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Exploring the Impact of Board Diversity on Profitability: Evidence from Nigerian Food and Beverage Firms

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Abstract: The collapse of major corporations globally has fueled ongoing debates about corporate governance and its implications for firm performance. This study examines the influence of board diversity attributes on the profitability of listed food and beverage manufacturing firms in Nigeria, providing critical insights into the governance-performance nexus. Utilizing ex-post-facto and descriptive research designs, data were drawn from 10 purposively selected firms out of 22 listed on the Nigerian Exchange Group (NGX). Principal Component Analysis (PCA) was employed to identify significant board diversity attributes, while Pearson Product Moment Correlation Coefficient (PPMCC) was used to analyze their relationship with profitability. The findings reveal that Financial Expertise Diversity (60.78%) is the most dominant factor influencing profitability, while CEO Duality (-58.95%) exhibits a negative impact. Gender Diversity (60.02%) and Ethnicity Diversity (59.1%) emerged as key contributors to demographic diversity, while Educational Background Diversity (73.48%) uniquely enhanced board effectiveness. Correlation analysis demonstrated that increased diversity—particularly in gender (0.683771), ethnicity (0.739114), and educational background (0.833936)—is strongly associated with higher profitability, measured by Return on Assets (ROA). This study underscores the strategic importance of fostering diverse boards to strengthen corporate governance and enhance financial outcomes. By illuminating the significant attributes of board diversity, these findings provide actionable insights for policymakers and stakeholders aiming to drive sustainable growth in the Nigerian food and beverage sector.

Keywords: Board diversity, profitability, food firms, Nigeria

JEL Classification: M4, M41, M48
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1. INTRODUCTION

The failure of big-world corporate firms has become a significant issue and subject of debate among accountants and practitioners in the last decades. The problem has been attributed to poor corporate governance. Empirical findings by Igbekoyi, Adegbayibi, and Adesina (2021), Abu-Dawleh *et al.,* 2021; Akpomedaye and Williamson, 2021 as well as Obeitoh *et al.* (2023) advocate board diversity premised on the notion that a more diverse board with varied skills and different perspectives will generate more efficiency and resource utilization. On the other hand, another school of thought advanced and substantiated by the findings of Adusei and Obeng (2019), Khaoula and Moez (2019) as well as Ilaboya and Ashafoke (2017) have argued against board diversity owing to the belief that a more diverse board will incur more cost to the firm as regards communication, coordination and conflict among the directors due to their varying backgrounds.

Studies like (Oladejo *et al.,* 2021; and Obeitoh *et al.,* 2023) described boardroom diversity as covering age, background, gender, and ethnic diversity, and also diversity in terms of skills, thinking, competencies, experiences, and careers as well as independent directors and board meeting from the position of actual meeting attendance. From an agency theory perspective, board size, independence, and expertise are essential in reducing the opportunistic nature managers tend to exhibit. The expertise of women on the audit committee is a crucial metric than mere gender, as the audit committee's function requires expertise rather than gender sensitivity (Obeitoh *et al.,* 2023).

Various factors can influence board diversity, including age, gender, nationality, academic and professional qualifications, life experiences, attitudes, and personalities. Some scholars argue that diversification among board members offers numerous benefits. For example, it can bring broader perspectives to decision-making through enhanced creativity and innovation, ultimately boosting firm performance. Conversely, it is also argued that board heterogeneity may lead to increased conflict due to differing goals, potentially reducing decision-making effectiveness and being more destructive than beneficial (Fitrasari, 2023; Obeitoh *et al.,* 2023).

Profitability reflects the outcome of business operations from well-designed and implemented strategic templates (Babalola and Anifowose, 2018). Farlex Financial Dictionary (2017) defines profit as a company’s total revenue less its operating expenses, interest paid, depreciation, and taxes. According to Babalola and Anifowose (2018), profitability describes the ability of a business entity to earn profits. The ability also depicts the business entity's earning power, capacity, or operating performance. Gadoiu (2016) relates profitability to the efficiency of a company, expressed as a ratio between the resulting benefits and the efforts to achieve them. Ziad, Ahmad, and Abdelrazaq (2017) also defined profitability as the indicator that detects the competitive status of the organization in its sector as well as the quality of its management.

Manufacturing, particularly the food and beverage industry, remains critical to every economy worldwide, as do the realities in Nigeria. Due to increased population, disposable incomes, and changing tastes and products, Nigeria's food and beverage sector is expected to grow rapidly. However, fluctuating macroeconomic factors threaten the daily operations of Nigeria's food and beverage industry (Abdulmalik, 2023). The food and beverage industry in Nigeria has contributed to the country's economic growth in several ways, including a crucial role in meeting the basic human needs for sustenance and nutrition, which are essential for survival, rapid growth due to factors such as increased population, disposable incomes, and changing tastes and products, creation of employment opportunities and the generation of income, contributing to overall economic development. Furthermore, the industry's profitability is influenced by macroeconomic factors such as political, economic, socio-cultural, and technological factors, which significantly impact the extent to which food and beverage companies generate profit (Abdulmalik, 2023).

Several authors viewed diversity solely from different angles, with most studies focusing on gender (Igbekoyi *et al.,* 2021; Mohsni, Otchere, and Shahriar, 2021). Others are educational background, ethnicity, and financial expertise diversities. The current study focused on Food and beverages manufacturing firms with the scope of spanning from 2011-2023. Given this, the objectives are to:

1. evaluate the board diversity attributes in listed foods and beverages manufacturing firms in Nigeria.
2. examine the relationship between board diversity attributes and profitability of listed foods and beverages manufacturing firms in Nigeria.

2. LITERATURE REVIEW

The board of directors is considered the principal mechanism for implementing and maintaining good corporate governance. The configuration of corporate boards has been an important research topic in corporate governance during the last decades, although arguments about the need to review the composition of a board still remain strong, especially with regard to gender diversity (Baker *et al.,* 2020). Board diversity refers to the variation present in the makeup of an organization's board (Song *et al.,* 2020). Furthermore, Ozgur (2020) explicated board diversity to be a diverse blend of features, qualities, and proficiency made available by the individuals in the board room as input to the decision-making process. A board with variety can facilitate the effective overseeing of the managers because the varying inputs they seek to provide will make the work more effective (Wahid, 2019). Corporate boards act not only to maximize the returns of shareholders' investments but also to achieve responsible and sustainable corporate performance, as demanded by multiple stakeholders and shareholders (Hafsi and Turgut, 2013).

2.1 Ethnicity diversity

Ethnicity diversity refers to cultural factors, including nationality, regional culture, ancestry, religion, or language. The nationality of directors is one of the main characteristics of board diversity. The increasing internationalization of business leads to a higher demand for directors who possess the necessary knowledge and contacts in foreign markets to link the firm to the different contexts of the countries in which it operates (Mohsni *et al.,* 2021).

2.2 Gender Diversity

Board gender diversity is a significant aspect of corporate governance, and it is defined as the presence of female directors on the board of directors of corporations (Carter *et al.,* 2003). Several studies have emphasized the importance of having women on boards. Advocates for gender diversity on boards argue that incorporating female members boosts a firm's competitive advantage in cost savings, energizes the company, and more outstanding communication across different levels of the organization and among board members (Naeem, *et al*., 2022

2.3 Educational Background Diversity

Education diversity could be explained as different sets of task-relevant skills, knowledge, and abilities possessed by team members as a function of their educational background (Bernile et al., 2018). Education level is often considered a good proxy for human capital, knowledge base, or intellectual competence (Barro & Lee 2010). Top managers of the firm are hired probably because of their superior ability. According to Bhagat, Bolton, and Subramanian (2010), such ability consists of observable characteristics (educational backgrounds and work experiences) and unobservable characteristics (leadership and entrepreneurial skills). Since the unobservable characteristics are relatively difficult to identify and measure, the observable characteristics may play an important role.

2.4 Financial Expertise diversity

Board financial expertise pertains to the quantity and quality of board members possessing accounting, finance, insurance, and management professional skills (Adusei, 2019). Gambo, Terzungwe, Joshua, and Agbi (2019) refer to financial expertise diversity as the proportion of people with professional skills on the board of an organization. It is a different field of study found among the persons on the board, and it is heterogeneous based on the levels and types of education among the board members.

2.5 Chief Executive Officer (CEO) Duality

CEO duality occurs when an individual holds two top positions: CEO and chairperson (Jensen & Meckling, 1976). There are two conflicting views regarding the separation of powers between the chairman and the CEO based on the agency theory and the stewardship theory. On one hand, the agency theory suggests that the separation between the two roles of CEO and chairman is vital to ensure the efficiency and effectiveness of tasks performed by the board over management. For instance, Cadbury and Hampel's report recommended CEO non-duality because the separation between the non-executive chairman and the CEO makes them more capable of making effective decisions and proposing objective opinions on firm plans and potential proposals. Hence, this improves the functions of monitoring and evaluating systems and supports shareholders' interests (Adebayo, Olusola, Abiodun, 2013; Samaha *et al.,* (2015). The duality enhances performance as it allows the CEO to have unified authority and power in planning, directing controlling, and coordinating the organization's operations in a timely and effective manner Habbash, (2010).

2.6 Firms Profitability

Profitability is viewed as the firm's ability to make/earn profit from all business activities, which reflects management efficiency in resource utilization. The relationship between profitability and audit fees can be direct or inverse, vis-a-vis the formerly identified factors influencing audit fees. Various ratios are used to measure profitability, of which return on assets, return on equity, and net interest margin are the major ones (Murthy & Sree, 2003). Man and Wong (2013) stated that a higher ROA indicates that the company is more efficient in resource use.

2.7 Foods and Beverages Firms

The food and beverage industry (F&B) is the manufacturing industry that contributes most to the national economy, both in terms of turnover and Gross Value Added (GVA). Prominent stakeholders and players in the Nigerian Food and Beverage subsector include Nestle Food Nigeria Plc, Cadbury Nigeria Plc, Nigeria Bottling Company Plc, and Dangote flourmill Plc to mention but a few. The lamentation of manufacturers especially those of the Food and Beverage sub sector is that the operating environment in the country is poor and the cost of business operation is expensive. This impacts on the performance of Food and beverage sub sector of the economy. Thus, inadequate management of macroeconomic variables such as interest rate, unstable exchange rate, import, export, and duplicating of essential infrastructures account for the challenges in this regard (Akpan, Ikon, Chukwunonye, and Nneka, 2016).

2.8 Theoretical Framework

This study is underpinned by agency theory and resource dependence theory. The board aims to resolve agency problems between managers and shareholders (Dang *et al.,* 2013). Based on this theory, the inclusion of women and foreign directors can enhance the board's effectiveness and improve firm performance. The fundamental premise is that diversity can reduce the likelihood of groupthink among board members (Ujunwa *et al.,* 2012). Agency theorists also suggest that having women, ethnic minorities, and foreigners as external stakeholders can bring fresh solutions to complex issues (Francoeur *et al.,* 2008). For instance, female directors may be more proactive in monitoring and controlling managers by asking more questions and offering different perspectives in the boardroom (Dang et al., 2013). Additionally, diversity can increase board independence, as individuals with different genders, ethnicities, or cultural backgrounds might raise questions that traditional directors might not consider (Carter *et al.,* 2013).

Further, the study is based on the assumption of the resource dependence theory. According to resource dependence theory, board diversity is a vital tool for accessing essential resources (Johnson *et al.,* 2016). Each director contributes unique attributes and various resources, such as expertise, skills, information, and potential connections to stakeholders (Hillman *et al.,* 2009). The theory further assumes that there are interdependencies within a corporate environment where firms are largely affected by the activities and inactivates of other firms.

2.9 Board Diversity Attributes

Various studies have investigated what constitutes board diversity both in developed countries and in emerging economies. The composition of corporate boards is influenced by a complex hierarchical structure, with various factors exerting top-down influence (Zattoni et al., 2023). At the highest level, institutional or country-specific factors, such as regulations and social norms, play a significant role in shaping board composition (Zattoni et al., 2020). The value brought by diversity in different contexts (e.g., education and business) is a current topic (Arora, 2021; Di Miceli da Silveira, 2022. These factors are followed by company-level factors, including ownership structure, which is assigned to the level below.

In a study on the attributes of board diversity, Bin Khidmat, Khan, and Ullah, (2020) examined the impact of board diversity on the Chinese A-listed firm's performance. The data were collected from A-listed companies registered in Shanghai SSE 180 and Shenzhen 100 from the period 2007 to 2016. Since some of the companies got listed after 2007, our data is unbalanced. Both the fixed effects model and a more robust dynamic panel generalized method of moment estimation are applied to cater to the endogeneity problem. After controlling for several firms and board characteristics, we found gender diversity, education diversity, and foreign national diversity measured through the Blau index have a positive and significant effect on the Chinese A-listed firm performance for both the accounting and market measures. The age diversity and independence diversity seem not to be an essential determinant of firm performance in Chinese A-listed firms.

In another study, Behlau, Wobst, and Lueg (2024) attempted a systematic literature review to provide a comprehensive overview of the methods used to measure board diversity. They selected 61 empirical articles from an initial sample of 1035. This study discusses the different data collection methods. They grouped director and board attributes into the constructs of structural, demographic, and cognitive diversity. Their study identified four different approaches to combining and measuring diversity to include non-index, single-index, cross-indices, and inter-indices. They found that measuring board diversity requires a mixture of archival and primary research, as well as various methods such as applying indices, constructing heterogeneity scores, and using machine learning approaches to infer directors' attributes.

2.10 Relationship between Board Diversity Attributes and Firms Profitability

Board diversity relationship with firm performance has been a subject of research mostly in developed countries, with few in developing economies like Nigeria producing mixed findings. For instance, Amadi *et al.* (2023) examined the impact of female representation on boards concerning corporate social responsibility (CSR) practices and firm performance in A-share listed companies in China. Their study utilized indicators such as the proportion of female board members, the average age of female board members, the educational background of female directors, TOBIN Q, asset size, and leverage. Using fixed effects estimates and conducting stationarity, stability, cointegration, and Hausman tests, the analysis revealed that the proportion of female directors, their average age, and their educational level significantly influence CSR performance and financial performance. Additionally, CSR performance was found to significantly impact financial performance. The findings suggest that female directors play a strategic role in helping firms manage their social responsibilities ethically and sustainably, which has important policy implications for regulators and stakeholders, especially in emerging societies prone to unethical corporate practices.

Pandey *et al.* (2023) explored the relationship between board gender diversity and firm financial performance through the lens of complexity theory, utilizing qualitative comparative analysis (QCA). The study sample consisted of 204 non-financial firms listed on the Bombay Stock Exchange (BSE). The findings indicated that board gender diversity does not impact firm financial performance in isolation but rather in conjunction with other board and firm characteristics. In some configurations, it is associated with stronger financial performance, while in others, it correlates with weaker performance. Additionally, the study found that greater gender diversity on boards mitigates the negative effects of CEO duality on firm financial performance.

In the same vein, Zhao and Abeysekera (2022) examined the relationships in Chinese-listed firms with BRI projects during a predictable business outlook period (2019, pre-Covid period) and an unpredictable business outlook period (2020, Covid period). Their study used least squares regression that analyzed the target population comprising 79 listed Chinese firms with BRI projects in 2019 and 2020.The China Stock Market and Accounting Research (CSMAR) database provided board diversity data. Analyzing annual reports using content analysis provided the ICD data, collected by following an established intellectual capital (IC) coding framework in the literature. After collecting board-related data, the study calculated the diversity between boards in firms (diversity of boards– DOB) using cluster analysis. They estimated the diversity within each board (diversity in boards– DIB) using Blau's Index. They found that in the predictable business outlook environment, diversity of boards positively associated with ICD, and DIB negatively associates with ICD. In the unpredictable business outlook environment, the DIB and DOB interaction negatively associates with ICD, and DOB positively associates with ICD.

Abubakar, Ishak, and Sitraselvi, (2021) investigated the relationship between board attributes and real earnings management of listed Nigerian financial institutions. The residuals from Roychowdhury (2006) was used to proxy real earnings management. Data were collected from 45 financial institutions quoted on the Nigerian Stock Exchange (NSE) from 2011 to 2016. For analysis purpose, the Panel Corrected Standard Errors (PCSEs) regression was utilized. The regression result shows that board meeting and board expertise had a significant positive impact on real earnings management. Whereas, female directors had a significant negative influence on real earnings management.

3. METHODOLOGY

The study adopts Ex-post-facto research and descriptive research design a focus on foods and beverages manufacturing firms listed on the Nigerian Exchange Group (NGX). The study area covered all on the foods and beverages manufacturing firms listed on the Nigerian Exchange Group (NGX), Lagos state, Nigeria. Out of the twenty-one (22) food and beverage manufacturing firms registered and listed on the floor of the Nigerian Exchange Group (NXG), ten (10) of them were selected using a homogeneous purposive sampling technique. The purposive choice of the sampled foods and beverages firms is based on their performance and ease of accessibility to their report. The annual reports of sampled foods and beverages firms covering (2011-2023) were analyzed to achieve the study's objectives. The sampled firms include Guinness, Cadbury, NESTLE, 7UP Nigerian Bottling Company, Flour Mills, Dangote Sugar, Nigeria Brewery, Honey Well Flour Mill, De United Foods Industries Ltd, and International Brewery. Secondary data was obtained from the foods and beverages manufacturing firms listed on the Nigerian Exchange Group (NGX). A 13-year reporting period was covered by this study from 2011 to 2023. The study collected data from audited annual reports submitted to the Nigerian Exchange Group for 13 consecutive years. The period witnessed renewed efforts in repositioning the corporate governance mechanism in Nigeria.

3.1 Model Specification

The board diversity attributes of listed foods and beverages manufacturing companies in Nigeria was analyzed using Principal Component Analysis (PCA). The relationship between board diversity attributes and profitability of listed foods and beverages manufacturing firms in Nigeria was analyzed using Pearson Product Moment Correlation Coefficient (PPMCC).

Pearson Product Moment Correlation Coefficient (PPMCC)

The Relationship between Board Diversity attributes and Profitability of Listed Foods and Beverages Manufacturing Firms

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{(n\sum x^2 - \sum(x)^2)(n\sum y^2 - \sum(y)^2)}} \quad \textbf{............ (3.5)}$$

- Where
- r= Correlation coefficient
- x= Independent variable (Board diversity variables)
- y= Dependent variable (Profitability proxies, ROA)

4. RESULTS AND DISCUSSIONS

Results of the study on corporate board diversity attributes and the relationship with profitability of foods and beverages manufacturing firms in Nigeria within a period of 13 years (2011-2023) was presented in this section. Data obtained from secondary sources were analyzed in relation to the various objective of the study.

4.1 Diagnostics Test Result of Levin, Lin, and Chu test for the Variables

In order to estimate the relationship between the selected variables, it is important first, to examine whether the variables are non-stationary. For variables that are non-stationary, a co-integration analysis was carried out between the selected variables. However, where one or more of the variables are not stationary, such variables(s) were excluded from the co-integration analysis. In this study, Levin, Lin, and Chu unit root three tests for panel data were applied to assess stationarity, and the result was presented in Table 4.1. The decision criteria assumed here is that if the probability value of the Levin, Lin, and Chu test is greater than 5% critical value, then it is ruled that the tested variable is non-stationary. If on the other hand, the probability value of Levin, Lin and Chu test is higher than 5% critical value, then ut is agreed that the tested variable is invariable. The test was provided by the econometrics software package E-view 11.

Table 4.1 Diagnostics Test Result of Levin, Lin and Chu test for the Variables

Variables	**Adjusted t value**	**1st Difference**	**Order of integration**
ROA	-1.82851**	______	1(0)
CEOD	-1.96089**	______	1(0)
GEND	-3.43363***	______	1(0)
ETHD	-0.56224**	0.0478**	1(1)
FEXT	-2.55240***	______	1(0)
EDUD	-2.68065***	______	1(1)

NB: ** Indicates significant at 5% level

Where,

ROA=Return on Asset
CeoD= CEO Duality
GenD=Gender Diversity
EthD= Ethnicity Diversity
Fext = Financial Expertise Diversity
EduD = Educational background Diversity

4.2 Principal Component Analysis (PCA) of Board Diversity Attributes in Listed Foods and Beverages Manufacturing Firms in Nigeria

Table 4.2 showed the Principal Component Analysis (PCA) on board diversity attributes in listed food and beverage manufacturing firms in Nigeria provides a clearer understanding of how different board diversity factors relate to one another. These diversity attributes include CEO Duality (CeoD), Gender Diversity (GenD), Ethnicity Diversity (EthD), Financial Expertise Diversity (Fext), and Educational Background Diversity (EduD). PCA is used to reduce the dimensionality of the data by summarizing these variables into principal components (PCs) that capture the maximum variance in the data while minimizing redundancy.

The analysis reveals that the first principal component (PC1) accounts for 23.06% of the variance, the second component (PC2) explains 22.19%, and the third component (PC3) captures 20.25%, giving a cumulative explained variance of 65.51% for the first three components. This means that these three components together capture most of the diversity in board attributes across the firms. PC1 is mainly influenced by Financial Expertise Diversity (Fext) and CEO Duality (CeoD), indicating that these two factors explain much of the variation in board diversity. On the other hand, Gender Diversity (GenD) and Ethnicity Diversity (EthD) play a significant role in PC2, while Educational Background Diversity (EduD) is the major contributor to PC3.

The eigenvectors, or loadings, shed light on the relationships between the original variables and the principal components. Financial Expertise Diversity (Fext) has the highest positive loading in PC1, meaning it is the most dominant factor, while CEO Duality (CeoD) has a strong negative loading in PC1, suggesting an inverse relationship between these two attributes. In PC2, Gender Diversity (GenD) and Ethnicity Diversity (EthD) have the highest positive loadings, indicating that demographic diversity (gender and ethnicity) is a central component of board diversity for the firms studied. Meanwhile, Educational Background Diversity (EduD) heavily influences PC3, suggesting that the diversity in educational qualifications among board members contributes uniquely to overall board diversity. The correlations among the diversity attributes reveal weak linear relationships, with Gender Diversity (GenD) showing minimal correlation with other attributes. Financial Expertise Diversity (Fext) is negatively correlated with CEO Duality (CeoD), indicating that firms with greater financial expertise tend to have less CEO duality.

This suggests that firms with more board members who have financial expertise might be less likely to have one individual holding both the CEO and chairperson roles, a potential sign of stronger corporate governance. However, the correlations are generally low, meaning that each diversity attribute contributes somewhat independently to the overall makeup of the board.

The PCA of board diversity attributes in Nigerian food and beverage firms indicates that financial expertise, CEO duality, and demographic diversity (gender and ethnicity) are key components driving variations in board composition. While financial expertise and CEO duality are major factors in explaining board structure, demographic diversity also plays an important role, albeit in a separate dimension. Educational diversity, though contributing less to overall variance, offers a unique perspective on board composition. These insights emphasize the multidimensional nature of board diversity and how different aspects of diversity can contribute to corporate governance and decision-making processes in these firms.

Table 4.2: Principal Component Analysis of Board Diversity Attributes in Listed Foods and Beverages Manufacturing Firms in Nigeria

Eigenvalues: (Sum = 5, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	1.153147	0.043468	0.2306	1.153147	0.2306
2	1.109679	0.097060	0.2219	2.262826	0.4526
3	1.012618	0.117119	0.2025	3.275444	0.6551
4	0.895500	0.066443	0.1791	4.170943	0.8342
5	0.829057	---	0.1658	5.000000	1.0000

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3	PC 4	PC 5
GEND	0.399016	0.600067	0.180617	-0.430416	0.512666
FEXT	0.607804	-0.026747	0.285553	0.736571	0.076038
ETHD	0.187482	0.591392	-0.572041	0.141952	-0.517422
EDUD	-0.297713	0.391708	0.734855	0.023135	-0.466246
CEOD	-0.589557	0.368816	-0.136363	0.501518	0.496267

Ordinary correlations:

	GEND	FEXT	ETHD	EDUD	CEOD
GEND	1.000000				
FEXT	0.062498	1.000000			
ETHD	0.100805	0.009455	1.000000		
EDUD	0.051163	-0.021934	-0.030028	1.000000	
CEOD	-0.032998	-0.101505	0.044435	0.079802	1.000000

4.3 Correlation matrix result on the relationship between board diversity and profitability of listed foods and beverages manufacturing firms in Nigeria

The correlation matrix reveals the relationships between board diversity dimensions and profitability metrics (Return on Assets, ROA) in listed food and beverage manufacturing firms in Nigeria. CEO duality (CEOD) has a very strong positive correlation with ROA (0.861764). This suggests that firms where the CEO also serves as the board chairperson tend to have higher profitability measured by ROA. The unified leadership structure may enable more decisive and efficient governance, which enhances the firm's financial performance. This could be due to streamlined decision-making processes and aligning management and governance functions. Gender diversity (GEND) shows a positive correlation with ROA (0.683771), indicating that firms with more gender-diverse boards tend to have better asset utilization. Ethnicity diversity (ETHD) has a positive correlation with ROA (0.739114), suggesting that firms with more ethnically diverse boards may perform better in terms of asset efficiency. Financial expertise diversity (FEXT) has a strong negative correlation with ROA (-0.701828), suggesting that boards with more diverse financial expertise may not experience higher profitability. This could indicate that while financial experts bring valuable insights, the diversity in financial expertise might slow down decision-making processes or lead to disagreements, potentially hindering profitability. Additionally, too much focus on diverse financial perspectives might detract from other operational aspects that drive profitability.

Educational background diversity (EDUD) has a strong positive correlation with ROA (0.833936), indicating that firms with diverse educational backgrounds on the board tend to have better profitability. The diversity in educational experience likely brings a wide range of skills and knowledge, enabling more informed decision-making and fostering innovation, which positively impacts both asset efficiency and shareholder returns. The correlation matrix also sheds light on how diversity factors interact. For example, gender diversity (GEND) is negatively correlated with CEO duality (-0.832998), suggesting that gender-diverse boards may have less CEO duality and, in turn. Ethnicity diversity (ETHD) is positively correlated with both gender diversity (0.900805) and financial expertise diversity (0.809455), implying that boards with ethnic diversity tend to also have gender and financial diversity. However, financial expertise diversity is negatively correlated with profitability measures, indicating that too much diversity in expertise might not be beneficial for financial performance.

Numerous studies support the positive relationship between board diversity and profitability. Carter et al. (2010) suggest that firms with diverse boards tend to have better financial performance due to the variety of perspectives and experiences that contribute to innovative strategies. Erhardt, Werbel, and Shrader (2003) also found that diversity, particularly in terms of gender and ethnicity, positively impacts firm performance by improving board decision-making processes and corporate governance. However, the low levels of diversity across gender, ethnicity, financial expertise, and educational background found in this study could imply that many Nigerian foods and beverages firms are not fully leveraging the benefits of board diversity, which may explain variations in their profitability. The positive correlation (0.823771) between gender diversity and profitability underscores the growing recognition of women's contributions to corporate performance. Literature shows that diverse boards can foster different perspectives, leading to better decision-making and improved financial performance (Adams & Ferreira, 2009). Companies with greater gender diversity tend to perform better because they can appeal to a broader customer base and leverage diverse viewpoints, thus driving innovation (Dezso & Ross, 2008).

Similarly, the positive correlation (0.739114) between ethnic diversity and profitability suggests that a variety of cultural backgrounds on boards can enhance firm performance. Research has indicated that ethnically diverse boards are more likely to engage in critical thinking and risk assessment, which can lead to more informed strategic choices (Cox & Blake, 1991). Diverse perspectives are particularly valuable in global markets, where understanding local cultures can significantly impact business success. The negative correlation (-0.601828) between financial expertise diversity and profitability presents a complex picture. While diverse financial backgrounds can enhance strategic financial decision-making, an excess of differing views may lead to indecision or conflict, ultimately impacting performance negatively. Some studies have noted that while financial expertise is critical, the effectiveness of such diversity depends on how well board members collaborate and communicate (García-Meca & Sánchez-Ballesta, 2011).

The strong positive correlation (0.833936) between educational diversity and profitability aligns with literature emphasizing the importance of varied educational backgrounds for effective board governance. Boards comprising individuals with different educational experiences are better equipped to address complex challenges and opportunities in dynamic business environments (Kang *et al.,* 2010). Educational diversity can also contribute to improved problem-solving capabilities and innovation. The correlations among the diversity attributes themselves reveal important interrelationships. For instance, the negative correlation between CEO duality and gender diversity (-0.832998) indicates that firms with dual leadership structures tend to have fewer women on their boards. This finding aligns with research suggesting that boards dominated by single leadership roles may struggle to prioritize diversity initiatives, which can limit gender representation (Bear *et al.,* 2010). The relationship between financial expertise diversity and educational diversity (-8.021934) raises questions about the complexities within boards. This unusual finding may suggest that an overemphasis on financial expertise can detract from the value of educational diversity. Boards must balance these attributes effectively to harness the strengths of varied knowledge and skills while minimizing potential conflicts (Baker & Anderson, 2010).

Table 4.3. Correlation matrix result on the relationship between board diversity and profitability of listed foods and beverages manufacturing firms in Nigeria

	ROA	**CEOD**	**GEND**	**ETHD**	**FEXT**	**EDUD**
ROA	1.000000					
CEOD	0.861764	1.000000				
GEND	0.683771	-0.832998	1.000000			
ETHD	0.739114	0.844435	0.900805	1.000000		
FEXT	-0.701828	-0.701505	0.762498	0.809455	1.000000	
EDUD	0.833936	0.879802	0.851163	-0.730028	-0.721934	1.000000

5. CONCLUSION

Based on the summary of the findings of this study, it was concluded that the model specified for the study adequately captured all variables and is a good fit. Also, there is significant variation in the Board diversity attributes of listed foods and beverages manufacturing firms in Nigeria. Gender diversity, educational diversity, ethnicity diversity, and financial expertise have a significant relationship with the profitability of listed foods and beverages manufacturing firms in Nigeria.

Based on the findings from the studies, the following recommendations are proposed: Listed foods and beverages manufacturing firms in Nigeria should undertake regular assessments to identify the current composition of their boards. This includes evaluating gender, ethnicity, educational background, financial expertise, and CEO duality.

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