The Role of Intellectual Capital on the Relationship Between Female Gender Diversity and Sustainability Disclosure of Listed Firms in Nigeria

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Abstract

The study investigated female gender diversity and sustainability disclosures of firms listed on the Nigerian Exchange Group by examining how value-added intellectual capital influences the relationship between female gender diversity and sustainability disclosure of listed firms. The study made use of the Global Reporting Initiative (GRI) disclosure index to extract environmental, social and economic disclosure information from the corporate sustainability reports of 50 firms listed on Nigerian Exchange group. An ex post facto research design was adopted, data was sourced and collected from annual report of sampled firms for a period of eleven (11) years spinning across 2012-2022. Female Gender Diversity (FGD) measured as the proportion of female directors on the board was used to determine the effect on sustainability disclosure {Environmental sustainability (ENSD), Social sustainability (SSD) and Economic sustainability disclosure (ECSD)} of listed firms. To examine the effect described in the study, the method of moment quantile regression analysis was performed using stata 17 analytical software. Findings from the regression analysis reveals that female gender diversity was found to have positive and significant influences on the three components of the explanatory variable. These significances were found to be increasing at the higher quantiles. The findings also demonstrated that value added intellectual capital (VAIC) has no considerable favorable effect to moderate the relationship between female gender diversity and sustainability disclosure of listed firms. Thus, the study recommends amongst others that Increasing the number of female genders on the board will lead to growing level of economic sustainability transparency, attracting investors because smart investors currently include sustainability consideration into their plans to achieve positive and favorable outcome.

Keywords: *Female gender diversity, Global reporting initiative, Sustainability disclosure, Nigerian Exchange Group.*

1.0 INTRODUCTION

Sustainability reporting practices is on the increase in the developing countries as firms are in receipt of deliberation of dynamics consideration in the socio-economic environment of Nigeria resulting upon a mixture of dynamics such as worries about globalization, growing distrust/ doubt of businesses by the society, corporate scandals, necessity for firms to reciprocate the patronage of society, pressures from non-governmental organisations against hostile corporate behavior and unprincipled practices, Initiatives from the government, public opinion, environmental activist agitation, the externality effect of enterprises' actions, and the necessity for firms to engage in processes that foster peaceful coexistence to increase long-term business success are all examples of such factors.

Host communities have continuously become more sensitive and conscious of the externality effects of the events of industries and have consistently driven the firms in their demand and or agitation for compensations and development of social infrastructure that would augment for those externalities effect. As firms' operations begin to have effect on the society, the people of the host community start to lay claims on the firms and this ultimately would have an effect on the decision-making process of the firm. Hence, they enhance their performance in an environment where there is mutually advantageous relationship between the society and itself this is because peaceful co-existence is inevitable for an unhindered business achievement, success, survival and growth (Jones, 2018).

According to the Chartered Institute of Bankers of Nigeria (2009), pressures from society has changed the value perception of businesses and now engraved with the rationale that sustainable growth and shareholders wealth maximization can be achieved through market oriented and responsible behavior. In their argument, firms are thinking of better ways to contribute towards sustainable and long-term business success rather than simply seeking short term goals and objectives. The pressure from society has partly made firms to report/disclosure such issues in their financial statements and annual reports. However, the need to balance the interest of different stakeholders and to strategically position the firm would necessitate them to build in the attendant cost into their overall cost structure.

The resource-based view of sustainable development suggests that firms with resources that are rare, valuable, inimitable and non-substitutable have a competitive advantage than those without (Kaawaase, Bananuka, Kwizina & Nabuweesi, 2020). Such resources are traceable in the human resources, systems resources and relationship resources. In a situation where the firm's total intangible and knowledge related resources useful for value creation are low, it is likely that, sustainability reporting practices will also be low. For example, organizations with low levels of intellectual capital will continue to generate simple reports such as financial reports due to a lack of resources required to prepare sustainability reports.

Despite the increasing importance of sustainability reporting world-wide, there are very few studies that have linked Intellectual capital (IC) and/ or its elements (Human, relational and structural capitals, Value Added intellectual capital (VAIC) to sustainability reporting. Nonetheless, UN Sustainable Development Goal 12.6 "encourages companies, particularly large and transnational corporations, to adopt sustainable practices and to incorporate sustainability information into their reporting cycle" (United Nations, 2015). The European Union adopted the 2014/95/U rule on non-financial information disclosures, which requires European Union enterprises to publish non-financial information such as environmental, social, and corporate governance performance.

Firms have created value not only through the sale of securities and financial assets, but also through intangible assets such as employee skills (human capital), technological innovation and breakthroughs (structural capital), and customer relationships (direct relational capital), all of which are types of intellectual capital (IC). As a result, when enterprises share IC information, stakeholders' ability to evaluate the firm's capacity for long-term value creation and sustainability disclosure improves. However, IC information sharing is voluntary, and no integrated IC reporting system that permits (individual) investors to make better investment decisions has been established.

Despite the numerous benefits associated with sustainability disclosure, there still exist a mixed evidence as to whether female gender diversity increases the quality of sustainability disclosure and also if moderated with intellectual capital- value added intellectual capital of firms will lead to an increase in the quality of sustainability reporting of listed firms. It however remains to be convincingly established empirically the impact of female gender diversity on the sustainability reporting of firms listed on the Nigeria Exchange Group. This study therefore, is an attempt to provide empirical evidence on the impact of female gender diversity on the sustainability reporting of listed firms in the Nigerian.

The main objective of the study is therefore to evaluate the role of intellectual capital on the relationship between female gender diversity and sustainability disclosure of listed firms in Nigeria. Specifically, the study seeks to:

i. Ascertain the effect of female gender diversity on environmental sustainability disclosure
ii. Determine the effect of female gender diversity on social sustainability disclosure of listed firms
iii. Investigate the effect of female gender diversity on economic sustainability of firms listed on the Nigerian exchange group.
iv. Evaluate the interacting effect of value-added intellectual capital on the relationship between female gender diversity and sustainability disclosure of listed firms in Nigeria.

2.0 REVIEW OF RELATED LITERATURES

CONCEPTUAL FRAMEWORK

Concept of sustainability disclosure

A sustainable organization is one that can continue operating incessant and must consider stakeholders in terms of environmental, social, and economic factors to achieve sustainable development goals. The subject of sustainability is gaining considerable attention globally.

The principle of sustainability is predicted on the necessity for companies to endeavor to sustain the environment where they operate for future generations. The act of companies to sustain the environment could take the form of reduction of air, rivers, seas and land pollution, developing an environment friendly business environment whereby replacements are made for all resources used by the company, reduction of the use of non-replaceable energy resources such as oil, gas and coal but place emphasis on the use of renewable energy sources such as water and solar (Institute of Chartered Accountants of Nigeria, 2014).

Social, economic and environmental accounting is therefore, the process of collecting, preparing, presenting, reporting and communicating the social, economic and environmental activities of firms whether actual or contingent to various stakeholders to guarantee an enduring relationship and long-term growth and survival.

The United Nations has advocated for and planned for sustainable development with the goal of increasing ethical and moral knowledge, as well as awareness of the importance of environmental and social stewardship, concurrently with economic growth. Between 2015 and 2030, the United Nations adopted the Sustainable Development Goals (SDGs) to serve as a framework for action.

The term "sustainability reporting" is used to describe "reporting on how an organization underwrites or aims to contribute in the future, to the improvement or deterioration of economic, environmental, and social conditions, developments, and trends at the local, regional, or global level" (GRI, 2015). A sustainability report's purpose is to offer stakeholders with sufficient information to hold the organization's sustainability performance responsible.

Sustainability reporting is the mechanism through which sustainability information pertaining to firms' sustainability performance is conveyed to the stakeholders of firms (Gnanaweera, Kunori & Ntim, 2018, Schaltegger & Wagner, 2006). According to Daub (2007), sustainability report is referred to as the level to which the report provides valid and reliable data to satisfy information needs of stakeholders, more so the decision-model used by stakeholders to assess the organization, and the recorded data is a credible and accurate measure of the sustainability success dimensions used in that model.

Despite the growing global acceptance of sustainability practices and the drive towards achieving sustainable development goals in the year 2030, disclosure of sustainability efforts under the GRI reporting framework has been limited in developing economies. This may be, due to the voluntary nature of sustainability disclosures and the non-availability of a compelling legislative framework in those jurisdictions. In Nigeria, as in many other developing countries, sustainability disclosure practice is voluntary, low and largely at an infant stage. For firms engaged in sustainability disclosures, the reports issued are largely deficient, given the Global Reporting Initiative guidelines. The deficiency may also be attributed to the absence of a legal or regulatory framework on how such reports should be framed (Otu et al., 2015). However, with recent legislative developments in the country, such as the 2021 climate law and the petroleum industry Act, there may arise genuine sustainability movements and increased sustainability reporting in Nigeria.

Female gender diversity

The presence of female directors on the board improves board quality and management effectiveness. Female directors, according to Mahmood, Kouser, Ali, Ahmed, and Salman (2018), are less economically motivated and more likely to help humanity than their male counterparts, making female filmmakers less motivated by short-term selfish intentions. Women can increase an organization's environmental, economic, and social consciousness because sustainability reporting is a long-term phenomenon. The primary function of the boards is to monitor and provide recommendations to managers in order to improve the firms' performance. It is proposed that (1) such a monitoring function (proposed by agency theory) may explain the influential role of gender diversity in corporate sustainability disclosure, (2) resource dependence and intellectual capital are proposed as explanatory theories by the diversity brought to the board by female directors, and (3) behavioral-based theories may elaborate it through some different behavioral characteristics of women directors compared to their male colleagues (Bennouri, Chtioui, Nagati & Nekhili, 2018).

Female directors on a board, according to agency theory, may generate a broader range of perspectives in decision-making processes, leading to better board independence and lower agency costs. As a result, such a trait on corporate boards is predicted to boost the value of the company. When examining the important impact of gender diversity on company performance, academic bodies present this notion as a vital issue (Hillman & Dalziel, 2003). Adams and Ferreira (2009), for example, reinforce agency theory by arguing that female directors can supervise and manage board activity.

Moderating role of intellectual capital

Moderation, according to Baron and Kenny (1986), is the activity of the third variable that intensifies the link between independent and dependent variables. The moderator does not have to be a predictor variable's antecedent. The intensity of moderating and independent variables is equal in terms of their involvement as a causal antecedent to specific criteria impacts (Baron et al, 1986). In this case, the current study considered the moderating influence of Intellectual Capital, which may raise the capability and capacity of board features that may strengthen an organization's sustainability disclosure.

New technologies have had a tremendous impact on societies over the previous decade (Izzo, Tomnyuk, Varavallo, 2020). Uncertainties could not be reduced solely through corporate governance (board characteristics) and the establishment of specific intellectual capital because our modern world is full of uncertainties and enterprise could be exposed to many risks, such as the recent COVID 19 pandemic, which primarily affected almost all industries worldwide (Chofreh, Goni, Klemes, Moosavi, Davoudi, Zeinalnezhezhad, 2020).

To survive in unpredictable conditions, firms must shift their strategies from a laborbased to a knowledgebased business while also possessing intangible resources, i.e., IC, which is defined as the value that an organization has due to the abilities, skills, knowledge, competencies of its workforce and other intangible organizational factors. It consists of its people (human capital), the value inherent in its relationships (customer/relationship capital), and structural capital, which is everything that remains after the employees have left (Onuche, Jones, and Nmesirionye, 2019). IC is not mentioned on the statement of financial condition, yet it is critical to an organization's performance.

Organisational sustainability issues are dealt with by board committee/characteristics, while the literature reflects on common features amid sustainability disclosure and Intellectual Capital (IC). Technically, to some extent, board characteristics depend on organizational IC to attain high performance. Higher firm performance is expected if board features are supplemented with IC, which is a crucial factor in business that provides a competitive advantage (Ozkan et al., 2017). A human capital component of IC may improve board members' knowledge, creativity, abilities, and willpower. In contrast, structural capital provides a foundation for the execution of human capital (Frederickson, Webster, Williamson,2010). Organizations are urged to invest in IC for two reasons: first, it enriches organizations economically, improving financial performance and firm value, and second, it supports mission-based performance (Bontis et al., 2018).

THEORETICAL UNDERPINNING

Resource Based View Theory (RBT)

RBV theory emerged in the 1980s and 1990s from the work of renowned researchers (Wernerfelt, (1984); Barney, (1991); Grant, (1996) & Spender and Grant, 1996). RBV educates on a firm's competitive advantage in the market by utilizing its resources. In other words, the competitive edge is found in the firm's tangible and intangible resources. Such resources should be prioritized in the formulation of organizational strategy, which will ultimately boost long-term value. Given this, the value of a business can be increased by exploiting its strategic resources, particularly intangible resources (Tahir & Dalwai, 2018). However, in order to assure increased firm performance, the resources should be more valuable, unique, limited, untransferable, and irreplaceable. All of these characteristics can be found in the company's IC. As a result, as a strategic resource within an organization, IC can gain a competitive advantage and superior performance (Clarke, Seng, & Whiting, 2011; Marr, Gray, & Neely, 2003). The organization needs to focus on developing an efficient utilization of IC (Marr, *et al.* 2003). The greater the firm's IC, the higher the firm's value will be (Pulic, 2004). Therefore, in light of RBV theory, IC as a resource will significantly positively impact the firm's performance.

The resource-based view theory suggests that firms with internal resources and capabilities that are rare, valuable, inimitable and non-substitutable have a competitive advantage than those without (Barney, 1991; Kaawaase *et al.*, 2020). In the case of this study, firms with internal resources are expected to have improvements in sustainability reporting practices than those firms without. Internal resources may not be limited to only human resources but also to social capital, physical assets, structural capital and other management systems such as management control systems. According to Barney (1991), firm resources include all assets, capabilities, organizational processes, firm attributes, information, and knowledge that a firm control and that enable the firm to devise and implement strategies that progress its competence and usefulness in terms of resource utilization.

Wernerfelt (1984), who codified this theory, asserted that "resources and products are two sides of the same coin to the corporation." RBT argues that it has the resources to meet its goals and that it can lead the company to improve its long-term success. Goals can be achieved by directing valuable and scarce resources. According to Barney and Arikan (2001), "resources are the tangible and intangible assets used by firms to develop and implement their policies." According to Nothnagel (2008), this idea is based on resource heterogeneity (diversity) and resource immobility.

RBT is an effective method for characterizing IC research, particularly the relationship between IC and business performance. Intangible assets are classified by IC into three categories: HC, SC, and RC (Kristandl and Bontis, 2007). Each organization, according to Pulic and Kolakovic (2003), has distinct knowledge, skills, values, and solutions that can be turned into market "value." Intangible resource management can help firms fulfill their objectives by enhancing productivity and market value. Pulic and Kolakovic's (2003) argument is consistent with Barney and Arikan's (2001) logic when examining the link between the two assumption resources in RBT.

The sustainability report necessitates a variety of information sources, including client information obtained from the public relations office, marketing information obtained from the marketing department, financial information obtained from the Accounts and or Finance officer, and production or environment-related information obtained from the production department. There is also need by an organization to have systems in place and databases where knowledge has been coded into formal documents. For example, employees need to access the guidelines for sustainability reporting or the GRI sustainability reporting standards. The entity needs to have policies on disclosures which are clear. The interaction environment created by those charged with governance enables knowledge sharing among people within and outside the organization. With the availability of all such resources in an organization, sustainability reporting practices are likely to be improved in such an organization. Resources in an organization, sustainability reporting practices are likely to be improved in such an organization.

EMPIRICAL REVIEW

Githaiga and Kosgei (2023), evaluated the impact of board features on sustainability reporting in East African listed enterprises. The analysis analyzed data from 2011 to 2020 and a sample of 79 listed corporations taken from East African stock markets. The Global Reporting Initiative is used to monitor sustainability reporting, and the data is analyzed using three-panel data estimate models - fixed effect, random effect, and the generalized method of moments. Their studies demonstrated that board gender diversity, board financial knowledge, and board independence are all connected with sustainability reporting in a favorable and meaningful way. Board size, on the other hand, has a negative and considerable impact on sustainability reporting.

Alodat, Salleh, and Hashim (2023) studied the impact of corporate governance (CG) on sustainability disclosure (SD) in Jordan from the perspectives of resource dependence, agency, and stakeholder theories, using 405 observations from non-financial enterprises listed on the Amman Stock Exchange between 2014 and 2018. Panel data regression models were used to investigate the CG that effects SD. The current study's findings indicate a favorable and significant association between the breadth of SG and the effectiveness of the audit committee and board of directors. In terms of ownership structure, both institutional and foreign ownership had a negligible effect on the amount of SDs. The report recommends that corporations be encouraged to reform their boards of directors in order to improve the board's efficacy in monitoring and supporting better SD.

Adahosa and Udeh (2023) studied the impact of board features on environmental disclosure of listed Oil and Gas businesses in Nigeria from 2008 to 2021.Board Characteristics such as Board Size, Board Independence, Board Gender Diversity, and Board Diligence were used as proxies, with Environmental Disclosure serving as the dependent variable. The study relied on secondary data from the Nigerian Exchange (NGX) Group fact books, annual reports and accounts, and stand-alone sustainability reports of sample firms. The study employed ex-post factor research, and the panel data sets were examined using Descriptive Statistics, Pearson correlation matrix, and Panel Least Square (PLS). Regression analysis is performed using E-Views 10.0. As per the results, there is a significant and positive correlation between board size and environmental disclosure ($\beta1$ = 0.042641; p-value = 0.0374); board independence and environmental disclosure ($\beta2$ = 0.181430; p-value = 0.0000); board gender diversity and environmental disclosure ($\beta3$ = 0.026707; p-value = 0.0000); and board diligence and environmental disclosure. The study shows that board characteristics have a positive impact on listed oil and gas businesses' environmental disclosure at the 5% significance level in Nigeria.

Arniati and Muslichah (2023), investigated the role of the board of directors in mining company performance: a mediating analysis of intellectual capital and sustainability reporting. The research looked at mining businesses that went public on the Indonesia Stock Exchange between 2019 and 2021. We examined a sample of 30 such businesses. The role of the board of directors is our independent variable, and the company's performance is our dependent variable. They looked into intellectual capital and sustainability reporting as potential moderators. They used the Partial Least Squares approach with the Smart PLS version 3 software for analysis. While independent board directors do not directly influence a firm's performance, they do have a substantial impact on its intellectual capital, which includes knowledge, expertise, intellectual property, and personnel talents. The firm's performance is directly influenced by intellectual capital, implying an indirect route via which independent directors contribute to the firm's success. Furthermore, independent directors have a direct impact on the firm's sustainability reporting, which includes the disclosure of economic, environmental, and social implications. Sustainability reporting, like intellectual capital, has an impact on corporate performance, giving another indirect channel for independent directors to influence performance. As a result, intellectual capital and sustainability reporting act as intermediaries between independent directors and business performance, highlighting the critical, albeit indirect, role these directors play in accelerating a firm's success.

Gallego lvarez and Rodriguez Dominguez (2023), investigated whether board diversity in terms of gender and culture, as well as members' experience and tenure, had a favorable impact on environmental practices. The study was conducted on a large sample of international corporations from 29 countries, using an index comprised of 55 environmental activities. The team created a Tobit model in which the index of environmental practices is a function of numerous board properties. The findings confirm that more diverse boards with more experienced and long-tenured members are more likely to promote a broader range of environmental projects. The article sheds new light on the impact of board diversity on culture, experience, and tenure.

3.0 METHODOLOGY

Data Collection: The companies selected for analysis were those listed on the Nigerian Exchange Group (NGX). The data for this study was derived from companies' annual reports and stand-alone sustainability reports. The study's population is the entire 154 firms listed on the NGX across eleven (11) sectors as at 31st December, 2022 out of which a sample size 50 where selected from 10 sectors excluding the service sector because firm in the sector do not have an homogenous characteristics.

Variable measurement: A content analysis was used to extract information on companies' sustainability disclosure using an un-weighted disclosure index. Based on the unweighted disclosure index, "1" indicates the presence of sustainability information and "0" otherwise (Chau & Gray, 2002; Haniffa & Cooke, 2005; Mohd Ghazali, 2007; Monteiro & AibarGuzmán, 2010). The nature and trend of sustainability disclosure were assessed using a sentence-counting method similar to Michelon and Parbonetti (2010). GRI G4 standard was used as the checklist. Based on the checklist, social disclosure has a total of 31 points while the environmental disclosure has a maximum of 17 points and economic 7 points. Therefore, each annual report has the chances of scoring a minimum of 0 and a maximum of 55 points for both social, environmental and economic disclosures. Data for the independent variable (board independence) and the moderating variable (VAIC) were hand collected from the sampled companies' annual reports.

Models and Techniques for Analysis: This study adopted a method of moment quantile regression approach in analyzing the data collected from companies' annual reports using stata 17 analytical software. Both descriptive and inferential analysis were performed using Eviews 10 analytical software. A descriptive statistic was performed basically to summarize the data into a manageable form with the view to make it more concise and to provide a summary of the sample and measurements. A multiple regression was applied to test the hypothesis based on the research models specified below. Moderation model tests whether the prediction of a dependent variable by independent variable differs across the level of a third variable. Moderation effect tends to exist when the interaction term explains a statistically significant amount of variance in the dependent variable. In this case, this study tested to determine whether inclusion of value-added intellectual capital as a moderator variable led to a significant variation in the effect of independent variables on the dependent variable.

MODEL 1

$SD= \beta_0 + \beta_1 FGDit + \beta_2 VAICit\ ei$……………………i

MODEL 2

$SD= \beta 0 + \beta_1 FGDit + \beta_2 VAICit + \beta_3 FGD*VAICit + ei$…ii

Where;

SD = Sustainability disclosure (made up of environmental, social and economic sustainability disclosures)

FGD= Female Gender Diversity

VAIC= Value added intellectual capital

B0= beta coefficient

ei= error term

4. ANALYSIS, INTERPRETATION AND DISCUSSION OF FINDINGS

This section presents the results analyzed, interpreted and discussed the findings as observed in the study.

Table 4.1: Descriptive Statistics of the Study Variables

	SD	ENSD	SSD	ECSD	FBM	VAIC
Mean	0.941643	0.304161	0.328499	0.376904	0.195996	124.4043
Median	0.596384	0.117647	0.142857	0.285714	0.000000	6.052240
Maximum	2.785714	1.000000	1.000000	1.000000	1.000000	8679.525
Minimum	0.066667	0.000000	0.000000	0.000000	0.000000	-8695.216
Std. Dev.	0.772401	0.384884	0.370508	0.381590	0.265284	1008.897
Skewness	0.966771	1.019730	0.926333	0.553499	1.414371	3.524426
Kurtosis	2.470480	2.305832	2.240055	1.744400	4.420597	45.70529
Jarque-Bera	92.10157	106.3623	91.89325	64.21195	229.6222	42932.73
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	517.9037	167.2885	180.6744	207.2973	107.7977	68422.37
Sum Sq. Dev.	327.5352	81.32629	75.36475	79.94031	38.63609	5.59E+08
Observations	550	550	550	550	550	550

The table above reviews that the mean values for SD, ENSD, SSD and ECSD are 0.94163, 0.304181, 0.328499 and 0.376904 respectively for the period covered in the study, indicating that the average value of SD of the series is 0.9%, ENSD is 0.3% while SSD is 0.3% and 0.3% also for ECSD. The higher the percentage for SD implies that the firm have higher SD performance. The standard deviation (Std. Dev.) indicates the dispersion from or spread in the series from their mean values. VAIC has the highest dispersion of 1008.897, however SD, ENSD, SSD, ECSD and FGD have low dispersion from their means of 0.772401, 0.384884, 0.370608, 0.266284 respectively.

Skewness which depicts the asymmetry of the distribution around the mean reveals that all the variables under study have a long right tail (positive skewness). The peakness or flatness of the distribution of the series is indicated by kurtosis. Statistics reveal that FGD and VAIC, are not normally distributed as their values exceed the acceptable 3 and are thus presumed to be peaked (leptokurtic) relative to the normal, while SD, ENSD, SSD and ECSD with values less than 3 are presumed to be flat (playtykurtic) relative to the normal.

The statistical significance for the Jarque-Bera statistics of all the variables are less than 0.05, hence, we reject the null hypothesis that the series are normally distributed. Thus, the series failed to meet the assumption of normality which is an indication of uncertainty in trend of the distribution of the data set collected for the study. Again, the panel data is a short panel with the time period (11 years covering 2012 to 2022) less than the number of cross-sessions (50 listed firms).

INTERPRETATION OF RESULTS

The study employed the method of moment quantile regression (MMQreg.) which according to Dye (2020) is an extension of linear regression that is used when the conditions of linear regression are not met (i.e., linearity, homoscedasticity, independence, or normality). The MMQ reg is equally used to a determinate the ascertain the level of significant at various quantiles. The Dynamic model is therefore required because the data is a short panel and quantile regression is used because the data is not normally distributed.

Effect of female gender diversity on ENSD of firms listed on NGX

The table below provides the summary of the MMQreg test of the effect of female gender diversity on environmental sustainability disclosure of listed firm in Nigeria.

Table 4.2 Method of Moment Regression Analysis for ENSD Model

	25%		**50%**		**75%**	
Variable	**Coef.**	**Z/ P values**	**Coef.**	**Z/ P values**	**Coef.**	**Z/ P values**
FGD	.623025	6.98(**0.000**)	.886435	7.64 (**0.000**)	1.172972	6.55 **(0.000)**
VAIC	-.0000214	-2.42(**0.016**)	-.000024	-2.13 (**0.033)**	-.0000269	-1.62(0.106)
C	-.0853649	-3.61(0.000)	0269335	0.87 (0.382)	.1490914	3.12 (0.002

Source: **Extract from MMQREG estimation output in appendix 3(a) for ENSD model**

Evidence from the estimated quantile regression shows that FGD has a positive and statistically significant effect on ENSD at the 25% quantile. The study established that all things being equal an increase in FGD by 1 unit increases ENSD by 62%. The moderating variable was however found to be statistically insignificant at the 25 quantiles. This implies that at the lower quantile.

As we move up the quantile, we discover that the impact of FGD on ENSD steadily increases. The effect of FGD on ENSD was found to increase with increasing level of quantile. The value increased to 89% and 117% as we move up the quantile (50% and 75%). The effect was also found to be statistically significant across all quantiles thereby establishing its position as a major determinant of ENSD regardless of grouping. This finding is also true for all quantile classes.

Looking at the moderating variable VAIC, we observed that the estimated model indicates a negative and significant effect of the variable on ENSD at 25 and 50 quantiles respectively. At 75% VAIC was found to be negative and nonsignificant.

In swift, the value of the beta coefficients for the three quantiles of 0.623, 0.886 and 1.173 for FGD implied that a unit increase in the values of female gender Diversity (FGD) will as well lead to 62.3%, 88.6% and 117.3% increase respectively on the environmental sustainability disclosure of listed firms in Nigeria.

Effect of female gender diversity on SSD of firms listed on NGX

Table 4.3 provides the summary of the MMQreg test on the effect of female gender diversity on social sustainability disclosure of listed firm in Nigeria.

Table 4.3: Method of Moment Regression Analysis for SSD Model

	25%		**50%**		**75%**	
Variable	**Coef.**	**Z/ P values**	**Coef.**	**Z/ P values**	**Coef.**	**Z/ P values**
FGD	6876484	8.45 (**0.000**)	.8539311	8.38 **(0.000)**	1.118556	6.59**(0.000)**
VAIC	.0000123	-1.51 (0.130)	.0000188	-1.87 **(0.062)**	.0000293	-1.74(0.083)
C	.1556826	-6.81(0.000)	.0435355	-1.50(0.133)	.1349371	2.82 (0.005)

Source: Extract from MMQreg estimation output in appendix 3(b) for SSD model

With evidence from the estimated quantile regression result displayed above, the FGD has a positive and statistically significant effect on SSD at the 25%, 50% and 75% respectively across all three quantiles under study. The study established that all things being equal an increase in the predicative variable FGD by 1 unit will cause an increase in SSD by 69%, 85% and 111% likewise which was observed to be at increase as we move up the quantiles.

The moderating variable however exhibited a statistically insignificant effect at the 25th quantile at 5% level of significance. This implies that at the quantile VAIC has a negative and nonsignificant effect on SSD across all quantile's distribution implying that FGD is a major determinant of SSD regardless of quantile distribution regardless of grouping. According, the result indicates that female board members play a pivotal role in the disclosure of companies' social sustainability information.

The positive influence between FGD and SSD indicates that female involvement as board membership is evident in the fact that female gender is more meticulous, patient and discipled in carrying out their duties and in pursuing firms' corporate objectives.

Effect of female gender diversity on ECSD of firms listed on NGX

Table 4.4 provides the summary of the MMQreg test of the effect of female gender diversity on economic sustainability disclosure (ECSD) of listed firm in Nigeria.

Table 4.4: Method of Moment Regression Analysis for ECSD Model

	25%		50%		75%	
Variable	**Coef.**	**Z/ P values**	**Coef.**	**Z/ P values**	**Coef.**	**Z/ P values**
FGD	.3465751	2.77 **(0.006)**	.5894956	4.31**(0.000)**	.982515	5.54**(0.000)**
VAIC	7.58e-06	0.62 (0.536)	-.0000121	-0.92(0.356)	-.0000439	-2.57**(0.010)**
C	-.0380811	-1.10 (0.271)	.1486196	3.49 (0.000)	.4506814	8.66(0.000)

Source: Extract from MMQREG estimation output in appendix 3(c) for ECSD model

From the outcome of the estimated quantile regression it is obvious that FGD has a positive and statistically significant influence on ECSD at the 25% quantile. The study recognized that all things being equal an increase in FGD by 1 unit increases ECSD by 34%.

Moving upward the quantile, we discover that the effect increased steadily at 50% and 75% to 58% and 98% respectively indicating that as we move up the classification the effect on ECSD becomes more obvious. The variable was also found to be statistically significant across all quantiles implying that FGD is a major determinant of ECSD regardless of quantile distribution.

The positive influence between FGD and ECSD indicates that female involvement as board membership is evident in the fact that female gender are more meticulous, patient and discipled in carrying out their duties and in pursuing firms' corporate objectives. This could also be as a result of the fact that women tend to be more proactive and softened in obeying laid down rules for the benefit of all in the society/ firm.

Table 4.5: Moderating Effect of VAIC on the Association between female gender diversity and Sustainability Disclosure of Listed Firms in Nigeria.

	Un-moderated VAIC Model			Moderated VAIC Model		
Details	**Coefficient**	**t-statistics**	**Sig**	**Coefficient**	**t-statistics**	**Sig**
(Constant)	.008	.304	.761	.013	.453	.651
McFGD	1.965	9.344	.000	1.997	9.384	.000
McVAIC	-4.775	-1.802	.072	-9.673	-.163	.870
McFGD-VAIC				.000	.841	.401
F-Statistic		76.853			43.934	
F-stat (Prob.)		.000			.000	
R2		.361			.362	
R2 change			.001			
F-change statistics			.388			
Sig. F-change			.762			
Durbin- Watson			.572			
VIF value range			1.028	3.526		

Source: Extracted from MMR results on SD Model in Appendices 5 (c, d, e)

Table 4.5 provides the Moderated Multiple Regression (MMQreg) results on two models (unmoderated and moderated) with the moderated model containing an interaction term for Value added intellectual coefficient (VAIC) which is used to measure the moderator- intellectual capital on female gender diversity used as focused independent variable (McFGD_VAIC). The Durbin Watson (DW) statistic of 0.586 is not within the acceptable range of 1 to 3 suggested by Field (2009) and this evidences that the problem of auto correlation is unlikely not to exist in the series. The computed value of Variance Inflation Factor (VIF) ranges from 1.022 to 3.189 and fails within the desirable (VIF values < 10). The results for both DW and VIF confirms the absence of multicollinearity problem and accordingly considered to be reliable and meaningful for interpretation. The table shows identical direction of the effect of female gender diversity on sustainability disclosure, with all having positive influence on SD before and after moderation. The pre and post moderation results indicate that FGD has significant influence on sustainability disclosures. The effects of the interaction terms (FGD_VAIC) on the relationship between female gender diversity and sustainability disclosure however indicate no significant interaction effect (with their respective p-values of 0.84, 0.207 and 0.2227 being greater than 0.05).

TEST OF RESEARCH HYPOTHESES

Testing for the effect of female gender diversity (FGD) on environmental sustainability disclosure (ENSD) of listed firms in Nigeria.

The null hypothesis is restated as follows:

$H0_1$: Female gender diversity has no significant effect on environmental sustainability disclosure (ENSD) of listed firms in Nigeria.

HA_1: Female gender diversity has no significant effect on environmental sustainability disclosure (ENSD) of listed firms in Nigeria.

On table 4.2 it was observed that FGD shows a positive and significant influence on ENSD on the 25%, 59% as well as 75% quartiles respectively with a ($Pv=0.000< 0.05$) in all the quantiles. We therefore reject the null hypothesis and conclude that FGD has a positive statistically significant effect on ENSD

Testing for the effect of female gender diversity (FGD) on social sustainability disclosure (SSD) of listed firms in Nigeria.

The null hypothesis is restated as follows:

H02: Female gender diversity has no significant effect on social sustainability disclosure (SSD) of listed firms in Nigeria.

HA_2: Female gender diversity has significant effect on social sustainability disclosure (SSD) of listed firms in Nigeria.

Table 4.3 indicates that the t statistics for FGD increased across all the three quantiles with positive and statistical significance. Accordingly, the result support the rejection of $H0_2$, hence the alternative accepted. We therefore conclude that female gender diversity has a statistically significant effect on sustainability disclosure of firms listed on the Nigerian Exchange Group.

Testing for the effect of female gender diversity (FGD) on economic sustainability disclosure (ENSD) of listed firms in Nigeria

The null hypothesis is restated as follows:

$H0_3$: Female gender diversity has no significant effect on economic sustainability disclosure (SSD) of listed firms in Nigeria.

HA_3: Female gender diversity has no significant effect on economic sustainability disclosure (ENSD) of listed firms in Nigeria.

Still on table 4.4 of the MMQreg, the results indicate a positive and statistical relationship between FGD and ECSD. Accordingly, the outcome supports the rejection of $H0_3$. we therefore conclude that FGD has a statistically significant effect on economic sustainability disclosure of listed firms in Nigeria.

Testing for the moderating effect of value-added intellectual capital on the relationship between female gender diversity and sustainability disclosure of listed firms in Nigeria.

The null hypothesis is restated as follows:

$H0_4$: Value-added Intellectual Capital (VAIC) does not have any significant moderation effect on the relationship between female gender diversity and sustainability disclosure (SD) of listed firms in Nigeria.

HA_4: Value-added Intellectual Capital (VAIC) does not have any significant moderation effect on the relationship between female gender diversity and sustainability disclosure (SD) of listed firms in Nigeria.

In appraising the interaction effects of VAIC on the relationship between female gender diversity and aggregate sustainability disclosure, reliance was placed on change statistic results reported in table 4.5 As can be read from the table, R^2 marginally increased from 0.361 in Model 1 to 0.362 in Model 2, resulting to R^2 change statistic of 0.001. R^2 change statistic shows the statistical significance of the interaction term, and this indicates the extent by which the VAIC moderates the relationship between the female gender diversity and SD. The R^2 change of 0.001 (that is, 1%) shows the proportional increase in variation explained by the addition of the interaction terms. This indicates that the addition of the interaction terms resulted to increase of 1% in SD. This increase resulted to F-change statistic of 0.388 which is indicated to be statistically non-significant at 5% probability level ($P = 0.762 > 0.05$). Accordingly, we fall to reject the null hypothesis (HO_4) and conclude that value added intellectual capital (VAIC) has no significant interaction effect on the relationship between female gender diversity and sustainability disclosures of listed firms in Nigeria.

DISCUSSION OF FINDINGS

Effect of female gender diversity (FGD) on Environmental Sustainability Disclosure ENSD of listed firms in Nigeria

The result established that the female gender diversity on environmental sustainability disclosure of listed firms in Nigeria is statistically significant and positive. The conclusion is on the increasing coefficient and significance of the probability, which FGD is significant at 5% level ($P=0.000 < 0.005$). This result conforms to a priori expectation. The result suggests that a higher number of female directors in corporate boards lead to higher disclosure of sustainability information in the annual report of companies. Accordingly, the result indicates that female board members play a pivotal role in the disclosure of companies' sustainability information. The finding coincides with Ali, et al. (2022); Adahasa, et al. (2023); Githaiga et al. (2023); Gallego et al. (2023) These studies unanimously conclude that participation of females in the management of companies' board positively impact the level of corporate sustainability information disclosure. Specifically, the study supports the assertions of Gallego et al. (2023) which claim that female directors bring to the boards a variety of strengths, including sensitivity to companies' environmental disclosures. Female directors are more considerate to the needs of others, there are also more active and concerned with issues of strategic nature, especially, issues that directly relate to companies' stakeholders (Amer et al. 2019). The result is also in line with the thought of Anazona et al. (2018) which suggest consideration of board diversity in the future selection of board members. By so doing, the appointment of more women into companies' boards will serve as efficient diversity strategy that is likely to improve companies' performance particularly, environmental performance. This means that when women on board increases, productivity pertaining to the environmental disclosure also increases there by adding value to disclosures of sustainability activities. On the contrary the findings failed to agree with those of Orunwense et al. (2023); Manita et al 2018; Ozordi et al. 2020; Salehi et al. 2021; Yahaya et al. (2022) who found a negative association with sustainability disclosure components.

Effect of female gender diversity (FGD) on social sustainability disclosure (SSD) of listed firms in Nigeria

The result established that the female gender diversity on social sustainability disclosure of listed firms in Nigeria is statistically significant and positive. The conclusion is on the increasing coefficient and probability significance which FGD is significant at 5% level ($P=0.000 < 0.005$). This result conforms to a priori expectation that board with diversified female membership is crucial in ensuring social disclosure practices which is as a result of the assimilation of female gender directors.

Consequently, the result indicates that female board members play a pivotal role in the disclosure of companies' sustainability information. The finding coincides with Githaiga & Kosgei (2023); Adahosa & Udeh, (2023); Oluwatoyin, Agbi & Mustapha (2021); Onuorah et al (2018); Zeeshan et al. (2017). These studies solidly conclude that involvement of females in the management of companies' board, positively have an effect on the level of corporate social sustainability information disclosure. Specifically, the study supports the assertions of Anazonwu, et al. (2018) which claim that female directors bring to the boards a variety of strengths, including sensitivity to companies' social disclosures.

Female directors are more thoughtful to the needs of others, there are also more active and concern with issues of strategic nature, especially, issues that directly relate to companies' stakeholders (Aslam, Makki, Mahmood & Amin, 2019). The result is also in line with the thought of Amer, et al. (2019) which suggest consideration of board diversity in the future selection of board members. By so doing, the appointment of more women into companies' boards will serve as efficient diversity strategy that is likely to improve companies' performance particularly, social performance. The findings however, is in contrast with those of Salehi & Zimon (2021); Ozordi et al. (2020); Salehnezhad, Amin & Razee, (2023); Manita et al. (2018), Arniati & Muslichah (2023) who found a negative association with social sustainability disclosure.

Effect of female gender diversity (FGD) on economic sustainability disclosure ECSD of listed firms in Nigeria

The result established that female gender diversity on board enhances economic sustainability disclosure of listed firms in Nigeria as it is obvious with the results of this findings. FGD is statistically significant and positive. The conclusion is on the increasing coefficient and p value significance at 5% level (P=0.000 < 0.005). This result conforms with our a-prior anticipation that the more diversified female board membership is crucial in ensuring meticulous utilization of resources as most women tend to be more cost-effective in their dealings.

This present finding supports the assertions of Onuorah et al. (2018): Khan et al (2019); Anazona et al (2018); Adehosa and Udeh, (2023). Specifically, the findings support the claims of Zeeshan et al (2017) who reviewed a positive and significant association, stating that, a large board with female directors is better able to check and oversee management decisions yielding greater results as regarding economic sustainability disclosure. The findings however, is in contrast with those of Ozordi et al (2020); Manita et al., (2018) Salehnezhad, Amin & Razee, (2023), Arniati & Muslichah, (2023) who found a negative association with sustainability disclosure components.

Moderating Effect of intellectual capital on the relationship between board characteristics and sustainability disclosure (SD) of firms listed in the Nigerian Exchange group

Result on the Moderating Effect of intellectual capital on the relationship between board characteristics and sustainability disclosure (SD) of listed firms in Nigeria reviewed an F- Statistics 0.388 which was indicated to be statistically insignificant at 5% probability level (P= .762 > 0.05) and thus concluded that VAIC has no significate moderation effect on the relationship between board characteristics and sustainability disclosure (SD) of listed firms in Nigeria. This result does not conform to apriori expectation. It was expected that the inclusion of VAIC as a moderator variable to board characteristics variables and sustainability disclosure should strengthen the disclosure sustainability information and practices of listed firms. The VAIC attempts to measure the degree that accompany produces added value based on intellectual capital or intellectual resources (which comprises the Human capital efficiency—HCE, Structural Capital Efficiency (SCE) and Capital Employed Efficiency.

The findings of this study correspond with Baba and Baba (2021), whose study examined the effect of ownership structure variables on social and environmental disclosure practices in Nigeria. The findings is likewise linked with those of Salvation et al. (2022) and Salehi & Zimon (2021). On the other hand, the contradicts with Arniati & Muslinchah (2023); who revealed that the firms sustainability performance have a substantial impact on its intellectual capital, implying an indirect route via which independent directors contribute to firms's success. Rebordo & Sowaity (2022); Shah et al. (2021); Jaturat et al. (2021); Pangaribuan et al, (2019) unanimously find a signification moderating effect of the variables of study. Baba and Abdul-Manaf (2017) precisely, explored the scope and drivers of sustainability disclosure to see if intellectual capital efficiency moderates the association between board governance mechanism and sustainability disclosure. They found a significant moderating effect between the individual variables (board size, board independence and women board diversity) and sustainability disclosure except for board meeting which does not reflect a significant interacting effect with IC.

5. CONCLUSION, RECOMMENDATIONS AND CONTRIBUTIONS

CONCLUSION

The study examined the role of intellectual capital on the relationship between female gender diversity and sustainability disclosure of firms listed on the Nigerian exchange group for aa period of 11 years. Based on the findings, female gender diversity (FGD) has increasing and significant and positive effect on ENSD, SSD and ECSD of listed firms in Nigeria across all quantile distribution.

Regardless of the effectiveness in intellectual capital procedures and strategies, it will not be able to support the relationship between board characteristics and sustainability disclosure of listed firms in Nigeria. Overall, the findings from this study provide a new and fresh perception on the relationship between female gender board membership and sustainability disclosure in of listed firms in Nigeria.

RECOMMENDATIONS

It is recommended based on the findings of this research work, that;

i. Female gender diversity should be encouraged and increased as it led to better environmental sustainability disclosures in the listed firms.
ii. FGD were a significant factor in sustainability disclosure which implied that social contracts between a corporation and its societal environment progress with time, which contributes to the firm’s legitimacy in social disclosures. We thus recommend the increased involvement of FGD on corporate board to enhance social sustainability disclosure of firms listed on the NGX.
iii. Increasing the number of female genders on the board will lead to growing level of economic sustainability transparency, attracting investors because smart investors currently include sustainability consideration into their plans to achieve positive and favorable outcome.
iv. Lastly, the study recommends that VAIC does not moderate the relationship between female gender diversity and sustainability disclosures in of listed firms in Nigeria. It is therefore, recommended for Firms to provide adequate training, increase research and development, develop their internal system, increase intellectual capital, organize research and development programs for their employee as well as promote a more comfortable atmosphere and environment to trigger value added intellectual capital which will bring above effectiveness in significantly moderating the association between female gender diversity and sustainability disclosure of listed firms in Nigeria.

CONTRIBUTIONS

It is needful to justify the bases of the variables observed in some of the conclusions reached by others study on the ground highlighted as follows: the current study meticulously carried out pre estimation diagnostic test as unit root test, and other required procedures to determine the appropriate analytical techniques adopted. On the bases of which MMQ Reg which uniquely differ from other study was chosen. The age of the study likewise differs and could account for differences in the results as this study made use of the most current data obtained from NGX to undertake the research; the context of the study could as well account for variations as this was carried out in Nigeria.

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