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# Board Diversity and Intellectual Capital Disclosure: Does Ownership Concentration of Firms Improve the Disclosure Requirement in an Emerging Economy?

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## Abstract

This study examines the moderating role of ownership concentration on the relationship between board diversity and intellectual capital disclosure. The study sample comprises four hundred and forty-four firm-year observations of listed non-financial firms in Nigeria from 2011 to 2020. After conducting pre- and post-estimation tests, the study runs robust ordinary least squares (OLS) regression to test the developed hypotheses. The results of the selected firms revealed that board gender and board size have positively influenced the disclosure of intellectual capital. The study also found that board composition does not have an influence on the firm's intellectual capital disclosure. The finding documented that the moderation effect of ownership concentration improves disclosure on the relationship of board gender and board size and intellectual capital disclosure of the selected firms. This study offers some interesting insight into board diversity variables and its effect on ICD of the studied firms. These findings are useful for management to consider the inclusion of more women as part of the board of directors of the non-financial firms in order to influence the decision to increase their ICD. The finding of the study is limited to only listed non-financial firms in Nigeria, This study attempts to fill the gap in the literature by providing insights into the relationship between board diversity, ownership concentration and intellectual capital disclosure. This study adds to the literature as it is one of the first empirical studies to find the moderating role of ownership concentration on the relationship between board diversity and intellectual capital disclosure.

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## 1. Introduction

The introduction of the new knowledge-based economy has renovated the organizational value drivers that have moved from tangible to intangible assets. Existing literature has identified these intangible organizational value drivers as intellectual capital (IC). Nowadays, IC represents a key element capable of creating and strengthening the competitive advantage of companies and allowing the achievement of financial goals in the medium and long term (Raimo et al., 2020).

In business settings, capital refers to funds or assets that generate wealth for the smooth running of businesses. Financial and physical capital were historically the entity's main sources of wealth-producing assets. However, the knowledge-based economy has made these types of assets inadequate for decision-making, which has led to the acknowledgement of the significance of intangible forms of capital, which are not usually included in a company's statement of financial position. As a result, relationships that build positive reputations, information systems, and brands and trademarks that are valuable in decision-making, often known as Intellectual Capital (IC), are vital in attaining the goals of organizations. Interest in IC research began in 1990s as a result of the move to an information era, in which the use of IC resources is critical to prosperity and economic progress (Dalwai & Mohammadi, 2020).

The organization for Economic Cooperation and Development (OECD, 2006)opined that most crucial production elements in industrialized countries in recent years are unseen. It states that intangible assets—also referred to as IC or intangibles are a source of rapidly increasing contribution to the competitiveness of an organization. Furthermore, it claimed that businesses are beginning to understand the importance of their stock of intangible assets to their ability to maintain a competitive advantage.

In contrast to tangible assets, which are widely recognized, fully defined, and recorded in financial statements, intangible assets are more difficult to identify, recognize, manage, and measure in the traditional sense (Sudarsanam *et al.*, 2005). Because of these challenges, most businesses fail to account for IC in their financial accounts, despite the fact that it is critical to a company's competitive advantage and contributes to its value generating capabilities. As a result, failing to include IC in the statement of financial position fails to reflect the genuine market value of enterprises, resulting in an information asymmetry gap. As a result, businesses must develop their client relationships and change their focus from physical assets to intangibles such as information, expertise, and skills. Firms must therefore disclose information about IC to stakeholders as a matter of necessity, as this will help them to make informed investment decisions, which will eventually result in future cash flows for the company.

Intellectual Capital Disclosure (ICD) is defined as the information on the organization’s IC made known to stakeholders.

Disclosing the IC voluntarily by firms to stakeholders is an important information source which may influence their investment decision and subsequently enhance the firm's performance. Hence, despite the fact that IC disclosure has the potential to improve capital market efficiency and company performance, and create value for companies, measuring, reporting, and managing it remains a problem in an emerging economies.

A substantial body of literature documents that the monitoring function of corporate governance significantly influences the extent and quality of voluntary disclosure. As board of directors are responsible for ensuring corporate reporting, board diversity can play important role in determining what to disclosure and the extent of disclosure in the annual report. The diversity of board refers to the differences in attitudes and perspectives among board members (Jibril et al., 2022). Therefore, board gender, board composition, and board size board are considered part of the board attributes used by board of directors in overseeing the affairs of an entity and disclose relevant information to the stakeholders about the organization's activities through annual reports.

However, in an emerging economies, ownership structure serves as a reflection of the distribution of the power and influence of shareholders on the company's activities (Ulfah et al., 2021). Dispersed owners may lack incentives or resources to keep an eye on managers' opportunistic behavior. Concentrated owners have the knowledge and resources to supervise management's activities and thus boost the resource endowment of enterprises and firm's disclosure pattern. In Nigeria, where the majority of shareholders have small stakes, the presence of large shareholders will influence the board's decision to disclose their intellectual capital, reducing information asymmetry, and, as a result, lowering the cost of capital, increasing firm value, and improving future cash flows. As a result, this study introduced ownership concentration as a moderating variable to investigate its multiplicative impact in the link between board diversity and intellectual capital disclosure of the firms.

Prior studies documented mixed evidences that board diversity has significant positive and negative impact on IC disclosure globally. These studies were centered in developed countries (Nicolò, Zampone, et al., 2022; Rajabalizadeh & Oradi, 2022; Tejedo-romero, 2020; Tejedo-romero et al., 2017) few were study in emerging markets (Anifowose et al., 2017; Bananuka et al., 2022; Kusumawardani et al., 2021; Loulou-Baklouti, 2023). Presently in an emerging economies, there is limited empirical evidence available on how board diversity influence IC disclosure. Specifically in Nigeria for example, Kusumawardani *et al.* (2021) and Oba *et al.* (2013) investigated the impact of board diversity on IC disclosure. Though, the number of firms studied and period covered cannot be a true representation of Nigerian firms. Similarly, those prior studies did not consider the effect of a moderating variable on the relationship between board diversity and IC. Furthermore, the paucity of research in this field underscores the need for this research. As a result, the influence of board diversity on ICD of listed non-financial firms in Nigeria is investigated in this study. The moderating role of Ownership Concentration (OC) on the relationship between board diversity and ICD was also examined during the period 2011 to 2020

## 2. Literature review and hypotheses development

## 2.1. Theories related to IC disclosure

Thought there several theories considered by the previous studies in the area of intellectual capital disclosure. Most of the existing theories built on resource dependency theory, agency theory, signal theory legitimacy theory, institutional theories and stakeholders theories. However, this study considered two theories and study hypotheses are build based on stakeholders and agency theory.

### 2.1.1. The Stakeholders Theory

Cots (2011) stated that the postulates of this theory make general assumptions about how businesses function in a complex multi-party context. In the same vein, Deegan, (2002) opined that stakeholders, have an impact on the firm either directly or indirectly. As a result, businesses will freely share information to allay the worries of external stakeholders and promote their participation in various activities (Michelon & Parbonetti, 2012). Each type of stakeholders has specific expectations from business organisations. For instance, shareholders demand constant wealth expansion, governmental agencies want compliance, and analysts want data that makes it easier for them to forecast and conduct analysis.

The stakeholder theory supports the premise that firms should satisfy all of these stakeholders' information needs because each stakeholder has different information needs. Additionally, they transmit various types of information via yearly reports in order to connect with several stakeholders and in response to a wide range of information needs. According to previous research (Soebyakto *et al.*, 2015; Susanto *et al.*, 2019), companies that adopt a responsive disclosure policy may find themselves in better communicative positions, which results in a better mental image and the ability to be more competitive than companies that disregard stakeholders' claims for information.

### 2.1.2. Agency theory

This study is underpinned by agency theory, which practically affirmed that firms face the issue of information asymmetries as there is a separation between the management (known as agents) and ownership (known as the principal) which leads to principals bearing corporate risks due to lack of managerial information (Fama & Jensen, 1983). Accordingly, opinions propose that managers could be motivated to exhibit alliance with company policy and disclose additional information to resolve information asymmetry issues faced by the owners (Deegan & Gordon, 1996).

However, managers' knowledge-intensive to firms' might influence the perception of outsiders by engaging in more IC disclosures (Li et al., 2008). Similarly, Jensen and Meckling (1976) postulates that an increase disclosures keep in fascinating more capital and reduce the cost of capital, leading to merits for both companies and managers. Therefore, this study built on the adoption and postulation of the agency theory.

## 2.2. Intellectual capital disclosure (ICD)

IC is an area that is becoming more and more appealing for academics and professionals. The term does not have a universally accepted definition as defined by different scholars based on their views. Su (2014) and Squicciarini & Voigtla

(2015) defined IC as a highly important tool for corporate performance, growth, and long-term sustainability. Lerro and Schiuma (2013) also see IC as a significant value creator and a strategic component to boosting a company's competitiveness.

Wee and Chua (2015) defined ICD as the information on the organization's IC that is made available to stakeholders. In addition, White *et al.* (2007) argued that the importance of IC statement is that it seeks to disaggregate information that is not often provided in a company's statement of financial position.

## 2.3. Bard diversity and intellectual capital disclosure

### 2.3.1. Gender Diversity and Intellectual Capital Disclosure

The proportion of women on the board compared to the total number of board members is known as the board gender diversity. Women's under-representation on the boards of directors has been the topic of various studies, and this continues to be well documented by many scholars (Burke & Mattis, 2000). The agency theory as described by Jensen and Meckling (1976) explains the interaction between the principal and agent and how the firm's owners exert pressure on managers to behave in the firm's best interests. This assumption will force managers to provide information willingly in order to satisfy the needs of the owners.

Executive management is granted free capabilities to examine the organization's information, operations, and performance under the information asymmetry assumption, allowing them to plan their future activities. Because some interested parties in the organization do not have access to this type of information, it is vital for management to disclose the information voluntarily so as to satisfy the demands of other stakeholders and close the information gap between management and other stakeholders. In Italy, Nicolò *et al.* (2022) evaluated the effect gender on ICD, the result shows that women representative lead to high ICD. Carter *et al* (2003) put forward some explanations about the association between board gender diversity and firm performance using the agency theory. The authors argued that the inclusion of women within the board is sure way to monitor the activity of top management. Similarly, Mallin and Michelon (2011) conclude that the inclusion of more women within the board leads to higher overall social performance.

With regard to emerging market, the study of Loulou-Baklouti (2023) found significant positive association between women on board and ICD. In the same direction Bananuka *et al.* (2022) found that gender diversity does not influence ICD in Ugandan manufacturing firms. Moreover, Findings from previous studies provide mixed results; some had positive impact, some negative while others showed no impact. For instance, in a study of Spanish companies during the period of 2007 to 2011, Tedejo-Romero *et al* (2017) found that gender diversity had a significant positive effect on the levels of disclosure of IC. Similarly, Mardini and Lahyani (2020) found that gender diversity had a significant positive impact on some ICD components of non-financial SPF-120 French listed firms during the period 2010-2017.

In contrast, Cardi *et al.* (2018) found that female directors on the board have no significant impact on ICD of the firms of 70 Italian firms during the period 2004 to 2014. However, based on the stakeholders and agency theories as well as these ongoing discussion this study formulates a first hypothesis as follows:

- **$H_{01:}$** Board gender has a significant positive impact on Intellectual capital disclosure of the selected firms in Nigeria

## 2.3. Board Composition and IC

The composition of the board of directors is another factor that can influence ICD. The percentage of outside directors to the total number of directors is known as board composition (Haniffa & Hudaib, 2006). Executive directors are those with particular skills and competence, as well as the necessary knowledge of organizational management, who are tasked with directing the entity's day-to-day operations. Non-executive directors are required in the boardroom because of cross-directorship ideas, independence, neutrality, and experience required for the entity's management. Non-executive directors' role is considered as more of a monitoring and supervision role, enhancing managers' responsiveness to investors and ensuring company compliance.

In an emerging market, Harun *et al.* (2022) study the influence of corporate governance and firm attribute on top listed firms in India. The study results reveals a significant positive association between corporate governance and disclosure of intellectual capital. In a study conducted by Tejedo-Romero and Aaraujo (2021) concluded that board composition and functioning had a significant positive impact on human capital disclosure of 210 corporate reports from 2007 to 2016. Similarly, Kusumawardani *et al.* (2021) study the effect of board structure on ICD, the study reveals that board composition resulted t o a high extent of ICD in emerging economies. In same vein, Alfraih (2017) found large number of board has increased ICD in Kuwait.

In contrast, Nurlis (2017) found that the independent commissioner composition does not influence ICD significantly in fourteen IICD listed companies in Indonesian during the year 2012-2015.Based on the study theories and ongoing discussion, this study formulates the second hypothesis as follows:

- **$H_{02:}$** Board composition has a significant positive impact on Intellectual capital disclosure of the selected firms in Nigeria

## 2.4. Board Size and ICD

The entire number of directors on a board, including independent, non-executive, and executive directors, is referred to as the board size. In emerging economies studies, Dalwai and Mohammadi (2020) found that board size has positive and significant relationship on IC efficiency of Oman’s financial sec tors. In the same direction, Raimo *et al.* (2020) and Abdul Rashid *et al.* (2012) found that board size had a significant impact on the extent of IC disclosure in IPO prospectuses of 130 companies listed on Bursa Malaysia between 2004 and 2008. Similarly, Kusumawardani, *et al,* (2021) found that board size had a significant positive impact on ICD among firms in Indonesia during the period 2008-2017. In a study of Bangladesh top 30 firms for the years 2013 to 2017, Dey and Faruq (2019) found that board size had no significant impact on ICD.

To sum up, the studies reviewed under board size, this study established that there are mixed results in relation to the

effect of board size and ICD. Virtually all studies conducted in developed countries and emerging economies countries demonstrated positive relationships, negative and zero relationships between board size and intellectual capital disclosure. Despite the inconsistency of findings, the study hypothesizes that:

- **$H_{03:}$** Board size has a significant positive impact on Intellectual capital disclosure of the selected firms in Nigeria

### 2.5. Ownership Concentration and ICD

Ownership concentration is taken into account as a moderating variable in this study. It is an important governance tool that enables owners to manage the firm and shape its direction in order to protect their interests. In many businesses, a small group of extremely wealthy and influential shareholders have complete control over the business and are heavily involved in managerial oversight. La Porta *et al* (2000) agreed with the efficient-monitoring hypothesis, which holds that large block holders minimize agency costs by monitoring management actions, supporting the function of large owners. In the examination of moderating role of ownership concentration on the relationship between board diversity and ICD firms in Nigeria, Isa *et al.* (2022) found that ownership concentration increased the negative impact of board education and board ownership on intellectual capital disclosure of the firms.

As a result, this research proposes the following hypothesis:

- **$H_{04:}$** Ownership concentration has significant influence on the relationship between board diversity (board gender, board composition and board size) and ICD.

## 3. Methodology

The population of this study is the entire non-financial services firms in Nigeria. However, using information from annual reports and accounts of companies listed on the Nigerian Exchange Group (NGX) from January 1, 2011 to December 31, 2020, only those firms that are perceived to be more inclined to IC were chosen. Likewise, some companies were left out because they did not meet the requirements for this study, such as being quoted after 2011 or being delisted during the time of the study. The sample size for this study was determined using a stratified sampling technique (sectorial selection). As a result, the study's final samples comprise 44 Nigerian listed non-financial services companies. This study used three different data analysis methodologies. These are descriptive, correlation and multiple regression. Table I presents summary of the sample that was selected for the study.

**Table I.** Population and Sample Size

| S/no | Sector Distribution | Population | Delisted/Quoted after2011 | Sample |
|---|---|---|---|---|
| 1. | Consumer Goods | 21 | 4 | 17 |
| 2. | Health Care | 10 | 2 | 8 |
| 3. | Industrial Goods | 15 | 6 | 9 |
| 4. | Information & Communication Technology (ICT) | 7 | 2 | 5 |
| 5. | Conglomerates | 6 | 1 | 5 |
| | Total | 59 | 15 | 44 |

***Source:*** *Authors' Compilation, 2023*

The table shows the sectorial distribution of firms and sample used in the study.

### 3.1. Measurement of variables

Four different categories of variables were used: dependent, independent, moderating, and control variables. The dependent variable is the disclosure of intellectual capital. Data for the ICD proxy was extracted from financial statement narratives using content analysis. A disclosure index was used to measure the quantity of information about IC included in the annual reports of the firms. The most commonly technique for measuring the quantity of information presented in annual reports is the content analysis (Li *et al* 2008; Al-Mamun, 2009; Yi & Davey, 2010).

The 0 and 1 coding system was employed in this study. In other words, if a specific index item is disclosed a 1 is recorded, and if the specified item is not provided in the annual reports of Nigerian companies, a 0 is reported. In this study, the level of disclosure was measured by dividing the highest number of information items in the disclosure index by the recorded information items found in annual reports (Li *et al* 2008; Al-Mamun, 2009; Yi *et al*, 2010). The extent of ICD is determined using the formula below:

the extent of ICD:

$$ICD_j = \frac{TADS_j}{MRDI_j}$$

Where $ICD_j$ is intellectual capital disclosure, $TADS_j$ is the total actual disclosure score for a company j and $MRDI_j$ is the maximum relevant disclosure items of the company j.

The IC index was created by listing the components in annual reports of sampled enterprises according to their drivers/indicators. Previous research such as Bozzollan *et al.* (2003) and Abeysekera (2010) utilized thirty-three items (human capital 11; structural capital 12; and relational capital 10) based on a literature review; Guthrie *et al.* (2000) used twenty-five items based on a literature review (human capital 7 items; structural capital 9 and relational capital 9). Sixty-one items were used by Li *et al* (2008). (human capital 22 items; structural capital 16 and relational capital 21). However,

based on the material accessible to researchers from prior studies, we have developed an intellectual capital framework/index for this study that is tailored to the unique characteristics of Nigerian firms.

Therefore, this study employed the count of IC related words as the unit of the content analysis in order to examine the factors impacting the level of IC disclosure. The prior content analysis was used to analyze the quantity of IC disclosure by aggregating the disclosure frequencies of occurrence.

Independent Variables

The independent variable in this study is board diversity, which includes board gender diversity, board composition, and board size.

Moderating variable- The moderating variable is ownership concentration. It is an important governance tool that gives shareholders the power to direct and affect the company's management.

Control Variables

The control variables taken into account include firm size, AC size, AC meeting and AC gender diversity. For instance, (Garca-Meca *et al*., 2005; Kamath, 2008; Li *et al*., 2008; El-Bannany, 2008; and Oziegbe and Ofe 2020) stated that specific factors are essential elements that have a positive impact on the amount of IC disclosure by corporations. These factors include firm size, AC, and so on. Similarly, earlier studies such as Ferreira *et al*. (2012) and Alshhadat (2017) have revealed that the size of the company is a crucial variable that positively affects ICD. In order to safeguard the interests of the shareholders, an audit committee is essential for keeping an eye on how the business is run and its internal control system. According to the code of corporate governance, the AC is responsible for monitoring a firm's adherence to the law and ethical standards. Therefore, it is important to emphasize the AC's responsibility in oversight and monitoring. The AC's capacity to fulfill its voluntary disclosure purpose depends on a number of AC characteristics, including its size, independence, diversity, expertise, and so on (Li *et al*., 2012; Madi *et al*., 2014). The impact of AC meetings, AC size, and AC gender on ICD is investigated in this study as control variables.

## 3.2. Validity and Reliability

### 3.2.1. Validity and Reliability Test

**Validity**: to confirm that the current disclosure index satisfies the criteria for validity, that is, that it helps the researcher collect the required data for the study, certain procedures were followed to ensure that the validity of the data collecting instrument (disclosure index) was established. Following the studies of (Krippendorff, 2013; Alshhadat, 2017), the following measures were adopted for testing the validity:

1. Based on a preliminary analysis of the annual reports, adopting a disclosure index from the literature and customizing it to the study setting by deleting non-applicable information.
2. After creating and completing the disclosure index, the researcher forwarded it to experts with extensive knowledge of

disclosure and expertise with the Nigerian financial markets for assessment. These experts input, significantly enhanced the research and gave it valuable contribution.

**Reliability**: this means the disclosure index must produce the same results when duplicated by the same researcher at a different time or simply by another researcher (s). In voluntary disclosure research, three criteria are typically taken into account when assessing reliability. As put forward by Kruppendorff (2013), these are: 1. Stability, 2. Reproducibility, and 3. Accuracy.

**Stability**: this refers to achieving the same outcome on the index when the researcher codes the same element more than once. In this study, the exercise was performed on 20 firms, and the results from the recoded data were identical.

**Reproducibility**: using the same coding procedure, reproducibility is the likelihood that other researchers will produce the same results. The researcher used two Research Assistants to help with the coding and applied the KAPPA inter-rater reliability test using SPSS Version 26 to assess the agreement in order to validate the research's findings. The tests' results indicated a very high percentage of agreement. The KAPPA statistic is used to examine inter-rater reliability, and rater dependability is essential since it indicates how accurately the study's data collection represents the variables being measured. The percentage of agreement is also compared to what would be anticipated if the ratings are independent using KAPPA testing. The threshold for a good or acceptable KAPPA value has been described in literature as being arbitrary. Altman recommended a rating of 0.8 to 1, which is considered to be very good, while Fleiss proposed 0.75, which is deemed exceptional. Similar to this, Hayes & Krippendorff (2007) claimed that an agreement level of more than 80% would be considered modestly acceptable.

**Accuracy:** Krippendorff (2013) and Milne and Adler (1999) concluded that accuracy in the context of content analysis is described as the assessment of the researcher's (coder's) performance based on the pre-established metrics, either by a group of experts or by comparing the results of previous studies. However, Milne and Adler (1999) asserted that if the researcher receives adequate training, reliability can be attained without the use of the reproducibility test.

**Table II.** Description of the variables

| Proxies | Measurement |
|---|---|
| **Dependent Variable**<br>Intellectual Capital Disclosure (ICD) | Total scored items by the company/Total maximum scores (Al-Mamun, 2009; Alshhadat, 2017; Al-Sartawi, 2017). |
| **Independent Variables**<br>Board Gender Diversity (BGD) | Gender diversity is defined using Blau Index<br>$Index=1-\sum_{i=1}^{n} P_i^2$ where Pi is the percentage of members in each gender and n is the total number of genders (Nadeem, 2019). |
| Board Composition (BDC) | Proportion of board of directors, who are non-executives to total directors (Li*et al*, 2008; Mahmudi & Nurhayat, 2015; Alfraih, 2018). |
| Board Size (BSZ) | Total number of board members both executives and non-executives (Abeysekera, 2010; Hatane *et al,* 2017) |
| **Moderating Variable**<br>Ownership concentration | Percentage (%) of ordinary shareholders holding more than 5% of the outstanding shares (Ferreira*et al*., 2012; Isa, 2014). |
| **Control Variables**<br>Firm Size (FSZ) | Natural logarithm of Total Assets (Ferreira *et al*., 2012; Alshhadat, 2017): Jibril (2017):Jibril et al. (2017). |
| AC Size (ACS) | AC size is measured as the total numbers of AC members (Oziegbe *et al*, 2020). |
| AC frequency of meeting (ACFM) | AC frequency of meeting is measured as the total number of times the AC members met during the year Oziegbe*et al* (2020): Jibril & Maikano (2022): Jibril et al. (2023). |
| AC gender diversity (ACGD) | AC gender diversity is measured as the proportion female audit committee members to total number of audit committee members Oziegbe *et al*, 2020; Isa *et. Al.* (2022): Jibril, AbdulAziz, et al. (2023): Jibril, Usman, et al. (2022). |

***Source:*** *Authors' Compilation 2023*

## 3.3. Research model

Both the direct relationship between board diversity and ICD and the moderating effect of ownership concentration are tested using robust ordinary least squares (OLS) regression. The following are regression models for both the direct relationship and the moderating variables:

$$ICD_{it} = \beta_0 + \beta_1 BGD_{it} + \beta_2 BDC_{it} + \beta_3 BSZ_{it} + \beta_4 FSZ_{it} + \beta_5 ACS_{it} + \beta_6 ACM_{it} + + \beta_7 ACG_{it}\ \varepsilon_{it}$$ ---------- Model 1

$$ICD_{it} = \beta_0 + \beta_1 BGD_{it} + \beta_2 BDC_{it} + \beta_3 BSZ_{it} + \beta_4 FSZ_{it} + \beta_5 ACS_{it} + \beta_6 ACM_{it} + + \beta_7 ACG_{it} + \varepsilon_{it}$$ ---------- Model 2

$$ICD_{it}=\beta_0+\beta_1 BGD_{it}+\beta_2 BDC_{it}+\beta_3 BSZ_{it}+\beta_4 BGD_{it}*ONC_{it}+\beta_5 BDC_{it}*ONC_{it}+\beta_6 BSZ_{it}*ONC_{it}+\beta_7 ONC_{it}+\beta_8 FSZ_{it} + \beta_9 ACS_{it}+ \beta_{10} ACM_{it} + \beta_{11} ACG_{it} + \varepsilon_{it}$$ ---------Model 3

Where:

- $ICD_{it}$ = Intellectual Capital Disclosure
- $BGD_{it}$ = Board Gender Diversity
- $BDC_{it}$= Board Composition
- $BSZ_{it}$ = Board Size
- $ONC_{it}$ = Ownership Concentration
- $FSZ_{it}$ = Firm size
- $ACS_{it}$ = Audit Committee Size
- $ACM_{it}$ = Audit Committee Frequency of Meeting
- $ACG_{it}$ = Audit committee Gender Diversity
- $\varepsilon_{it}$ = Error term
- $\beta_0$ = Constant
- $\beta_1$= Constant

## 4. Results and Discussions

The descriptive statistics of all the variables used in the study is presented in table III.

**Table III.** Descriptive statistics of the variables

| Variables | Observation | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| **ICD** | 440 | 0.55 | 0.15 | 0.25 | 0.83 |
| **BGD** | 440 | 0.44 | 0.12 | 0 | 0.60 |
| **BDC** | 440 | 0.82 | 0.07 | 0.5 | .92 |
| **BSZ** | 440 | 8.79 | 2.46 | 4 | 17 |
| **ONC** | 440 | 0.60 | 0.18 | 0.18 | 0.94 |
| **FSZ (NBillion)** | 440 | 63.78 | 0156.96 | 0.1 | 998 |
| **ACS** | 440 | 5.534 | 0.81 | 4 | 7 |
| **ACM** | 440 | 3.67 | 0.71 | 2 | 5 |
| **ACG** | 440 | 0.19 | 0.16 | 0 | 0.67 |

***Source:*** *Generated by the Authors 2023*

Table III showed that the sampled Nigerian non-financial services companies have average information disclosure score of 0.55 for their total mean intellectual capital disclosure. Accordingly, the firms reported IC at a rate of 55% on average. With a minimum disclosure level of 25% and a maximum disclosure level of 83%, this demonstrates a moderate amount of ICD by the companies. The mean value of the board gender diversity of the sampled non-financial services firms is 0.44,

meaning that on the average; the firms have 44% of women represented on the board.

The value of board composition ranges from 0.50 to 0.92. Accordingly, the minimum percentage of non-executive directors for businesses is 50%, while the maximum percentage of non-executive directors to all board members is 92%. 82% on average of the total number of directors are non-executive directors. Board size has a minimum value of four (4) and a maximum value of seventeen (17). The mean value of ownership concentration is 0.60, which indicates that on average, 60% of the firms' shareholders held more than 5% of the company's shares during the study period. The minimum value is 0.18 and the maximum value is 0.94. This means that a minimum of 18% of the shareholders held more than five percent shares, while a maximum of 94% of the shareholders held more than five percent shares of the firms.

Firm size recorded a minimum of N100 million and maximum of N998 billion. The average amount of investment in total asset of the firms is N63 billion. The mean audit committee size was 5.5342. This means that on the average, there are 5 members in the audit committee of the sampled firms. The minimum value is 4 and the maximum value is 7. Audit committee frequency of meeting has a mean of 3.67 with a minimum of 2 and maximum of 5. Finally, audit committee gender composition has a mean of 0.19 with a minimum of 0 and maximum of 0.67.

**Table IV.** Correlation Matrix

| Var. | ICD | BGD | BDC | BSZ | ONC | FSZ | ACS | ACM | ACG | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| **ICD** | 1.00 | | | | | | | | | |
| **BGD** | 0.24 | 1.00 | | | | | | | | 1.80 |
| **BDC** | -0.02 | 0.44 | 1.00 | | | | | | | 2.02 |
| **BSZ** | 0.24 | -0.06 | 0.28 | 1.00 | | | | | | 1.96 |
| **ONC** | -0.07 | -0.12 | -0.04 | 0.08 | 1.00 | | | | | 1.23 |
| **FSZ** | 0.42 | 0.05 | 0.01 | 0.52 | 0.23 | 1.00 | | | | 2.47 |
| **ACS** | 0.23 | 0.19 | 0.13 | 0.38 | 0.02 | 0.44 | 1.00 | | | 1.64 |
| **ACM** | 0.29 | 0.21 | 0.05 | 0.31 | 0.05 | 0.42 | 0.34 | 1.00 | | 1.49 |
| **ACG** | 0.33 | 0.18 | -0.04 | -0.22 | -0.07 | 0.08 | -0.01 | 0.04 | 1.00 | 1.34 |

**Source:** G*enerated by the Authors 2023*

Variance inflation factors (VIF), tolerance levels and the correlation matrix were used to check for multicollinearity. The results demonstrated a lack of multicolliearity since the minimum VIF is 1.23 and the maximum VIF is 2.47 respectively. Table IV presents the correlation analysis and VIF of the study.

## 4.1. Regression Results of Board Diversity and Intellectual Capital Disclosure (Direct Relationship)

The regression result of the robust Ordinary Least Square (OLS) estimation technique is presented in Table V. The Table presents the coefficient and probability of the OLS.

**Table V.** Summary of Ordinary Least Square Regression of ICD (Direct Relationship)

| Variables | Coefficients | Prob. |
|---|---|---|
| **Cons** | 0.19 | 0.131 |
| **BGD** | 0.36 | 0.000 |
| **BDC** | -0.15 | 0.172 |
| **BSZ** | 0.02 | 0.000 |
| **FSZ** | -0.04 | 0.000 |
| **ACSZ** | -0.01 | 0.419 |
| **ACFM** | -0.02 | 0.147 |
| **ACGD** | 0.28 | 0.000 |
| **R-square** | 0.2621 | |
| **F-Statistic** | 18.18 | |
| **Prob. F** | 0.0000 | |

**Source.** Results Output from STATA

The proportion of the overall variance in the dependent variable that the independent variables collectively explained was given by the cumulative R-squared (R2) of 0.2661. In other words, it means that the proportion of women directors on the board, the composition of the board and the size of the board of directors used in the study all explained 27% of the variation in ICD of the study firms in Nigeria. The F statistics of 18.18, which is significant at one percent, indicates that board diversity and ICD model is fit. The P-value of F-statistics which is statistically significant at a level of 0.0000 implies that there is 99.9 percent probability that the relationship among the variables were not due to mere chance.

Table V revealed that the coefficient value for gender diversity was 0.36 with a p-value of 0.000. This signifies that gender diversity has a significant and positive effect on ICD of the firms. This implies that for every increase in the number of women on the board of directors, the IC of the non-financial services firms will increase by the coefficient value. Hypothesis one states that gender diversity does not have significant impact on ICD. However, based on the results of the regression which is significant at (0.000) 1%, therefore, the null hypothesis is rejected. This finding is in line with those of Tedejo-Romero *et al* (2017), Mardini *et al* (2020). But it is contrary to that of Oba, *et al* (2013), Cardi *et al* (2018). Board composition recorded a coefficient value of -0.15 which is neither significant at 1% nor 5% level. This implies that the presence of non-executive directors on the firms has no effect on ICD. This finding is in line with those of Tejedo-Romero *et al* (2017) and Tejedo-Romero *et al* (2018). However, it is in contrast to those of Martins*et al,* (2018) and Dey *et al,* (2019).

Board size has a coefficient value of 0.02 which is significant at 1%. This implies that for every increase in the number of board members, there is an increase in the level of ICD of the firms. Hypothesis three states that board size has no significant impact on ICD. However, based on the results of the regression which is significant at 1%, we therefore reject

the null hypothesis. This concurs with the findings of Abdul Rashid *et a.l* (2012), Kusumawardani *et al.* (2021). However, study such as Dey *et al.* (2019) had a position that is contrary to ours.

The coefficient for firm size was -0.04 which is significant at 1%. This implies that an increase in the size of the firm will reduce the extent of ICD. This finding is in line with the studies of Taliyang *et al* (2011), Abdulrahman *et al* (2012), Dewi *et al,* (2014). However, it is in contrast to that of Damayanti*et al* (2009). Similarly, the gender composition of the AC has a coefficient value of 0.28 and a probability value of 0.000. This shows that the gender mix of the audit committee has a significant, positive impact on the corporations' disclosure of their IC. This implies that for every increase in the number of women on the AC of the firms, the ICD will increase. The regression results showed that both AC meeting and AC size have no significant impact on ICD of the firms.

## 4.2. Regression Results on Board Diversity and ICD of Pre-moderation and Interaction Models

The regression results of the robust Ordinary Least Square (OLS) estimation technique of board diversity and ownership concentration (pre-moderation and interaction models) is presented in Table VI.

**Table VI: Summary of Ordinary Least Square Regression of ICD of Pre-moderation and Interaction Models**

| Variables | Pre- moderation model | | Interaction model | |
|---|---|---|---|---|
| | Coefficients | Prob. | Coefficients | Prob. |
| Cons | 0.65 | 0.612 | 0.92 | 0.001 |
| BGD | 0.37 | 0.000 | -0.68 | 0.004 |
| BDC | -1.11 | 0.334 | -0.37 | 0.299 |
| BSZ | -0.02 | 0.006 | 0.01 | 0.475 |
| BGDONC | | | 1.25 | 0.000 |
| BDCONC | | | 0.37 | 0.481 |
| BSZONC | | | -0.03 | 0.037 |
| ONC | 0.01 | 0.000 | 0.01 | 0.000 |
| FSZ | 0.05 | 0.000 | 0.03 | 0.009 |
| ACS | -0.01 | 0.298 | 0.01 | 0.840 |
| ACM | -0.03 | 0.016 | -0.01 | 0.678 |
| ACG | 0.30 | 0.000 | 0.19 | 0.000 |
| R-Squared | 0.3034 | | 0.4551 | |
| F-Statistics | 20.30 | | 29.09 | |
| Prob. F | 0.0000 | | 0.0000 | |

**Source:** *Results Output from STATA*

Findings from the panel data regression analysis of models two and three in Table VI indicated that, $R^2$ were 0.3034 and 0.4551. This therefore means that, the two models were capable of explaining about 30% and 46% of the systematic variation in the value of dependent variable. The coefficient of ownership concentration is 0.01, and the significance level is 1%. As a result, the relationship between board diversity and ICD can be moderated by ownership concentration. The fourth hypothesis asserts that ownership concentration does not moderate the relationship between board diversity and ICD. However, in view of the regression result which is significant at 1%, we therefore reject the null hypothesis.

The result from the moderated model revealed that board gender has a coefficient value of 1.25 with a probability value of 0.000 which is significant at 1%. Similarly, board size has a coefficient value of -0.03 with a probability value of 0.037 which is significant at 5%. However, moderated board composition has no significant impact on ICD of the firms. Based on the finding of the study, it means that ownership concentration improves the relationship between board gender, board size and ICD of the firms.

## 5. Conclusion and Recommendations

Gender diversity is one of the most studied board structures, since numerous policymakers provide policies on gender equality. Other factors such as composition and size are also important as past studies have shown that they have significant influence on ICD. Most of research findings on board diversity have were carried out in developed countries and few in emerging economies. Because of differences in economic situations, regulatory systems, and governance procedures affecting board diversity in different countries, generalizing the findings of these research to most developing nations, particularly Nigeria, may be impossible.

In light of the foregoing, the purpose of this study is to investigate the influence of board diversity on ICD of listed non-financial firms in Nigeria. It also looked at how OC influenced the relationship between board diversity and ICD in 440 firms' year observation of Nigerian listed non-financial services companies during the period 2011-2020.

According to both agency and stakeholder theories, the study is predicated on the idea that diverse boards, by virtue of their expertise and professional competencies, influence decision on ICD. The results showed that the degree of ICD is significantly impacted by board gender diversity and board size. However, the finding of the study showed that board composition does not have impact on ICD. Similarly, the finding showed that ownership concentration influenced the relationship between board gender and board size and ICD. The activities of shareholders with more than 5% of a company's stock in monitoring the operations of managers in Nigeria's listed non-financial services companies is a sure way to enhance and influence decision on ICD.

This study offers some interesting insight into board diversity variables and its effect on ICD of the studied firms. These findings are useful for management to consider the inclusion of more women as part of the board of directors of the non-financial services firms in order to influence the decision to increase their ICD. Also, in order to ensure efficient decision concerning ICD by non-executive directors, they should be made to be independent of the firms. In addition, the SEC should peg the minimum number of members of the board of directors to eight (8) and maximum to fourteen (14) for all

the firms. Moreover, emphasis should be placed on the quality of members and their effectiveness in enhancing the ICD of the firms. Finally, when choosing the board's structure, management should take into account the numerous functions of concentrated ownership and board diversity. This will make it possible for management to carefully choose, propose, and appoint diverse board members.

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