Chapter 30

Women in Top-Echelon Positions and their effects on Carbon Emission Disclosure in Nigeria

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Abstract

Gender diversity in top-echelon positions and the disclosure of carbon-related information are two topics of increasing importance for corporate entities. Corporate disclosure of carbon emissions has become increasingly encouraged to monitor and address the issue of climate change mitigation. Hence, this study aims to examine the impacts of women in top-echelon positions on carbon emission disclosure of Nigerian companies during the years 2012 to 2021. Content analysis was employed on the annual report and sustainability report of 12 sampled listed deposit money banks in Nigeria to capture data on carbon emissions. The data collected were analysed with the aid of the generalised least squares (GLS) multiple regression technique. Using 120 firm-year panelled observations, the result of the GLS showed that both board gender diversity and CEO gender have a significant positive impact on the disclosure of carbon emission information. This study concludes that carbon emission disclosure is promoted in firms with a female presence in their top-echelon positions, which means that gender diversity is an important indicator of effective monitoring and oversight of carbon emission disclosure. The findings have significant implications in theory and practice, as they contribute to the ongoing discussion about the advantages of female representation in governance. The study suggests that banks should use the appropriate proportion of female directors in their board composition and appoint females as CEO to enhance their sustainability responsiveness.

Keywords: Board Gender Diversity, Carbon Emission Disclosure, CEO Gender, Environmental Sustainability, Women on Board

Introduction

Climate change has become an increasingly important political and business issue for most countries, making environmental sustainability a global concern. Governments and regulatory agencies around the world are constantly making efforts and trying to figure out the solution for deterioration and preventive measures of environmental problems such as carbon emission. This is evident in the climate change conferences and summits where leaders from various countries have convened to discuss environmental sustainability. The most recent conference was the United Nations Climate Change Conference (COP27) held in Egypt in 2022, where leaders of over 100 countries (Nigeria inclusive) committed to reducing carbon emissions and achieving the United Nations Sustainable Development Goals (UN, 2015).

Nigeria, amongst others, has been identified as one of the countries with a high degree of environmental pollution that contributes significantly to global environmental problems. The total CO^2 emission in Nigeria increased by 214.04% from 1990 to 2020 (IEA, 2019). In addition, according to the 2022 World Bank Global Gas Flaring Tracker report, Nigeria is the world's seventh highest gas flaring nation (World Bank, 2023). The Global Methane Tracker 2022 ranked Nigeria ninth amongst the world's top ten emitters of methane (IEA, 2022).

These low scores have led to intensive growth in investor demand and agitations for mitigation and disclosure of carbon emissions. Many of these environmental challenges arise because of companies' actions and activities aimed at meeting their financial obligations. In response, many initiatives and agendas have emerged to promote sustainable development goals and the transition to cleaner energy. To monitor and support these efforts, corporate disclosure of carbon emissions has become increasingly encouraged. In 2021, Nigeria enacted the Climate Change Act, which emphasise reporting of climate change action by corporate entities in Nigeria (Federal Republic of Nigeria, 2021).

Concern for the disclosure of carbon information makes it important and necessary to know the factors influencing management's decision to disclose such information to stakeholders. This study goes beyond demography and opens the black box of board executives by drawing upon theories of gender differences; the Upper-Echelons Theory. The theory proposes that the top executives' decisions are influenced by their

individualised perspective, which is shaped by their unique experiences, values, personalities, and other human factors that could be linked to the gender of the executives. By diversifying the composition of boards, firms can benefit from the unique perspectives and experiences of women directors, who tend to be more attuned to environmental concerns. Existing research consistently suggests that women are more inclined towards sustainability initiatives and are likely to promote greater awareness of the importance of developing environmental disclosure strategies (Agarwal, 2010; Bannò et al., 2023; Hossain et al., 2017).

In contrast to previous studies (for example, Desai, 2022; Chithambo, 2013; Meiryani et al., 2023), our study investigates the impact of women in upper-echelon positions on carbon emission disclosure. Notably, we differentiate between the roles held by women within the firm - such as board of directors, chief executive officer (CEO), and board committees - which has received limited attention in existing literature. In addition, there is less evidence in the literature globally as to the relationship between female CEOs, gender diversity of the audit committee, effect on environmental disclosure in general and particularly carbon emission disclosure (Bravo & Reguera-Alvarado, 2018; Ararat & Sayedy, 2019; Wang & Sun, 2021). As such, this study is one of the first to provide evidence on the impact of women in upper-echelon positions on carbon emission disclosure in a developing nation. Addressing the concerns raised regarding how to measure disclosure, our study improves upon the limitations of previous research by adopting a scoring system and checklist that aligns with the Global Reporting Initiative (GRI) guidelines, as recommended by scholars (such as Muhammad & Aryani, 2021). Furthermore, this study is amongst the pioneer studies using Global Reporting Initiative (GRI) Standards 305: Emission checklist to measure carbon emission disclosure in a developing nation context (GRI, 2016).

Therefore, in an attempt to bridge gaps and overcome the limitation in literature, this study investigated the impact of women in top-echelon positions on carbon emission disclosures in the context of a developing nation context. This study is motivated by the dearth of studies in this research area in Nigeria, even though the country is amongst the countries with serious environmental problems.

On this note, this study raises the following questions.

1. Does board gender diversity affect carbon emission disclosure?
2. Does CEO gender diversity affect carbon emission disclosure?
3. Does audit committee gender diversity affect carbon emission disclosure?

Literature review

Gender diversity is considered one of the most intriguing human aspects that have been the focus of numerous studies (Fernandez-Feijoo et al., 2014; Galbreath & Tisch, 2020; Liao et al., 2015). Gender diversity can be evaluated at various levels within an organisation, and a growing body of research has examined the impact of gender diversity on organisational outcomes, including studies focused on board gender diversity (Cucari et al., 2018; Dang & Nguyen, 2016), gender diversity within board committees such as audit committees (Bravo & Reguera-Alvarado, 2018; Ararat & Sayedy, 2019), and gender diversity amongst CEOs (Smith et al., 2006; Glass et al., 2016). The underlying reasoning behind this is that boards, board committees, and CEOs can influence organisational decisions and strategies. For the purposes of our study, gender diversity is defined as the active participation of men and women on both the board and its committees.

Board gender diversity

The concept of board diversity can be examined from the perspective of Resource Dependency Theory, which Pfeffer and Salancik proposed in 1978. This theory explains how an organisation's behaviours such as environmental sustainability practices are influenced by its need to acquire external resources from its environment. Carter et al. (2010) contend that diversity on a firm's board, which improves decision-making, can be justified based on the Resource Dependency Theory. The theory suggests that gender diversity, particularly with respect to traits traditionally associated with women, represents a crucial resource for promoting an environmentally responsible approach (Fernandez-Feijoo et al., 2014).

Kim (2022) conducted a study on the impact of female directors on the voluntary disclosure of carbon emissions information. The research utilised a sample of 9,406 firm-year observations spanning from 2014 to 2020 in South Korea. The results indicate that female representation on the board significantly improves the voluntary disclosure of carbon emission information. Using a sample of 215 publicly listed firms on the London Stock Exchange, Tingbani et al. (2020) investigated how board gender diversity affects greenhouse gas disclosures. The result indicates that board gender diversity strongly impacts greenhouse gas disclosures. Ben-Amar et al. (2015) reported similar empirical findings, as they discovered that an increase in the proportion of female directors enhances the probability of voluntary greenhouse gas emissions disclosure. The study utilised 541 quoted Canadian companies covered in the CDP Canada annual survey from 2008 to 2014.

Charumathi and Rahman (2019) conducted a study and found that board gender diversity positively impacts climate change-related disclosure in India. Hollindale et al. (2017) arrived at a similar finding, as they discovered that several female directors were more likely to provide higher-quality GHG emissions-related disclosures in Australia. Using global data of 331 companies from 33 countries from 2011 to 2013, Hossain et al. (2017) found that women on boards significantly and positively impact carbon emission disclosure. Carbon emission disclosures were captured using carbon emission disclosure scores from the Carbon Disclosure Project (CDP) Index (CDP, 2024). Using data from 329 of the largest corporations in the United Kingdom for the year 2011, Liao et al. (2014) found that gender diversity is significantly and positively related to the propensity and level of carbon emission disclosure.

Contrary to the above, by using data of 72 sampled listed firms in Indonesia from 2017 to 2019, Astuti and Setiany (2021) provide empirical evidence that board gender diversity has no significant impact on carbon emission disclosure. In addition, using data of non-financial firms listed in Borsa Istanbul from 2011 to 2015, Kılıç and Kuzey (2019) found that board gender diversity has an insignificant relationship with carbon emission disclosure. Using CDP data of Turkish firms' data from 2010 to 2019, Ararat and Sayedy (2019) found that female representation on the board has no significant impact on the likelihood of voluntary climate change disclosure.

Drawing on the principles of Resource Dependency Theory, we propose that the inclusion of diverse genders on the board can enhance the quality of board discussions and bolster the board's ability to supervise the company's disclosures and reports effectively. As a result, we contend that a greater representation of women on the board increases the likelihood of carbon emission disclosure. Based on this reasoning, we propose the following hypothesis:

H1: Board gender diversity has a significant positive impact on carbon emission disclosure.

CEO gender diversity

According to the Upper-Echelons Theory proposed by Hambrick and Mason (1984), the values and cognitive bases of powerful actors in an organisation shape its strategies and effectiveness. Carpenter et al. (2004) emphasise the need to examine gender as a characteristic that influences upper-echelon research. This assertion is supported by several scholars who have found a connection between the gender of CEOs and the adoption of environmentally friendly practices, particularly the reduction of carbon emissions (Kassinis

et al., 2016). This aligns with the argument that female CEOs prioritise positively, impacting society and the world (Spencer et al., 2019).

Using Upper-Echelons Theory, Tran (2022) investigated the impact of CEO gender on corporate environmental performance in Vietnam. Data used were sourced from a sample of 1,508 cooperatives spanning from 2014 to 2016. The hypotheses were tested using the OLS (ordinary least squares) regression model. The result shows that CEO gender has an insignificant association with corporate environmental performance. Using 836 sampled companies from 16 developed countries, Caby et al. (2022) arrived at a similar conclusion, as they discovered that the sex of the CEO did not affect any of the climate change management scores. Using data from the Australian wine industry, Galbreath and Tisch (2020) investigated the effect of female CEO on environmentally sustainable practices. The study was grounded on Stakeholder Theory. Findings show that a female CEO has no significant impact on environmentally sustainable practices in Australian. In contrast, Pan et al. (2020) contend that female managers have a positive impact on a company's sustainable competitive advantage. This includes their ability to discourage unethical environmental behaviour and encourage proactive environmental strategies.

From an Upper-Echelons Theory viewpoint, CEO gender diversity is expected to foster environmentally sustainable practices such as carbon emission disclosure. Thus, the following hypothesis is proposed:

H2: CEO gender diversity has a significant positive impact on carbon emission disclosure.

Audit committee gender diversity

Stakeholder Theory is one of the most applied theories of environmental disclosures amongst scholars. Individuals or groups of persons who have a special interaction with an agency as a consequence of their daily operations are referred to as stakeholders (Freeman et al., 2004). In line with Stakeholder Theory, multi-stakeholder governance considers adopting monitoring mechanisms to mitigate management opportunism and resolve information asymmetry issues (Rupley et al., 2012). The audit committee serves as one such monitoring mechanism to ensure that information reported to interested stakeholders is of high quality (Collier, 1993). Gul et al. (2011) contend that gender diversity improves the ability of board subcommittees, such as the audit committee, to provide more effective oversight of a firm's disclosures and reports, while also enhancing the dissemination of information to board stakeholders.

Using observation data of 375 firms quoted on the Madrid Stock Exchange from 2012 to 2015, Bravo and Reguera-Alvarado (2018) examined the link between audit committee gender diversity and ESG (environmental, social and governance) reporting. The study's multiple regression analysis found that gender diversity in the audit committee improves the quality of voluntary sustainability reporting, both in terms of comprehensiveness and relevance. This is attributed to the monitoring role that women can play in fostering a greater stakeholder orientation and increasing the commitment to provide valuable sustainability information. In addition, using Turkish firms' data from 2010 to 2019, Ararat and Sayedy (2019) found that the presence of women on the board committee enhances the likelihood of voluntary climate change disclosure. CDP data were used to measure the climate change disclosure of the sampled firms. Wang and Sun (2021) arrived at a similar conclusion, as they discovered that female members of the audit committee are more successful than male members in increasing the extent of environmental disclosures. Their study was based on a panel dataset of Chinese energy firms from 2012 to 2018. Their findings support the positive role of gender diversity in enhancing environmental disclosure. Appuhami and Tashakor (2017) found similar findings that AC (audit committee) gender diversity positively impacts CSR (corporate social responsibility) environmental disclosure. However, both studies did not use any theory to institutionalise the study's variables. In contrast, Said et al. (2020) found that AC gender has no significant impact on sustainability disclosure in Malaysian listed firms.

From a Stakeholder Theory viewpoint, the audit committee acts as an oversight tool for improving the level of information provided to interested parties (Collier, 1993). Based on these arguments, it can be inferred that gender diversity in audit committees enhances the monitoring effectiveness of the committee and leads to an increase in the level of carbon emission disclosure. Consequently, we propose the following hypothesis:

H3: Audit committee gender diversity has a significant positive impact on carbon emission disclosure.

Methodology

This study used an expo-factor research design to investigate the impact of women in top-echelon positions on carbon emission disclosures. This study's population included all 14 listed deposit money banks (DMBs) in Nigeria as of 31 December 2022. The study's sample comprised the 14 DMBs with their annual reports and other relevant information accessible during the research period. The banking industry is responsible for a significant

portion of the global carbon emissions because of their large numbers of bank offices and branches. Banks are expected to mitigate emissions associated with their financing and investment activities, known as their 'financed emissions.' Data were extracted from their annual report or stand-alone sustainability report from 2012 to 2021. The dependent variables, which is carbon emission disclosure (CD), was measured using content analysis (Muhammad & Aryani, 2021; Sudibyo, 2018). Unlike prior studies that relied on the CDP questionnaire to construct an assessment or scoring index (such as Matsumura et al., 2014), we utilised the Global Reporting Initiative (GRI) Standards 305: Emission (GRI, 2016) because it is the most commonly used index for disclosing carbon-related activities by firms in Nigeria, making it a more suitable tool for evaluating carbon disclosure in Nigeria, compared to the CDP questionnaire.

The measurement of carbon emission disclosure in this study involved three steps: First, a structured checklist was developed based on the GRI Standards 305: Emission indicators. Second, a coding system was used, with '0' indicating the absence of disclosed information and '1' indicating its presence. Third, the carbon emission information disclosure was calculated using a content analysis approach, with a simple unweighted average formula. Consequently, an index was created using the above three steps to measure carbon emission disclosure in this study (Muhammad & Aryani, 2021).

CD =

where: **-**

CD = Carbon Disclosure,

CQ = Carbon Information Scores,

MX CQ = Maximum disclosure scores for this study is 10.

Table 50: Variables Measurement

Variables	Types of variables	Measurement	Sources
Carbon emission disclosure	Dependent variable	Based on GRI Standards 305: Emission checklist. A score of 1 was assigned to each disclosed item on the checklist, and a score of 0 was assigned to each undisclosed item. The total number of disclosed items was then divided by the total possible items to obtain the disclosure score for each company.	Muhammad and Aryani, 2021
Board gender diversity	Independent variable	Proportion of women on the board	Hossain et al., 2017
CEO gender diversity	Independent variable	Equal to 1 if CEO is female and 0 if male	Tran, 2022
AC gender diversity	Independent variable	Proportion of women in the AC	Bravo and Reguera-Alvarado, 2018
Firm size	Control variable	Firm's year-end total assets	Tran, 2022
Profitability	Control variable	Net income divided by the firm's total assets at year end	Hossain et al., 2017

Source: Authors' own

Model specification

Gujarati and Porter (1984) suggest that a regression model can be developed to account for relationships between variables in general. In this study, the following model was created to estimate the link between women in top leadership positions and carbon emission disclosure:

$$CD_{it} = ß0 + ß1\ BGEN_{it} + ß2\ CEOGEN_{it} + ß3\ ACGEN_{it} + ß4\ FSIZE_{it} + ß5\ PROF_{it} + \epsilon_{it}$$

where:

CD = Carbon Emission Disclosure

ß0 = Intercept

ß1 to ß8 = Regression Coefficients

Є = Residuals

it = Panel Data Indicator

BGEN = Board Gender Diversity

CEOGEN = CEO Gender

ACGEN = Audit Committee Gender Diversity

FSIZE = Firm Size

PROF = Firm Profitability.

Results and discussion

Descriptive statistics are used by researchers to effectively summarise and organise data in order to enhance understanding of the data.

Table 51: Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
CDIS	122	0.183	0.183	0	0.8
BGEN	122	0.221	0.114	0	0.455
CEOGEN	122	0.05	0.219	0	1
ACGEN	122	0.158	0.153	0	0.6
FSIZE(billions)	122	2,357	2,010	156	9,660
PROF	122	0.016	0.018	-0.095	0.061

Source: Author's computation using Stata13 output

Carbon emission disclosure (CD) is a ratio that ranges from 0 to 1 and can also be expressed as a percentage. Based on the mean CD value of 0.183 presented in Table 51, the average CD during the study period was found to be low, at 18.3%. Additionally, the highest average disclosure rate was 80%, while the lowest was 0%, indicating a wide range of CD activities amongst the sample firms. The average female board gender is 22.1% and the standard deviation of 11.4% shows moderate variance from the mean. The highest board gender diversity is 45.5% and the lowest is 0, indicating some sampled firms have no women on their board within the period covered in the study.

Table 51 also shows informative figures for the dummy variables. On average, only 5% of the sample corporations have a female CEO, implying that a low proportion of firms appointed a female CEO. The audit committee gender diversity mean rating is 0.158%, indicating audit committees of the sampled companies have a comparatively poor degree of gender diversity in general. The standard deviation is 15.3% which is close to the mean, showing that the gender diversity ratio of the observed companies cluster around each other. The highest AC gender diversity is 60% and the lowest is 0, indicating that some sampled firms have no women on their audit committee within the period covered in the study.

Profitability as indicated shows that the average ROA (return on assets) has a mean of 1.6%, with a standard deviation of 0.018 (1.8%), indicating a low level of variability in the return on total assets amongst the firms sampled during the study period. The most profitable DMBs earn N0.06 income from N1 of asset invested and the max loss incurred is negative N0.095 on N1 of asset invested. Finally, with respect to firm size, it has a mean value of N2.3 trillion. The min asset value amongst the firms sampled is N156 billion, while the max value in terms of size is owned by a firm with assets worth N9.6 trillion.

Table 52: Correlation matrix

Variables	CDIS	BGEN	CEOGEN	ACGEN	FSIZE	PROF
CDIS	1.000					
BGEN	0.211	1.000				
CEOGEN	0.153	-0.077	1.000			
ACGEN	0.146	0.124	0.114	1.000		
FSIZE	0.469	0.094	0.142	0.108	1.000	
PROF	0.113	0.138	0.402	-0.136	0.441	1.000

Source: Author's computation using Stata13 output

All the independent variables (BGEN, CEOGEN, ACGEN) and control variables (PROF, and FSIZE) have a positive correlation with CD of listed DMBs in Nigeria. This means that they move in the same direction with carbon emission disclosure. Table 52 also shows the association amongst the independent variables themselves. Gujarati and Porter (2004) consider a correlation coefficient of more than 0.80 to be excessive. All correlation coefficients amongst the explanatory variables are below 0.80, which indicate the possible absence of harmful multi-collinearity. This was further validated using variance inflation factor.

Residuals test

Several diagnostic tests were conducted, including multi-collinearity, linearity, auto and serial correlation, heteroskedasticity, normality, and Hausman specification tests. Based on the results presented in Table 53, it can be inferred that there are no multicollinearity issues because all the variables' VIF values are below 10, as Hair et al. (2006) suggest. Furthermore, the Hausman test was performed to determine the appropriate model between random and fixed effects. As shown in Table 53, the probability value is 0.1179. This indicates that the random effect model is supported. As the test was insignificant, the Lagrange Multiplier test was conducted to determine the best model to interpret between the random effect model and the pooled OLS. The result obtained showed that the random effect model is the most appropriate as the result is significant.

However, the result also shows the presence of auto-correlation and heteroskedasticity because the *p*-value of both tests is significant. This indicates that the random effect regression is not appropriate as the panel regression estimators may be biased (Hausman & Kuersteiner, 2008). To address the limitations of the random effects model in the presence of heteroskedasticity and autocorrelation, this study utilised the generalised least squares (GLS) model, as recommended by Westerlund and Narayan (2012). The study presents the GLS regression result in Table 53.

Table 53: GLS Regression Result

CDIS	Coef.	St.Err.	z-value	p-value
BGEN	0.012	0.005	2.56	0.011
CEOGEN	0.214	0.103	2.07	0.039
ACGEN	0.028	0.149	0.19	0.852
FSIZE	0.106	0.017	5.92	0.000
PROF	-0.054	0.025	-2.18	0.029

Constant	-3.150	0.546	-5.77	0.000
Number of obs	120	Hausman Test		0.1179
Wald-chi	49.48	LM test		0.0000
Prob > chi2	0.0000	Hettest		0.0000
Mean VIF	1.28	Auto Correlation Test		0.0140

Source: Author's computation using Stata13 output (2023)

Interpretation of the model

The Wald chi-square value of 49.48 for the model presented in Table 53 exceeds 2, indicating that the model is appropriate for estimating the impact of independent variables on carbon emission disclosure. Additionally, all the explanatory variables in the model are statistically significant based on the probability of the Wald chi-square, which is significant at the 1% level. Therefore, the model is well-suited for examining the relationship between women in top-echelon positions and carbon emission disclosure.

From the findings thus, the model of the study is:

$$CD_{it} = -3.150 + 0.012\ BGEN_{it} + 0.214\ CEOGEN_{it} + 0.028\ ACGEN_{it} + 0.106\ FSIZE_{it} - 0.054\ PROF_{it}$$

Interpretation and discussion of findings

Board gender diversity has a positive impact on the carbon emission disclosures of listed deposit money banks in Nigeria, as shown by the 0.012 coefficient, which is statistically significant at 5% (from the *p*-value of 0.011). The finding that carbon emission disclosure is positively influenced by board gender diversity supports the notion that female directors are more environmentally conscious than their male counterparts. This is because women exhibit a higher inclination towards sustainability initiatives and are more likely to advocate for disclosure of carbon emission information. This finding is consistent with the Resource Dependency Theory, which proposes that the presence of women on boards can increase firms' attention to environmental issues and encourage the adoption of proactive strategies to address stakeholder demands for greater transparency in carbon emission reporting.

Therefore, increasing the representation of women on boards can be an effective strategy for promoting greater attention to environmental

concerns and enhancing the transparency of carbon emission reporting. The finding is consistent with previous studies (Kim, 2022; Ben-Amar et al., 2015; Hossain et al., 2017) that females enhance the carbon emission disclosure of environmental information, but dissimilar to those of Astuti and Setiany (2021) and Ararat and Sayedy (2019). Since the *p*-value is less than the 5% significance level, this study supports the first hypothesis that board gender diversity has a significant positive effect on carbon emission disclosure.

CEO diversity also has a positive impact on carbon emission disclosure of listed deposit money banks in Nigeria, as shown by the 0.214 coefficient, which is statistically significant at 5%. This confirmation that a female CEO significantly improves the carbon disclosures than a male CEO. This finding may be explained by the fact that female CEOs tend to be more environmentally conscious than their male counterparts. Research has shown that women in leadership positions often prioritise social and environmental issues and advocate for sustainable business practices. As a result, female CEOs can positively influence companies in the long term by bringing a new perspective to the disclosure environment and promoting greater transparency in carbon emission reporting. The results support the Upper-Echelons Theory but it contradicts with the findings of Tran (2022), Galbreath and Tisch (2020) and Caby and Ziane (2022), who found that a female CEO has no significant impact on environmentally sustainable practices. Since the *p*-value is less than 5%, this study supports the second hypothesis, that CEO gender diversity has a significant positive effect on carbon emission disclosure.

The audit committee gender diversity variable has a Z-value of 0.19, a coefficient value of -0.028 and a probability value of 0.852, which is insignificant. This shows that female representation in the AC has no significant effect on carbon disclosure amongst listed DMBs in Nigeria. In this respect, the low degree of females on the ACs of the sampled banks during the study's time span could explain the statistically insignificant association with carbon disclosure. This finding of the study supports the study of Said et al. (2020). However, the results do not support the Stakeholder Theory and it is in contrast to the findings of Bravo and Reguera-Alvarado (2018), Ararat and Sayedy (2019) and Wang and Sun (2021). The *p*-value is more than 5%, hence this study rejects the hypothesis that audit committee gender diversity has a significant positive impact on carbon emission disclosure.

Conclusion and recommendations

Gender diversity in top management teams and adopting environmental sustainability strategies are two critical topics gaining momentum on

corporate agendas. There are increasing pressures from diverse stakeholders, such as the stock exchanges, national governments, employer lobby groups, and shareholders, amongst others, for women's representation in top positions. Drawing from Upper-Echelons, Stakeholder, and Resource Dependency theoretical frameworks, this study provides novel insights into the connection between women in top-echelon positions (board gender diversity, female CEO, and AC gender diversity) and carbon emission disclosures from an emerging nation perspective. Content analysis was utilised on the annual report and stand-alone sustainability report of 14 listed DMBs in Nigeria from 2012 to 2021. The carbon emission disclosure was measured based on Global Reporting Initiative (GRI) Standards 305: Emission checklist. The result shows that board gender diversity and female CEO significantly improves carbon emission disclosure, while AC gender diversity has no significant impact on carbon emission disclosure.

Our study extends both the Upper-Echelons and Resource Dependence theories and contributes to ongoing debate about the role of women in top positions by demonstrating that a female CEO and the presence of women on the board has a positive relationship with the carbon emission disclosure score. The study's findings indicate that gender diversity can improve the effectiveness of boards in managing stakeholder relationships and drive the adoption of sustainability initiatives, including disclosure practices that promote transparency and accountability. This research adds to the growing body of literature on the role of gender diversity in promoting sustainable business practices and sheds light on an area that has received little attention in previous studies - the impact of gender diversity in audit committees on carbon emission disclosures.

Our results contribute to the growing body of literature highlighting the potential significance of female representation in top positions. The research findings present implications for both regulatory bodies and corporate practice. The study's findings are relevant to policymakers who are implementing gender quota legislation and other initiatives aimed at promoting gender diversity in corporate governance. The study's results provide valuable insights into the effectiveness of women in stakeholder management and reinforce the efforts being made globally to increase the representation of women in leadership positions. Furthermore, the study's results can help build a case for the importance of diversity and inclusion in corporate decision-making, leading to better business outcomes and greater social and environmental impact.

The study recommends that banks should use the appropriate proportion of female directors in their board composition and appoint females as CEO to enhance their sustainability responsiveness as they aid in

enhancing the disclosure of material carbon-related information. Finally, regulatory bodies should take the necessary measures to require corporate bodies to minimise their carbon emissions and disclosure of relevant carbon information through annual reports or stand-alone sustainability reports.

Despite the contributions of the study, it has some limitations similar to other empirical studies. The study suffered some limitations amongst which the study only focused on listed deposit money banks in Nigeria. Secondly, this investigation focused solely on the content analysis of the information presented in annual reports and stand-alone sustainability reports; thus, some firms may disclose their carbon emission information via other outlets like magazines, newspapers, or corporate websites. Future research may consider using these other ways to collect information other than annual reports. Although this study has some limitations, the value of the research is still validated by the rigorous methodology employed in measuring the variables, the careful establishment of the findings, and the adequate observation of the research context. While the limitations of the study cannot be ignored, they do not detract from the overall validity of the research findings. Instead, they provide opportunities for future studies to improve on the research design and methodology.

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