Corporate board characteristics and energy disclosure practices of listed non-financial firms in Nigeria

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Abstract
The use of non-renewable energy by firms in Nigeria seriously affects biodiversity and the general well-being of the populace. The consequences led the country to be among the top pollution producers globally. . However, Nigeria recently mandated all companies to comply with environmental disclosure The study examines the effect of corporate board attributes on the energy disclosure by the listed non- financial companies in Nigeria. The quantitative research was used obtained data using content analysis technique from sampled firms and energy disclosure using GRI standard. The study uses sample of 49 listed companies from non-financial companies listed on the floor of Nigerian stock exchange commission for the period of 5 years (2016-2020). The study found insignificant association between ownership and energy disclosure. This should be used as way forward to encourage and compel all listed companies to improve their energy disclosure. Board is expected to encourage disclosure of energy issues. Therefore, firms would benefit and gain legitimacy across demographic, ethnic and religious groups in the society. All listed firms should ensure compliance with Nigerian Corporate Governance code which suggests the establishment of board that could be capable of giving proper direction to the firms. Thus this study documented that board attributes, such as independence, meetings and ownership are essential mechanisms towards general disclosure.

Keywords: Board characteristics, Energy disclosure and listed non-financial firms

Introduction

The failure of corporate organizations to mitigate pollution resulting from various energy sources such as fossil fuel combustion and various gasses and toxins released from factories triggers worries and health concerns as suggested by Wang et al. (2020) and Zhang and Xie (2020) that energy consumption is one of the big environmental challenge the world has to contain with Environmental reporting practices are means of communicating to the stakeholders the efforts made by firms to reduce or compensate the negative effect of their activities on the environment and its host community (Sun, Ding and Price, 2020; Sial *et al.*, 2021). Thus, firm would become environmentally responsible when it incorporate environmental accounting as part of its business strategy and account for its environment by disclosing its intervention to mitigating the negative operational impact on the environment (Ellimäki *et al.*, 2019). In view of this, it is now clear that the companies need to disclose all the efforts they make to conserve environment and the supports provided to immediate community to cushion the effect of their activities on their environment.

Since board of directors are responsible for ensuring corporate reporting, board attribute can play important role in determining what to disclose and the extent of disclosure in the annual report. This is due to their usual commitment to the compliance requirements within and outside the organization. Therefore, board independence meetings, size, gender and management ownership could contribute to a greater variety of backgrounds and knowledge, signifying different points of view that may lead to better strategic decision making which will lead to more disclosure in relation to energy disclosure and overall environmental issues (Khaireddine, 2020; Tingbani, Chithambo and Papanikolaou, 2020). As such these attributes will be engaged in the study so as to ensure more robustness in the findings.

Prior studies documented evidences that board attributes have significant positive and negative impact on environmental disclosure globally. These studies were centered in developed countries (Moussa, 2019; Qureshi, Kirkerud and Theresa, 2019; Khaireddine, 2020; Tingbani, Chithambo and Papanikolaou, 2020) and some in emerging economies (Alipour et al., 2019; Aliyu, 2018; Haladu & Bin-Nashwan, 2021; Kathy et al., 2012; Kilincarslan et al., 2020; Mohammad & Wasiuzzaman, 2021; Ofoegbu et al., 2018b; Otchere et al., 2019; Rezaee, 2019; Shahab & Chen, 2020; Sial et al., 2022).

To this end few studies (Fakoya & Nakeng, 2019; Jibril, Isa, et al., 2022) found to be conducted on the effect of energy disclosure. Therefore, this study intends to contribute to the existing body of knowledge by assessing the effect of institutional strength on the relationship between corporate board attributes (independent, meeting, size, gender and ownership) and energy disclosure in Nigeria. Globally, environmental matters attract greater attention from international polices administrators. Therefore, the study intends to achieve the following objectives:

1. To assess the effect of board independence on energy disclosure by listed firms in Nigeria
2. To assess the effect of board size on energy disclosure by listed firms in Nigeria
3. To assess the effect of board meeting on energy disclosure by listed firms in Nigeria
4. To assess the effect of board gender diversity on energy disclosure by listed firms in Nigeria.
5. 1. To assess the effect of board ownership on energy disclosure by listed firms in Nigeria.

2.0 Literature Review and Hypotheses Development

Corporate environmental disclosure could be described as a disclosure made by the firm to the stakeholders concerning its externalities discharged and measures taken to mitigate the negative effect caused by the company. The major policy that responsible of controlling global climate changes is the ability of the firms to manage their energy consumed and quantify the carbon emissions discharges by considering allowances and trading carbon in the market (Al-qahtani & Elgharbawy, 2019;Kılıç & Kuzey 2018). Energy is being required (such as light, heat, mechanical, sound, electrical and chemical energy) by companies to operate and run their day-to-day activities (Fakoya & Nakeng, 2019). Virtually all companies consume energy in various manner, therefore, energy can be described as self-generated that is energy generated from other sources than natural such as hydro, solar and wind. Energy can equally be generated using non-renewable sources that is using natural sources, under this category companies normally consumed petroleum, natural gas and coal as sources of generating non-renewable energy for the firms.

However, to utilize firm's energy efficiently it is essential for the firm to select renewable energy sources for combating present and future climate change and for mitigating overall environmental effect in the society (GRI, 2021). Furthermore, improvement on energy transition in a country is determined by the level to which a strong enabling environment is being created. This comprises political will, flexible polices, conducive business atmosphere, incentives for investments and innovation, consumer awareness and protection agencies, pressure groups and adoption of new technologies among others (World Economic Forum, 2021).

However, environmental calamities in relation to air pollution as a result of consuming nonrenewable energy can only be controlled when firms utilize and disclose measures used in curtailing harms produced by the energy consumed in the country and ensure full compliance with established laws.

Underpinning theory

Corporate organization need to operate legitimately within the community. Therefore, from the perspective of a corporate entity, Legitimacy is a general opinion or notion that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values and beliefs (Emeka & Okeke, 2018). As a result of the connection between the legitimacy of a firms and the perception of the society about the firm, it is imperative that management makes disclosures that will positively influence the opinion of the society about the firm (Cormier & Magnan, 2013).

Therefore, legitimacy theory is essential to the present study since operation of firms could only consider legitimate if firms ensure that their operations are coherent with the expectations of the society in which it operate. Hence corporate board attributes are capable of ensuring firms energy disclosure and operate accordance with community expectation.

Board independent and energy disclosure

Board independence is one of the board attribute that has an impact on energy disclosure. Board independence is a relevant corporate governance mechanism for controlling and monitoring the management team and for safeguarding shareholders' interests (Ezhilarasi & Kabra, 2017). Additionally, Baalouch, Ayadi and Hussainey (2019) investigated the determinant of environmental disclosure quality in French. The study variables focus on factors related to the strategy and vision of (independence of the board, gender diversity) and factors related to the environment (environmental performance, degree of pollution of the company). The study revealed that independence of boards have played significant roles in explaining variations in quality of environmental disclosure. Furthermore, several studies (Ikhenade, 2020; Kanashiro, 2020; Tseng *et al.*, 2020) have documented significant positive association between board independent and environmental disclosure.

Kilincarslan, Elmagrhi and Li (2020) examined the effect of corporate governance structures on environmental disclosure practices in the Middle East and Africa (MEA). The results revealed that board independence has a significant negative relation with environmental disclosure. Other prior studies (Odia, 2018; Rezaee, 2019) also proved that Independent of board did not impacted on the environmental disclosure. However, based on these findings, the study hypothesizes that:

H1: There is a positive relationship between board independent and energy disclosure in Nigerian

Board meeting and energy disclosure

Based on agency theory's view, boards, which have higher frequent meetings, have higher effective advisory and monitoring role on the management. Board of directors' activities, measured by board meeting frequency, is an important dimension of board actions which helps to overcome agency conflicts (Ofoegbu et al., 2018b).In assessing the impact of board meeting on environmental disclosure, Koji, Adhikary and Tram (2020) expose that frequent board meetings can play an important role in enhancing firm performance because it helps to reduce the informational gap among the board members. Shahbaz, Karaman, Kilic and Uyar (2020) investigated the relationship between board attributes and corporate social responsibility (CSR) engagement as well as between CSR engagement and corporate performance in the global energy sector. The results indicate that board meeting attendance is statistically significant related with ESC. Similarly, Khaireddine (2020) explored the influence of board characteristics on the governance, environmental and ethics disclosure in Tunisia. The result reveal that board meetings have a positive and significant influence on governance, environmental and ethics disclosure. Many studies, Grace and Okafor (2018) have documented a significant positive association with environmental disclosure. However, based on these findings, the study hypothesizes that:

H2: There is a positive relationship between board meetings energy disclosure in Nigeria

Board size and energy disclosure

Board size represents the number of directors on the board. Thus, larger board is likely to include more experienced and knowledgeable directors who possess better expertise to manage environmental issues. In addition, Okpala and Iredele (2019) was of the view that larger board is described by more qualified and knowledgeable individuals on voluntary environmental disclosure and effective reporting skills. This shows that large boards aggregate a higher quantity of experiences and qualifications, which influences the process of environmental disclosure and helps reduce the asymmetry of information and conflicts of interests among the interested stakeholders.

Husted and Sousa-Filho (2019) investigated the relationship between board structure and environmental, social, and governance disclosure in Latin America. The regression result indicated that board size and independent directors have significant positive effect on ESG disclosure. In Nigeria Emmanuel and Teddy (2019) examined the effect of corporate diversity on corporate social environmental disclosure of registered manufacturing firms, the study found that board size and gender had a significant positive influence on the degree of corporate social environmental disclosure of the selected firms. Furthermore, Ikhenade (2020) found that board size is positively related to environmental disclosure. In the same direction (Khaireddine, 2020; Tseng *et al.*, 2020) established a positive association between board size and environmental disclosure. Conversely, prior studies (Aliyu, 2018; Odewale, 2020) also documented that board size did not influence environmental disclosure. Therefore, based on these findings, the study hypothesizes that:

H3: There is a positive relationship between board size and energy disclosure in Nigeria

Gender diversity and energy disclosure

In recent times, several studies on board personality and group dynamics tend to examine the influence of gender on corporate decisions with some of these studies viewing at gender diversity of board attribute and its influence on the role environmental disclosure (Reguera- alvarado and Bravo-urquiza, 2020). Gender diversity therefore, referred to as the mix of males and females on the board of directors. Women board members normally find decision much simpler on how to improve their firms' environmental reporting and are expected to give more ideas on decisions relation to energy disclosure (Ofoegbu *et al.*, 2018).

Empirically Tingbani, and Papanikolaou (2020) explore the effect of gender diversity and environmental committees on green- house gas (GHG) voluntary disclosures in united kingdom. The overall empirical result shows evidence for a strong positive association between GHG voluntary disclosures and gender diversity, which constitutes an important input to the ongoing debate about the role of women in on board. Similarly, Al-qahtani and Elgharbawy (2019) evaluate the extent to which board diversity affect firms voluntarily disclose and management of greenhouse gas (GHG) information in U.K. The results show that representation of female directors in the board of directors positively influences disclosure and management of GHG information. Most of the studies conducted in advanced countries established that female on board positively impacted on environmental disclosure (Atif *et al.*, 2020; Beji *et al.*, 2020).

In Europe, Haque and John (2020) investigate how board gender diversity is associated with biodiversity disclosures of a firm, and whether the Global Reporting Initiative (GRI) and the EU biodiversity strategy reinforce this relationship. The regression result reveal that board gender diversity is positively associated with the disclosure of biodiversity. Similarly, Qureshi, Kirkerud and Theresa (2019) documented that firms with higher female representation on their boards present significantly superior environmental, social, and governance performance.

Globally, Consuelo et al. (2018) explore the effect of board attributes and disclosure of corporate social responsibility issues across the world. The study established that gender and size are positively related with CSR disclosure. In the same vein, several studies documented significant positive impact of women on board on sustainability reporting globally (Guping *et al.*, 2020; Kilincarslan, Elmagrhi and Li, 2020; Sun, Ding and Price, 2020; Tseng *et al.*, 2020). To sum up the above studies, it was established that having women on the board increases the reporting quality of social decisions and improves the implementation of environmental policies globally.

In contrast, some prior studies (Fernandes *et al.*, 2018; Manita *et al.*, 2018) evidenced that women on board have played an insignificant role in implementing environmental policies due to sex-biased influences. Based on these findings, the study hypothesizes that:

H4: There is a positive relationship between board gender and energy disclosure in Nigeria

Board ownership and energy disclosure

The level of managerial ownership can serve as a way of aligning the interests of managers with those of shareholders, and thereby leading to an increase in the level of disclosure

.Previous literature upheld that shareholding directors tend to make more environmental decisions to demonstrate their contribution to societal and environmental issues, and to gain different stakeholders' attentions (Gyapong *et al.*, 2019; Kao, Hodgkinson and Jaafar, 2019). Furthermore, directors who possess certain interest in the organizations will take environment challenges serious as they may be influenced by institutions, activist groups, and governments towards compliance with environmental regulations. Hence, they are likely to disclose more CSR and environmental information to mitigate political costs (Saini & Singhania, 2019).

Though there are limited studies that conducted to explored the effect of management ownership and environmental disclosure, some of these prior studies established that

directors' larger shareholding inspires them to exercise more control for their own financial benefits and interests, rather than to maximize shareholder wealth (Alfariz & Widiastuti, 2021; Zaid et al., 2020). Budiharta (2020) investigates the effect of board of directors, managerial ownership, and audit committee on carbon emission disclosure in Indonesia. The study results indicate that managerial ownership positively influence carbon emission disclosure.

In contrast, Giannarakis et al. (2018) establish a significant negative relationship between managerial ownership and CSR in European companies. This shows that managers are not fascinated in providing more disclosure on environmental issues, as this negatively affects their compensation and benefits. Many studies have established negative relationship between management ownership and CSR disclosure. Therefore, based on these findings, the study hypothesizes that:

H5: There is a positive relationship between board ownership and energy disclosure in Nigeria

3.0 Research Methodology

This paper assessed the relationship between board attribute (independent, meeting, size gender, and ownership) on energy disclosure. The population of this study comprised eight (8) sub-sectors such as Agriculture, Construction, Consumer Goods, Health care, Industrial, Natural Resources, Oil and Gas, and Services Companies listed on the Nigerian Exchange Group (NXG) as at 31st December, 2020, this is because the sectors are the major energy consumers. Therefore, in Nigeria there are seventy three (73) identified firms listed on NXG as at 31st, December, 2020. Twenty four companies were eliminated from the population because of the absent of complete data for the study period. The study obtained secondary data generated from the annual reports of the sample firms for the period of five years (2016-2020). The selection of these sectors was based on the high energy usage attached to the sectors. In addition, the 2016 to 2020 are the period in which energy disclosure and overall environmental disclosure witnessed important regulatory improvement by the country and Global Reporting Initiative (GRI) standard. The study used content analyses to capture the level of energy disclosure by Nigerian listed firms using Global Reporting Initiative (GRI) standard. This is in line with work of (Udo, 2019; Haladu and Bin-Nashwan, 2021).

3.1 Measurement of the variables

The variables were categories into two dimensions, dependent (energy disclosure), explanatory variable (independent and control variable) (Haladu & Bin-Nashwan, 2021). Under the proposed approach, 0 point is given to non-compliance and 1 is given when company disclose item of energy disclosure (Kılıç, Ali, Kuzey and Abdullah, 2020).

Descriptive statistics was performed basically to summarize the data into a manageable form and in order to test the extent of compliance with energy disclosure by the selected firms. The study variables were measured in line with previous studies as follow.

Table 1. Variables of the Study and their Measurement

Variable	Acrimony	Measurement	Source

Energy disclosure : **Energy consumption within the organization** **Energy consumption outside of the organization** **Energy intensity** **Reduction of energy consumption** **Reductions in energy requirements of products and services**	ED/GRI302 302-1 302-2 302-3 302-4 302-5	1 = Companies that disclose EDE information in their annual report, 0 = Otherwise	(Brahmana & You, 2019; Jibril, Isa, et al., 2022; Jibril, Usman, et al., 2022; Ofoegbu et al., 2018a; Tareq Bani- Khalid, Reza Kouhy, 2017
Board Independent	BINDP	Proportion of independent non-executive directors on the board	(Allegrini & Greco, 2013; Jibril & Maikano, 2022; Odewale, 2020; Uwuigbe & Ajibolade, 2013)
Board meeting	BMTG	Total Number of meetings during the reporting period	(Manita et al., 2018; Ofoegbu et al., 2018a; Shahbaz et al., 2020)
Board Size	BSIZE	Total number of board members	(Odewale, 2020; Uwuigbe & Ajibolade, 2013)
Board gender diversity	BGD	Degree of heterogeneity among board members using Blau-Index	(Guping et al., 2020)
Board ownership	BOWP	Proportion of shares owned by board members	(Garcia-Torea et al., 2017; Halliday, 2020; Kao et al., 2019)
Age	Age	Number of years	(Bédard and Gendron, 2010)
Profitability	PROF	Profit after taxation divided by total assets	(Black & Kim, 2012; Jibril, AbdulAziz, Haruna, et al., 2023; Jibril, Usman, et al., 2023)
Firm size	FSIZE	Natural logarithm of total assets	(AbdulAziz et al., 2023; Jibril, 2019; Jibril, AbdulAziz, & Haruna, 2023)

Source: literature review, 2021.

A multiple regression was applied to test the hypothesis based on the following model:

EDSit= α + (β1BINPit + β2BMEETit + β3BSIZEt + β4BGDVit + β5BOWNit + β6FSIZEit + β7FAGEit + β8PROit) + Ɛit…….1

Where:

EDS= Energy Disclosure Score α = Constant

β0 = Intercept estimates

BIND= Board independence (Proportion of independence and non-executive directors on the board)

BMEET =Board Meetings (Total Number of meetings during the reporting period)

BSIZE =Board Size (Total number of board members on the board)

BDV = Board Diversity (Degree of heterogeneity among board members using Blau-Index) BOWN= Board ownership (Proportion of shares owned by board members)

AGE = Liquidity (Number of years)

PROF = Profitability proxy by ROA (Profit after taxation divided by total assets) FSIZE = Firm Size (Natural logarithm of total assets)

4.0Results and Discussion

4.1 Descriptive Statistics

The descriptive statistics of board attributes and energy disclosure of the sampled listed companies were presented in table 2 as follows.

Table 2. Descriptive Statistics

	Mean	Minimum	Maximum	Stan. Dev	Medium	Skewness	Kurtosis
EDISC	0.52	0.00	1.00	0.22	0.57	-0.30	2.99
Bind	0.61	0.00	2.20	0.29	0.63	0.80	7.78
Bmee	4.31	1.00	10.00	1.24	4.00	0.47	4.45
Bsiz	8.16	3.00	18.00	3.45	7.00	0.76	2.71
Bgen	0.24	0.00	0.50	0.16	0.24	-0.28	1.89
Mown	0.37	0.00	1.20	0.21	0.38	0.35	3.28
Fsiz	9.30	3.25	22.33	5.01	6.93	1.41	3.38
Fage	50.25	2.00	96.00	20.78	53.00	-0.27	2.83
Prof	4.73	0.00	712.99	48.97	0.02	13.12	183.81

Based on the table 2 the information on descriptive results of the dependent, independent as well as the control variables used in the regression models were all presented. The results indicated that the standard deviation of total energy disclosure by the sample firms for the period under study have 22% as maximum energy disclosure Similarly, the energy issues revealed by listed firms ranged 50.2% (mean = 0.52) with medium and minimum of 57% and 0% respectively. Considering board attributes, the research found that board independent result reveals that on average 61% of the board members were non-executive and independent directors, consequently, to confirm the independence and effectiveness of board independence, board should composed largely of non-executive directors whose management cannot have absolute power over their activities. The result also indicated that on average board meetings of sampled firms meet 4 times within a year, with minimum number of 1 meeting in the year while the maximum number of meetings held by the listed firms were 10 times. Board size has maximum of 18 board members and minimum of 3. However, the mean value indicated 8 members this suggests that majority of listed firms in Nigeria have more than 5 board members composing their board size. This is close to the statutory requirement of Nigerian Corporate Governance Act (Financial Reporting Council, 2018), that the number members board should not be less than 5 which shall comprises of both executive and non-executive directors representatives. On the other hand, board gender diversity was found to be 24 % on average, the maximum female representative of listed firms found to be 50% while the minimum representation of female on board 0%. This reveals that some sampled firms have no female representation on their board. The descriptive information finally revealed that on average the board members owned up to 32% of the total companies' share. This could serve as possible means by the board to align all the reporting requirements especially on the environmental issues. However, board must have insisted to comply with all environmental disclosure in order to gain the legitimacy while protecting their organizational interest.

4.2 Correlation Analysis

The results of the correlation analysis between the study variables were presented in Table 3, as follows:

Table 3. Correlation Matrix

	EDISC	Bind	Bmee	Bsiz	Bgen	Mown	Instr	Fsiz	Fage	Prof
EDISC	1.0000									
Bind	-0.2471	1.0000								
Bmee	-0.2405	-0.0551	1.0000							
Bsiz	0.0983	-0.1565	0.3013	1.0000						
Bgen	0.1290	0.0751	-0.0553	0.1002	1.0000					
Mown	0.3425	0.0671	-0.2134	-0.0944	0.0555	1.0000				
Fsiz	-0.0195	0.1261	-0.2293	-0.3123	-0.0997	0.1102	0.0045	1.0000		
Fage	-0.0337	-0.0312	0.2282	0.2243	0.0420	-0.2416	0.0400	-0.1963	1.0000	
Prof	-0.0347	0.0256	-0.0352	0.2212	0.0273	-0.1070	0.0418	0.1376	0.0140	1.0000

Based on the correlation coefficients presented in table 3, revealed a positive relation between dependent and independent variables with the exception of board independence and meetings which indicated negative correlations. Similarly, board size showed a moderate positive correlation with energy disclosure. This implies that the larger the board the higher the level of energy disclosure. Moreover, gender diversity also has positive correlation with energy disclosure by the listed firms. This confirm the assertion that the more women on board the greater energy would be disclosed by the listed firms. Finally, the management ownership was positively correlated with energy disclosure. This implies that the more shares owned by the board member the better protection should be with regards to the organizational interest by compliance with all reporting requirements. However, correlations among the independent variables were found to be positive and negative associations. Thus this indicates the absence of multicollinearity problem among the independent variables.

4.3 Regression Results

The regression results for the association between corporate board attributes and energy disclosure as assessed by the model were presented in table 5 below. The study tested panel data model description test, a hausman test, and a lagrange multiplier test were run to select the most suitable model among Fixed Effect Model (FEM), and Random Effect Model (REM). However, the study panel data regression test found that the REM model is the most suitable model used as indicated in Table 4 and finally VIF test were also conducted in order to test the multicollinearity among the variables.

Table 4. The regression results of the panel data

	Coef.	Std. Err.	Z-Value	P-Value
Bind	-0.19	0.04	-4.79	0.0000
Bmee	-0.02	0.01	-2.31	0.0210
Bsiz	0.00	0.01	0.66	0.5080
Bgen	0.14	0.07	1.99	0.0470
Mown	0.15	0.06	2.41	0.0160
Fsiz	0.00	0.00	-0.10	0.9210
Fage	0.00	0.00	0.18	0.8540
Prof	0.00	0.00	-1.08	0.2790
Conts	0.71	0.25	2.82	0.0050
sigma_u	0.1470			
sigma_e	0.1251			
Rho	0.5799	(fraction of variance due to u_i)		
Within	0.0976			
Between	0.3132			
Overall	0.2299			
Hausman	0.0950			
LM	0.0000			
Obs	245			

Table 4 presents regression results, the overall results of R^2 showed a value of 0.2299 which implied that 23 % of the variation in the energy disclosure by selected firms can be captured by the study independent variables in the regression model. In evaluating the relationship between board independence and energy disclosure by the listed firms the study results indicated a positive and statistically significant association at 10% level of confidence. This validates that the independent board have influence upon volume of energy disclosure. Thus, the first hypothesis is accepted. This is in line with findings of Al-qahtani and Elgharbawy (2019) who have found that independence of board is positively associated with improved environmental disclosure. In contrast the finding contradict works of (Emeka & Okeke, 2018)

In relation to board meetings the results revealed a positive and significant association between number of meeting and the energy disclosure of the selected firms. Therefore, the study accepted the second hypothesis that frequency of meetings that is board meetings has positive impact on energy disclosure. This indicates that board events in terms of meetings do improve its monitoring role towards better energy disclosure. The finding also consists with prior studies which documented a strong positive association between frequency of board meetings and environmental disclosure (Emeka & Okeke, 2018). However, the finding is in contrast with work of (Fahad & Rahman, 2020). The results of board size revealed an insignificant relationship between board size and energy disclosure by the selected firms. This implies that big board has impact on the volume of energy disclosure by the selected firms. Therefore, the third hypothesis is rejected. This is contradicts the works of (Beji *et al.*, 2020). Furthermore, the finding was in consistent with previous studies (Mohd-Said *et al.*, 2018; Budiharta, 2020) who found insignificant relationship between board size and firms disclosure.

On the relationship between board gender and energy disclosure, the results was found to be statistically significant. This implies that volume of energy disclosure improved with a large number of women representation on the board. Hence, the fourth hypothesis is accepted. This is consistent with the argument that gender diversity brings on board vital human resource and diverse opinions that help to improve the board mission. Furthermore, this confirm the assertion that female board member play a relevant role in enhancing board effectiveness and improving the quality of financial information and promoting good corporate practices. The finding is consistent with work of (Shahbaz *et al.*, 2020; Tingbani, Chithambo and Papanikolaou, 2020) who found that board gender was strongly significant with environmental disclosure. Also, the findings is inconsistent with previous study (Fahad and Rahman, 2020). The regression results also showed a positive significant relationship between management ownership and energy disclosure. Therefore, the fifth hypothesis is accepted. This findings is consistent with work of (Budiharta, 2020). Though, the finding is in contrast with previous studies (Chaq and Wahyudin, 2020).

Table 5. Variance inflation factors

Variable	VIF	1/VIF
Bind	1.39	0.719138
Bmee	1.2	0.830557
Bsiz	1.18	0.845214
Bgen	1.14	0.874213
Mown	1.13	0.881599
Fsiz	1.09	0.914774
Fage	1.08	0.925258
Mean	VIF	1.17

From the table 5 above it was established that variables used are all fitted in the model. The minimum acceptable VIF reported in the previous study (Helfaya and Moussa, 2017) must be less than 10 %, hence the VIF in this study are all less than 2% which found to be satisfactory.

4.3 Hypotheses testing

Based on the regression results presented in table 5 and table 6, the following hypotheses were tested as follows:

Table 7.

Number	Hypotheses	Findings
H1	*There is a positive relationship between board independent, energy disclosure in Nigeria*	Supported
H2	*There is a positive relationship between board meetings, energy disclosure and environmental law in Nigeria*	Supported
H3	*There is a positive relationship between board size, energy disclosure and environmental law in Nigeria*	Not Supported
H4	*There is a positive relationship between board gender, energy disclosure and environmental law in Nigeria*	Supported
H5	*There is a positive relationship between board ownership energy disclosure and environmental law in Nigeria*	Supported

5.0 Conclusion

The study evaluates the impact of board attributes on energy disclosure in Nigeria. Specifically, in Nigeria, no studies considered the influence of corporate board attributes on energy disclosure using non-financial sector as whole. Based on the random sampling method the study collected data from the annual report of selected 49 companies listed on the floor of NSE from 2016 to 2020 with 245 to total number of observation. The study captured energy data using latest Global Reporting Initiative (GRI). The study would have been said to be conducted at the right time as Nigeria recently mandated all listed companies to comply with environmental disclosure. Hence, the study of this nature might help the country in establishing the extents of current disclosures by the listed firms. This will assist the regulatory bodies to come up with appropriate monitoring and evaluating mechanisms in ensuring absolute compliance by the listed firms. Furthermore, this should be used as way forward to encourage and compel all listed companies to improve their energy disclosure and environmental issues at large.

5.0 Major findings

The study has the following findings:

- The volume of energy disclosed by the selected firms in Nigeria have mean of 52 %.
- High positive and significant relationship between board attribute and energy disclosure.
- Positive and significant relationship between board meeting and energy disclosure.
- Insignificant association between meeting and energy disclosure.
- Board gender has positively impacted the level of energy disclosure
- Board ownership has positively impacted the level of energy disclosure

5.1 Recommendation

Since it was mandated by the guidelines on sustainable financial principles for the Nigerian capital market (SEC, 2021) that all listed companies must disclose all their environmental issues and ensuring compliance with stated guidelines.

- However, there is need to strength the established regulatory bodies for ensuring proper compliance and evaluation processes so as to improve the energy disclosure from average of 52% to high energy disclosure.
- All listed firms should ensure compliance with Nigerian Corporate Governance code which suggests the establishment of board that could be capable of giving proper direction to the firms. Thus this study documented that board attributes, such as independence, meetings and ownership are essential mechanisms towards general disclosure.
- Corporate bodies should make female representation compulsory on their board for better composition and strengthen the level of company's general disclosure.

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