Pairwise Correlations

Variables	ENDI	BSIZ	BIND	BGED	FSIZ
ENDI	1.000				
BSIZ	0.195	1.000			
BIND	0.367*	-0.205	1.000		
BGED	0.339*	0.328*	0.223	1.000	
FSIZ	0.426*	-0.097	0.113	-0.233	1.000

Source: STATA 14 Output (2024) *** p<0.01, ** p<0.05, * p<0.1

Table 3 above indicates that ENDI has direct association with BSIZ though not significant as shown by the coefficient 0.195 at 5% significance level. ENDI has a direct and significant link with BIND as shown by the value of 0.367. ENDI is also found to have direct and significant link with BGED as recorded by 0.339 coefficient. ENDI has a positive and significance correlation with FSIZ with r=0.426 at 5% level of significant. It can be seen that the dependent variable and control variable are directly correlated with the independent variables.

Table 4. Normality of Residual Test

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob>chi2
Residual	100	0.5016	0.0002	11.67	0.0029

Source: STATA 14 Output (2024)

The result gotten from both the skewness and kurtosis for the residual shows that the residual is normally distributed at 1% level of significance. This therefore means that the OLS normality assumptions holds and the intercept can be discussed. As it can be seen there is no much randomness of the variation in the residual on the regression estimation. Therefore, the intercept remains unaffected.

Table 5. Heteroskedasticity Test Results

Dependent Variable	Chi2(1)	Prob> Chi2	Null (Ho)
ENDI	2.95	0.0858	Rejected

Source: STATA 14 Output (2024)

Note: Ho (Null) = Homoscedasticity;

Table 5 shows the p-value of 0.0858 predicts that there is no heteroskedasticity problem since the $p > 0.05$. This implies that there is constant variance assumption of the OLS estimator.

Table 6. Multicollinearity Test

	VIF	1/VIF
BSIZ	1.671	.598
BIND	1.388	.721
BGED	1.208	.828
FSIZ	1.444	.692
Mean VIF	1.423	.

Source: STATA 14 Output (2024)

Table 6 affirm the absence of multicollinearity, as indicated by the tolerance values ranging from 0.598 to 0.83, substantially exceeding the threshold of 0.1 (Hair et al., 2014). Similarly, the Variance Inflation Factor (VIF) falls within the range of 1.208 to 1.671, well below the threshold of 10.

Table 7. Regression Result of Board Structure and Environmental Disclosure

Variable	Coefficients	Robust Std Error	T-test	P > t
Constant	16.2762	7.0390	1.196	0.241
BSIZ	-0.1704	0.0903	-1.887	0.069
BING	0.2673	0.1802	1.483	0.149
BGED	0.2031	0.8820	0.230	0.029
R-Squared		0.3371		
Adjusted R-squared		0.0154		
S.E. of regression		15.3570		
Sum squared residual		33375.2		
Log likelihood		-3214.15		
F-statistic		4.92545		
P-Value		0.0000		
Dependent Variable: ENDI				
Predictors: BDST				
Sample: 2019-2024				
Periods included: 5				
Observations: 100				

Source: STATA 14 Output (2024)

The estimation of the moderation effect was done using the technique suggested by Kenny and Baron (1986). To do this, the procedure entailed testing the direct effect of Board structure on

environmental disclosure, and the moderating variable was measured by firm size. The first adapted model was expressed as follows:

$$ENDI_{it} = \beta_0 + \beta_1 BSIZ_{it} + \beta_2 BIND_{it} + \beta_3 BGED_{it} + \varepsilon_{it} \dots\dots\dots(ii)$$

Table 7 above shows, the relationship between board structure and environmental disclosure. Board size (BSIZ) was negative and insignificant with a coefficient of -0.1704 and p value of 0.069. Board independent (BIND) was positive and significant with coefficient of 0.2673 p-value of 0.149. Board gender diversity (BGED) was positive and significant with a coefficient of 0.2031 and p-value of 0.029 respectively. The research findings indicate that board structure was a significant predictor of environmental disclosure of listed oil and gas companies in Nigerian Exchange Group ($\beta=16.2762$, $p<0.05$). The overall model was statistically significant. The adjusted (R^2), which indicates the amount of dependent variable’s variation explained by the independent variable was reported (Adjusted $R^2 = 0.0154$, $F=4.92545$ and p-value of 0.0000). Generally, based on the overall model’s results, there exist a statically significant relationship between board structure and environmental disclosure of listed oil and gas companies in Nigeria.

Table 8. Regression Result of Moderating Effect of Firm Size on the relationship between Board Structure and Environmental Disclosure of Oil and Gas Companies in Nigeria

Variable	Coefficients	Robust Std Error	T-test	P > t
Constant	17.2762	9.0450	1.910	0.000
BSIZ	0.1204	0.0603	1.997	0.000
BIND	0.2673	0.1802	1.483	0.149
BGED	0.2031	0.8820	0.230	0.003
FSIZ	0.8874	0.4991	1.778	0.000
BDST*FSIZ	5.5799	2.9202	1.911	0.001
R-Squared		0.1451		
Adjusted R-squared		0.1024		
S.E. of regression		15.2581		
Sum squared residual		54275.402		
Log likelihood		-41214.234		
F-statistic		5.62746		
P-Value		0.0132		

Dependent Variable: ENDI
 Predictors: BDST, FSIZ,
 BDST*FSIZ
 Sample: 2019-2024
 Periods included: 5
 Observations: 100

Source: STATA 14 Output (2024)

Table 8 presents the results of hierarchical regression analysis conducted the test the moderation effect of firm size on the relationship between the board structure and environmental disclosure. The second adapted model was expressed as follows:

$$ENDI_{it} = \beta_0 + \beta_1 BSIZ_{it} + \beta_2 BIND_{it} + \beta_3 BGED_{it} + \beta_4 FSIZ_{it} + \beta_5 (BDST * FSIZ_{it}) + \varepsilon_{it} \dots\dots\dots(iii)$$

The results of model one test in table 7 showed a significant linkage between board structure and environmental disclosure ($p<0.05$). Table 8 shows the model of moderating effect of firm size (FSIZ) related with board structure measured by board size, board independent and board gender diversity (BSIZ, BIND & BGED), significantly predict environmental disclosure ($F=5.63$, $p<0.05$). The study findings established that firm size moderate the relationship between board structure and environmental disclosure. Therefore, all the interaction terms and

the overall moderation models were significant. This meant that most of the listed oil and gas companies that are bigger in terms of asset base, make higher environmental disclosure activities on increasing than smaller companies with small asset base. The study results also meant that older firms in terms of incorporation were very slow in adopting the concept of environmental disclosure despite the fact that they were endowed with larger asset bases. The results meant that oil and gas companies that were incorporated recently in Nigeria were aggressively participating in environmental disclosure. Based on the findings, the study null hypothesis was rejected. Thus, conclude that firm size moderating the relationship of board structure and environmental disclosure of oil and gas companies in Nigeria

The findings on the moderating effect of firm size on the relationship between board structure and environmental disclosure are backed by those of Iliemena, Amedu, & Uagbale-Ekatak, (2023), revealed a substantial and positive relationship between leverage and the degree of environmental reporting practices. Andreas, Obeiteh, Ridzwana and Zaidi, (2017). The analysis of coefficients reveals that on the overall, only firm size is seen as the only variable to having a positive and significant impact on environmental disclosure.

From the stakeholder theory viewpoint, firm size, organization capabilities and culture can be broadly viewed as the purpose of the firm that extends the creation of economic value while addressing the interests of the society. Stakeholder theory proponents such as Marcoux, (2013) argued that in the governance of any firm, overriding interests among the different stakeholders of the firm should be addressed without partiality and a balance struck. Therefore, stakeholder theory supports this study as it strives towards striking in addressing the stakeholder concerns and/or interests. The stakeholders are very key in as far as survival of a firm is concerned. They influence business policy development and adoption, determines firm size, and they push the organization towards proper governance, social responsiveness, environmental management and contribution towards economic growth and development. The results of this study also emphasize on the importance of fully environmental disclosure among the listed oil and gas companies in Nigeria while at the same time appreciating the stakeholder networks. The company's management and the company as a whole must be aware of the valued created while engaging in sustainability reporting. The managers should also appreciate that environmental disclosure could at one hand be an enterprise's tool of marketing and promotion and the other hand a point at which information is disseminated to customers, existing and future investors among other interested stakeholders and third parties. Therefore, investors stand to benefit by making investment decisions based on the environmental disclosure prepared and issued by corporate governance.

4. Conclusion and Recommendation

The study conclude that firm size had a moderating effect on the relationship between board structure and environmental disclosure of listed oil and gas companies in Nigeria. The result revealed that board size, board independent and board gender diversity have positive significant effect on environmental disclosure. Conclusively, board structure has positive influence on environmental disclosure. As firm size increases the level of environmental disclosure also increases, this should be encouraged among firms. This study also revealed that when there is good board structure the environmental disclosure tends to be high. This indicate that oil and gas companies with diluted board structure and highly geared tends to comply more with environmental disclosure. The study recommends the need for improved environmental disclosures for oil and gas companies in Nigeria.

The study is applicable to various stakeholders interested in environmental reporting, including policymakers, non-governmental organizations, management teams, green investors and lenders, academicians, researchers, and practitioners. This study would be pertinent for global and international accounting bodies in shaping their perspectives on environmental

disclosure. The study is limited in scope as it relies on selected oil and gas companies, draws findings based on few indicators of corporate governance on environmental disclosure. As a result, there is no real evidence to support and generalised the research conclusions.

References

- Abedalrazzak K. A., Ghaleb A. E., & Abdel N., H., (2024), Sustainability accounting and its impact on the quality of financial reports: Evidence from Industrial Firms. *Journal of Business and Law*. 8(1), DOI: 10.51958/AAUJBL2024V8I1P1
- Abubakar, A.A., Moses S., & Inuwa M.B., (2017). Impact of environmental disclosure on performance of cement and bravery companies in Nigeria. *Civil and environmental*
- Adams, A.A., & Busola, A.A, (2017). Environmental disclosure practices in annual report of listed manufacturing firms in Nigeria. *Social Science Research Network, (SSRN) 1-19.research*. 9(10), 40-46.
- Ajibodade, S. O. & Uwaugbe, U. (2013). Effects of Corporate Governance on Corporate Social and Environmental Disclosure among listed Firms in Nigeria. *European Journal of Business and Social Sciences*, 2 (5), 76 – 92.
- Akbas, H. E. (2019). The Relationship between Board Characteristics and Environmental Disclosure: Evidence from Turkish Listed Companies. *South East European Journal of Economics and Business*, 11 (2), 7 – 19.
- Al-Jubouri H. H. A. and Chakroun A. A. D., (2022). Environmental Disclosure and its Role in Achieving, Sustainable Development in Industrial Companies, An exploratory Study in the Factories of the Northern Iraqi Cement Company. *Journal of Positive School Psychology*. 6 (5). 3598 – 3608.
- Al-Matari, E. M., & Al-Arussi, A. S., (2016). The effect of the ownership structure characteristics on firm performance in Oman: Empirical study. *Corporate ownership and control Journal*, 13(2), 93-182.
- Almashhadani Mohammed & Almashhadan Hasan Ahmed (2023). Corporate Governance and Environmental Discloser *International Journal of Business and Management Invention* 12(4);112-117.
- Agyemang, A. O., Yusheng, K., Ayamba, E. C., Twum, A. K., Chengpeng, Z., & Shaibu, A. (2020). Impact of board characteristics on environmental disclosures for listed mining companies in China. *Environmental Science and Pollution Research*, 27(17), 21188–21201. <https://doi.org/10.1007/s11356-020-08599-2>
- Baron, R.M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of personality and social psychology*, 51(6), 1173-1182
- Brennan, N. (2006). Boards of Directors and Firm Performance: Is There an Expectations Gap? *Corporate Governance: An International Review*, 14(6), 577-593.
- Dibia, N.O. & Onwuchekwu, J.O (2015). Determination of Environmental Disclosure in Nigeria. A case study of oil and gas companies. *International journal of finance and accounting* 4(2), 115-135.
- Federal Reporting Council of Nigeria FRCN,(2018). Nigeria Code of Corporate Governance. Retrieved from <https://nambnigeria.org>.
- Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Boston: Pitman/Ballinger (Harper Collins).
- Gwar S., Angahar P. A., & Iorpev L., (2024). Moderating Role of Board Composition on the Relationship between Environmental Disclosure and corporate performance of Nigerian manufacturing Quoted Companies. *FUDMA Journal of Accounting and Finance Research* 2(1);206-213.

- Husillo, J. & Alvarez Gil, M. J. (2008). A Stakeholder-Theory Approach to Environmental Disclosure by Small and Medium Scale Enterprise (SMEs) <http://www.researchgate.net/publication/23805226>.11(1):125-156
- Ibrahim, R., Ibrahim, Y. K. & Hussain, M. H. (2023). Environmental Reporting and Financial Performance of Listed Industrial and Consumer Goods Firms in Nigeria. *FUDMA Journal of Accounting and Finance Research [FUJAFR]*, 1(2), 123 – 140.
- Iliemena, R. O., Amedu, M. J. A., & Uagbale-Ekatah, R. E. (2023). Empirical examination of sustainability reporting, return on capital employed and gross profit margin. *European Journal of Sustainable Development Research*, 7(1), em0204. <https://doi.org/10.29333/ejosdr/12539>
- Iyafekhe C., Osamagbe Annabel Utomwen, O. A., Eguavoen, I. & Nelson Oke Egware, N. O. (2020). Moderating Effect of Foreign-Domestic Ownership Ratio on Firm Attributes and Environmental Disclosure in Nigerian Oil and Gas Quoted Companies. *Gusau Journal of Accounting and Finance*, I(1), 1-18.
- Jensen, M. C. & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360. [http://doi.org/10.1016/0304-405X\(76\)90026-](http://doi.org/10.1016/0304-405X(76)90026-)
- Marcoux, A. M. (2013). A fiduciary argument against stakeholder theory. *Business ethics quarterly*, 13(1), 1-24.
- Ndalu T.C., Ibanichuka, E. A. L., & Ofurun, C. O., (2021). Board Characteristics and Environmental Disclosure of Quoted oil and gas Firms in Nigeria. The Moderating role of Firm Size. *International Journal of Innovative Finance and Economics Research*, 9(4), 51-62.
- Ofoegbu, N. G. & Odoemelam, N. (2018). Corporate Board Characteristics and Environmental Disclosure Quality. A Comparative Analysis of Traditional and Integral Reporting Evidence. www.preprint.org.
- Okafor, O. O., Egbunike, P. A. And Amahalu, N. N. (2022). Determinants of Environmental Disclosure of Quoted Oil and Gas Firms in Nigeria, *International Journal of Management Studies and Social Science Research*. 4(2): 258 – 265.
- Oladeji, E. O. & Olutola, A. O. (2022). Social and Environmental Impact on Financial Performance of Selected Listed Cement Manufacturing Firms in Nigeria. *Nigeria Academy of Management Journal*, 17(2), 156-163
- Oyedokun, G., E., Umoh, R. O., Haruna, A. R., & Zakari, A. Z. (2019). Effect of Ownership Structure on Earnings Management of Listed Industrial Goods Companies in Nigeria. *Journal of Business and Management*, 21(1), 47-54. DOI: 10.9790/487X-2101034754.
- Rabi, A.M. (2019). Board Characteristics and Environmental Disclosure: Evidence from Jordan *International Journal of Business and Management*, 14(2), 57-65.
- Ramly, Z., Chan, S. G., Mustapha, M. Z. & Sapiel, N. S. (2015). Gender diversity, board monitoring and bank efficiency in ASEANS. *South East Asia Journal of Contemporary Business, Economics and Law*, 7(1), 9-21.
- Seteyawan, & Kamila (2015). Impact of Corporate Governance on Corporate Environmental Disclosure. Indonesian Evidence. *International Conference proceedings on Trends in Economics and Management*. 1-27
- Suchman, M.C. (1995). Managing Legitimacy: Strategic and Institutional Approaches. *The Management Review*, 20(3), 571-610.
- Tiresani, T. & Djajadikerta, H.G., (2016). Corporate Governance and Environmental Disclosure in the Indonesian Mining Industry. *Australasian Accounting, Business & Finance Journal*, 10(1), 17-28.