

Research Article

Board Structure and Performance Outcomes: Evidence from Listed Manufacturing Firms in Nigeria

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Abstract

The dynamism of today's business environment has placed an increasing significance on corporate governance in firms around the globe. Owing to inconclusive results of prior studies on the relationship between board structure and financial performance in the context of Nigeria listed manufacturing firms, it is this gap that this study aimed to achieve by investigating the effect of board structure on financial performance in listed manufacturing firms in Nigeria. The study adopted an ex-post facto research design using panel data from the annual financial reports of 6 listed manufacturing firms over a period of 6 years. Eviews version 12 was utilized to analyze the data collected for descriptive statistics and Panel least square regression analysis was employed to test hypotheses for this study. The findings from the analysis revealed a coefficient and P-value of 0.008 and 0.53 respectively (Board size) and -0.086 and 0.0008 (board gender diversity) based on the fixed effect model and significance level of 5% (0.05). Hence, it indicates that the impact of board size on financial performance (ROA) is direct, insignificant while the impact of board gender diversity on financial performance (ROA) is negative, significant. It is, therefore, recommended that future researches should consider the impact of other controlling factor that could influence the relationship between board structure and financial performance, for the possibility of enhancing corporate performance.

Keywords

Board Structure, Board Size, Board Gender Diversity, Financial Performance, Return on Asset

1. Introduction

In today's ever changing business landscape, corporate governance has become a high profile issues all around the globe, given its potential impact on an organizational reputation, business continuity and its culture. The central role the board members play while carrying out their responsibilities poses as a critical aspect of any organization's long time health and survival. A strong governance practices in any organization can be considered an asset to the firm, for its propensity to add huge value to its market, reassures shareholders and stakeholders and improves a nation's economy [18].

The manufacturing industry represents a significant sector of a nation's economy. Hence, it is one sector that should be given all the attention it deserves for growth and development in any country. Furtherance, focusing and creating a strong manufacturing sector has seen many countries develop into major players in the global economy [28]. The 19th and 20th century, saw Europe and some Asian countries respectively transform the fortune of their economy by developing the foundation of a strong manufacturing industry. China has a Gross Domestic Product of 19.23 trillion dollars,

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Received: 1 October 2025; **Accepted:** 17 October 2025; **Published:** 28 November 2025



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making 28.7% of the global manufacturing output, becoming the manufacturing hub of the world and currently has the second largest economy in the world. Likewise, India is now the fourth largest economy in the world with a Gross Domestic Product of 4.19 trillion dollars, owning 2.91% of global manufacturing output in 2024 [22].

In spite of the above, the manufacturing industry in Nigeria is faced with a myriad of challenges, from the harsh economic crisis that has plague the nation in recent times which has brought the manufacturing sector face to face with the turbulence of its business environment to banking reforms that has increase the cost of borrowing [19]. In July, 2024, the Central Bank of Nigeria increased the MPR to 24.75% adding to the financial burden of the manufacturing sector. Also, the over dependence of the manufacturing sector on raw materials from foreign countries and the high cost of sourcing foreign currency are some of the major factors that have pushed the country's inflation rate to an 18-year high of 28 percent in the first quarter of 2024 and now 20.12 percent in August, 2025 [16]. Also, among the several challenges threatening the viability of the manufacturing industry in Nigeria are the nation's over dependence on oil for income, poor infrastructure, shortage of skilled labour, access to funding, lack of adequate financial resources, and lack of proper planning and management [2].

Board structure plays a major role in the corporate governance practice of firms and as a result, a sound corporate governance system is considered a crucial aspect of the firm, in particular to protect the interest of the shareholders and in making critical, informed decisions for the firm that ascertains its survival in the present business environment [15]. Hence, with such responsibility, a keen interest in the appointment of qualified, highly educated and well experienced directors cannot be overemphasized. Central to this study is the concept of board size as a key dimension of board structure. It is characterized as the whole sum number of director on the board of an organization responsible for influencing decision making in the company [32]. The affiliation between the size of the board of directors and the success of the corporate is essential in corporate governance [43]. Another dimension under scrutiny is the gender diversity of a board, which encapsulates the existence of women as directors on the board of a company. The existence of women directors on the board is a subject that is receiving a lot of attention lately, hence its selection for this study.

Currently, the argument on the poor financial performance of the manufacturing sector are attributed to feeble corporate governance in the sector, despite several regulatory interventions to curb these challenges [17] and a review of extant literatures on board structure and performance of manufacturing consumer firms specifically in Nigeria, reveals very few studies in this domain, and where these studies exist, they lack the contemporary empirical research establishing the inter-connectivity between board structure and performance in Nigeria manufacturing industry, hence a major factor that un-

derpins the critical importance and need for this study to bridge the gap.

2. Literature Review

2.1. Concept of Board Structure and Financial Performance

The concept of board structure derived from the corporate governance, is viewed as a general term and as such, has no definite definition. Board structure refers to attributes of a firm's board that are responsible for the entire governance of the firm. Hence, the board is majorly liable for the successful continuity of the corporation. The main function of the board is to govern the firm [12, 37] described board structure to be the size, independence, CEO duality, gender diversity, and meeting frequency of the board of an organization. According to Roffia et al., (2022), board characteristics refers to those attributes of a corporate board of directors that can influence its effectiveness and the overall performance of the company [35]. Thus, the composition of the board of directors is linked to corporate performance and issues around the board independence, the board size, diversity of board members and the number of meetings held, have the ability of stirring a company's success.

Board size, refers to the number of members on the board that makes up the board size [13, 23] defined board size as to the total number of directors that can dictate the corporate governance practices of a firm and upshot its performance. In furtherance, selecting the appropriate number of members on a board is a prerequisite for a firm to operate effectively and enhance performance [8]. Base on the two perspectives on board size postulated by Agency theory and Resource Dependency Theory, there has been serious debate on what number of directors is suitable to constitute a board for maximum performance. Some scholars, [10, 32] are for a smaller board, saying a smaller size of board could be more active than larger board. In addition, suggesting that a small board size will be more effective in monitoring and as the board become larger interpersonal communication may be loss [20]. On the other hand, other scholars have also suggested that larger board size may be much needed in firms on the bases of an increase in advice to the CEO, scrutiny, and increase network for financial gains [39].

On Board gender diversity, its definitions has span from the existence of a female member of board of directors to the density or the fraction of women represented on the board. [38] supports the definition that gender means the femininity or masculinity of a person. However, most write ups on gender diversity collegiate the construct to the existence, delegacy and proportion of women on the board of a corporation. Work place gender diversity simply means the consideration and equal treatment of both male and female employees in all organization's levels [9]. Board gender diversity is a critical

factor of corporate governance and represents the presence of female directors on the board of directors of corporations [44]. Women directors and women in general are believed to be more risk averse and puts all into consideration before making a decision [33]. As a result, this study defines board gender diversity as the fraction of women existence as directors on the board of the listed manufacturing consumer firms in a given financial year.

There are several definitions of financial performance influence by the perspective of various authors which could be represented as monetary or operational in makeup [9]. Financial performance is considered as the product of a firm's decisions and management over a period of time. This term is also used as a general measure of the firm's financial health over a given period of time, and can be used for comparison across industries [33]. Using accounting ratios such as Return on Assets (ROA), Return on Equity (R. O. E) and economic models such as Maris co-efficient and Tobin's Q, financial performance can be ascertain. This research work employs return on assets (ROA) as the accounting ratio to determine the financial performance of selected listed manufacturing firms. To compute ROA, the net income of the firm is divided by its total asset in value, resulting to either a success in converting its asset into revenue (positive) or not successful (negative). The conceptual framework below, describes the relationship among the variables proposed to be used for the study (the independent and the dependent).

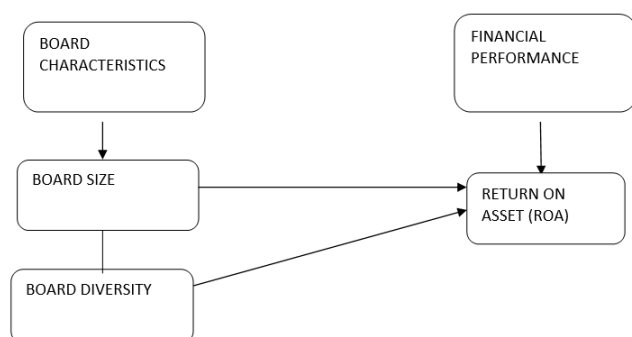


Figure 1. Nexus between Board Structure and financial performance.
Source: Author's Conceptual Framework (2025).

2.2. Theoretical Review

Corporate governance is often characterized by these theories namely; Resource dependence theory, Agency theory, Stakeholder's theory and Stewardship theory. Agency theory concept dives into the vital relationships between the principals and their relative agent [26]. The theory assumes the duo, that is the principal and the agent with different objectives, both want to maximize value and that because of irregularities in information, the agent will not always carry out its operations in the best interests of the principal [5]. The agency theory explains that the board of directors is the primary in-

ternal control mechanism [5]. In stewardship theory, executives of a company are stewards of the owners, and both share same goals [14]. The theory depicts managers as stewards, who will act responsibly towards the asset and resources of the firm. Stewardship theorists assume that where a choice is given between self interest attitude and pro-organizational behavior, a steward will place higher value on collaboration than otherwise [24]. Resource dependence theory argues that a core function of the board is to provide resources and the executives are saddled with the responsibility to achieve the organizational goals [33]. In conclusion, stakeholder theory explains the interlaced relationship between the firm and its stakeholders such as its customer suppliers, investors amongst others. The theory argues that importance should be created for all those that have a stake in the business inclusive of its shareholders. In this context, the board has the responsibility in ensuring that all stakeholders interest is protected.

2.3. Theoretical Framework

For this study, the stakeholders theory was adopted as the theoretical insight through which the relationship between board structure and financial performance will be investigated. This is because today's global business environment is one for carrying all stakeholders along for the achievement of business success. The theory has been criticized for ambiguity in its definitions and mode of measurement, also, the likely hood to place some stakeholders over others. However, in spite of these criticisms and for the purposes of this study, this vagueness was taken into consideration as stakeholders are identified in the context of listed Nigerian food and beverage sector in the manufacturing industry. The board of listed food and beverage companies, leveraging on their strength are best able to design a standard scale of preference in the terms of their stakeholder, that is most consistent with internal factors and effectively protect the interest of various stakeholders without resulting to tradeoffs to improve on its financial performance. After all, successful companies today, are those that get it right in aligning the interest of their stakeholders and the business goals of the company.

2.4. Empirical Review

In Nigeria, a study on board diversity and the performance of a firm where panel data evidence collected from 12 selected commercial banks was conducted by [33]. The study adopted an ex post facto research design, where dimensions used in measuring firm's performance include Return on Assets (ROA) and Return on Equity (ROE) and the independent variables board diversity was ascertained using board gender diversity and board independence. The study investigated 12 banks, listed with the Nigerian stock exchange and made use of secondary data from sources such as databases and the annual reports of selected banks over a period ranging from 2015- 2019. The results of the study showed that board

gender diversity is significantly, positive related to both ROA and ROE in the context of the banks under investigation. Conversely, the findings of the study also indicated that board independence has a significantly, negative impact on both ROA and ROE of banks under review.

A study on the effect of board characteristics on the financial performance of non-financial firms listed at the NSE was conducted by [21] in Nairobi Kenya. The study employed the quantitative research, by selecting randomly 26 non-financial companies quoted on the Nairobi Security Exchange, correlation and regression analysis was used to analyze historical financial information obtained from companies' financial statements. Return on Equity (ROE) was used as a dimension for performance of the non financial firms under review, while board size, board independence and board gender diversity were dimensions picked to measure the independent variable board characteristics. Regression analysis was used to analyze the relationship between variables. Pre-analytical were conducted before the Pearson's correlation test. The findings revealed that the size of the board and its independence had statistically insignificant effects on the performance of non-financial firms in Nairobi, Kenya, while board gender diversity had a significant effect on return on asset which was used as a measure for financial performance of non-financial firms listed on the NSE.

Contrarily, [31] examined the impact of board characteristics on profitability of listed service firms in Nigeria. The study's proxies for the independent variable (board characteristics) includes board size, board composition and board gender. The study adopted ex-post-facto design using the secondary data collected from annual accounts and reports of selected 20 listed service firms on Nigerian Stock Exchange (NSE) over a period of ten years ranging from 2011 to 2020. The ordinary least square panel regression analysis was used to analyze data collected over applying Generalized Method of Moment (GMM) analysis. The study found that board characteristics have strong effects on the listed service firms' profitability. The board size and board composition both have a significant positive effects on the companies' profitability while board gender has insignificant negative effect on the profitability of the selected companies' profitability. The study recommended that the firms should have quite a sizeable board or at least maintain the minimum requirement mandated by the Nigeria Securities and Exchange Commission corporate governance Code.

Covering the Health care sector, a study to examine the effect of board characteristics on financial performance of listed healthcare firms in Nigeria, was carried out by Abu and Bamidele (2022) [1]. The study's secondary data was obtained over a period of 7 years, ranging from 2015 – 2021, from published annual reports of 5 selected listed health care firms. Data collected were subjected to pre-test analysis using STRATA 13, with the aim of reducing errors associated with research. The results revealed that dimensions of board characteristics which are board size, board independence,

board gender diversity, and board meetings all revealed a negative, non-significant relationship with financial performance of the firm's performance. Also, in conclusion, the study recommend that the number of board and non – executive members should be raised. The board should have more knowledgeable and competent members vast in corporate governance and more female as board members.

This research work assessed the effects of board features on fiscal performance of 14 quoted banks in Nigeria. Conducted by [3], the study covered a period of five (5) years from 2018 to 2022. Proxies for measuring board characteristics were Board size, board independence, board gender, and board meetings and financial performance was measured using return on assets. Secondary information was extracted from the financial reports of the banks under investigation. Co-relational research design was employed and panel data regression analysis was used to analyze the data. The outcome from analysis revealed board meetings, board gender diversity and board independence show insignificant effects on financial performance. However, the study's outcome illustrates a constructive, consequential result of board size on financial performance. Furthermore, some recommendations were made that those banks with more than 9 board members should reduce board size in compliance with central bank regulation. In the context of board independence, banks should ensure that majority of directors are independent and non-executive. On board meetings, those banks that hold meetings less than four times in year should do so in compliance. The number of female board members less than 30% should be increase in banks with less in compliance with central bank regulation. Finally, the study also recommends that directors should not waste time and money on board meetings, board independence and board gender as they do not determine the financial performance of banks in Nigeria.

In a bid to juxtapose the consequence of board characteristics on the performance of quoted non-financial firms and quoted financial firms (commercial banks) in Ghana. [11] carried out a study. Panel regressions analysis was employed for the quoted banks on 63 observations. Generalized least square was used for data analysis. The study's findings revealed some similarities and differences on the impact of board characteristics on the performance of listed companies not in the financial sector and banks. The non-financial companies and the financial companies both had a significant, non – linear result on Tobin's q . In addition, the fraction of foreigners as board members revealed a positive and significant association with firm performance for both listed non-financial firms and the financial firms. For the assessment of board members with higher level of education on the performance of the firm, a negative, significant association was observed for both sector of firms under review. Disparities was observed while reviewing the role of board composition and board gender diversity on firm performance for both financial and non-financial companies.

Nainggolan et al. (2023) investigated the impact of board

characteristics on the risk-taking and performance on Islamic banks in Indonesian and Malaysian [30]. Panel data on board characteristics were obtained from 27 Islamic banks in Indonesia and Malaysia from the period 2006 to 2016. Generalized Least Square (GLS) regression and Generalised Method of Moments (GMM) was used to analyze the data obtained. The findings indicated that the Sharia Supervisory Boards (SSB) and Board of Commissioners (BoC) both actively contribute to the risk taking role of Islamic banks and their fiscal performance. Furthermore, the study's findings also included the presence of female directors in SSB and BoC have positive effect on performance, and their presence as Board of Commissioners reduces risk-taking. In addition, the existence of foreigners as members enhances performance of the banks and lessens the risk taking tendencies of the banks. In addition, Sharia supervisory board members with not just only Islamic knowledge but other expertise such as in finance, economics tend to know how best risk can be manage, while Board of Commissioners members with Islamic education know how to manage other risk types. Also, Sharia Supervisory Board and Board of Commissioner members with educational background in finance are likely to increase Islamic bank's performance. Finally, Sharia Supervisory Board and Board of Commissioner members that are older, are inclined towards increasing performance, and Sharia Supervisory Board that have busy schedules have the propensity to reduce risk-taking of Islamic banks.

To investigate the impact of corporate governance mechanisms on the profitability of listed companies, [4] carried out his study on 60 corporations within Saudi Stock Exchange in Saudi Arabia. The study's independent variables envelopes the size of the board of directors, frequency of board meetings, and the presence of risk management practices. The dependent variable corporate performance was measured by the return on assets (ROA). Data collected for the fiscal year 2021. Descriptive statistics was computed to provide a general idea of the variables under examination, after which the regression analysis was applied to explore the relationships between corporate governance mechanisms and firm performance, considering potential control variables such as company size and age. Outcome from the findings revealed that a board with many directors translates to a constructive impact on firms in the country. In addition, both an increased rate of board meetings and the realization of risk management practices exhibited affirmative effects on corporate performance. According to the author, the research is sure to add value by investigating the direct influence of the variables and risk management practices on the performance of SSE-listed companies. The study's novelty lies in its comprehensive examination of these specific corporate governance mechanisms and their correlation with return on assets.

Murti et al [29], in their study, examined the influence of intellectual capital factors and characteristic boards on the financial performance of insurance subsector companies in India. The study covered the period 2017 to 2022. Where

board characteristics was measured using board size, board diversity, and board compensation, intellectual capital was measured using capital employed, human capital and structural capital. Financial performance was measured by return on asset. The research type employed was a quantitative approach, where 12 insurance sub-sector firms in India were chosen and as a result, a total of 72 observations were obtained. Observations obtained were analyzed using panel data regression analysis. The study's finding states a direct influence of intellectual capital component on financial performance. On the other hand, the dimensions of board characteristics selected for this study was realized not to be factors that could improve the fiscal performance of insurance sub-sector firms. Contribution of physical capital, human capital, and structural capital are values that can be added to gain a competitive advantage capable of making a remarkable difference in this sector.

Le et al., (2024) investigated the impact of corporate social responsibility disclosure and board characteristics on firm performance in Vietnam [27]. The study's sample was 498 listed firms from Vietnamese stock exchange. Dimension employed to measure firm performance was return on assets (ROA), earnings per share (EPS), and Tobin's Q (TQ). Period under investigation was 2015 to 2019. To analyze data obtained, various statistical methods was employed, including pooled ordinary least squares (OLS), fixed effects model (FEM), random effects model (REM), and generalised least squares (GLS) estimation. Findings for the study revealed significant and positive association between corporate social responsibility disclosure and firm performance when evaluated by TQ, whereas a negative relationship is observed when measured by ROA and EPS. In addition, the impact of board characteristics on firm performance is partially significant when firm performance is assessed using all three variables i.e ROA, EPS, and TQ.

This study conducted by [25] in Pakistan, to examine how chief executive officer (CEO) reward can be affected by the agency premise, utilized dimensions of board characteristics such as board autonomy, board gender diversification and audit quality i.e if they possess a link between the corporation's performance and CEOs reward. The data for the study covers a period of five years ranging from 2013 to 2017, gathered from 100 non-financial firms quoted on Pakistani stock exchange. Results from the analysis of data obtained illustrated that firm performance is constructively associated with CEO reward which is quite similar to the agency theory's "pay-performance correlation plan". The outcome exhibits that the autonomy of directors on the board inconsequential affects the arrangement that exist between firm performance and CEO compensation in Pakistan. Similarly, board gender diversity also revealed an inconsequential cause on the position between firm performance and CEO compensation. In contrast, audit quality constructively affects the arrangement among firm performance and CEO reward, since a more comprehensive quality audit portrays a realistic view of the

organization. Findings on financial leverage and firm age have no control on the CEOs compensation but firm size has constructive cause on CEOs reward.

Agnese et al [7] examined the relationship between relevant board characteristics and the corporate social performance represented by the Social pillar of ESG scores. 50 biggest and most traded companies in the Eurozone were taken as samples for the study, covering a period from 2015 to 2022. Empirical method adopted for the study was the generalised method of moments (GMM) system version of the Arellano-Bond estimator. Findings for the study showed that more gender-diverse and independent boards, as well as the presence of a CSR sustainability committee, enhance corporate social performance. These results are largely confirmed by investigating the four sub-pillars of Social score, i.e. Human Rights, Workforce, Product Responsibility, and Community. To our knowledge, this paper is the first to highlight how high corporate governance standards positively affect the Social pillar in the Euro Stoxx 50 index context. Our findings provide important implications for several stakeholders, including regulators and policymakers. Increasing attention should be paid to board characteristics to improve corporate social performance.

2.5. Literature Gap

There are several inconclusive arguments surrounding the role board structure plays in financial performance across industry types. The review of several empirical studies carried out by various authors on the effect of board attributes on financial performance has presented this gap. Vast number of empirical studies reviewed, examined the relationship between board characteristics and financial performance underpinned the agency theory as the theoretical insight to their study ([9, 24, 32]). As a result, this study intends to fill the gap by adopting the stakeholders theory as it's theoretical insight. This is because the world today is one for protecting the interest of all stakeholders with the focus of achieving organizational growth and success. Also, manufacturing firms operate within a multifaceted environment that involve numerous stakeholders whose interest can have a direct impact on the firm's performance, such as employees, suppliers,

customers, the community they exist in, regulators and the environment, extending their attention beyond the shareholder–manager relationship.

3. Methodology

3.1. Research Design and Sample Size

In this study, the ex post facto research design was employed. This is because the data required for the study's analysis are base on historic information obtained from the yearly financial reports of selected companies. The study's population is 15 listed food and beverage companies on the Nigeria Stock Exchange and the study's sample comprises of 6 food and beverage manufacturing companies listed on the Nigerian Stock Exchange as at December 31, 2024. Convenience sampling method was used to obtain the sample for this study due to availability of complete information needed for the period under review. The important cross-sectional data for this study was obtained from annual financial reports of the 6 food and beverage companies over a period of 2019 to 2024, representing the source for the secondary data required. Quantitative information was acquired for this inquiry. Using descriptive and inferential statistical techniques, panel data that was obtained from the companies' annual financial reports was analyzed. Panel least square regression was used to analyze the significance of the independent variable (board size and board gender diversity) on the dependent variable (return on asset).

3.2. Model Specification

The model used in this study was adapted from the work of [33] as represented in [1] below. The panel multiple regression model to consider in this study will take board size and board diversity as the explanatory variable due to inconclusive arguments on the impact of these dimensions on financial performance (return on asset), representing the dependent variable.

$$Y_{\text{performance}} = \beta_0 + \beta_1 \text{Gender}_{it} + \beta_2 \text{Independence}_{it} + \beta_3 \text{board_Size}_{it} + \beta_4 \text{Age}_{it} + \beta_5 \text{Firm_Size}_{it} + \varepsilon_t \quad (1)$$

$$Y_{\text{Performance (ROA)}} = \beta_0 + \beta_1 X_{\text{Board Size}_{i,t}} + \beta_2 X_{\text{Board Diversity}_{i,t}} + \varepsilon \quad (2)$$

Where;

it = signifies panel of company i at time t

Y = signifies financial performance variables used (ROA)

β_0 = signifies constant

β_1 = signifies coefficients

X = signifies explanatory variables, board size, board gender diversity

εt = signifies error term

4. Data Presentation, Analysis and Interpretation

The analytical tool adopted for this study was the panel least square regression analysis. Eview version 12.0 software was used as the statistical tool for data analysis. This tech-

nique was employed to examine the significance of a board director size, board gender diversity on financial performance of selected quoted manufacturing firms in Nigeria. Panel data obtained from the annual report of selected manufacturing firms was loaded into Eview 12.0 and checked for consistency. Preliminary tests such as unit root test and descriptive statistics test were consummated to validate the data and select an adequate model for the study. In addition, the preliminary estimation tests were also carried out to help identify impending issues or obscurity that may distraught the results of the analysis.

4.1. Descriptive Statistics

Descriptive statistics of return on asset, board size and board gender diversity of six (6) listed manufacturing firms for the period of 2019 –2024 is presented in Table 1.

Table 1. Descriptive Statistics for ROA Model.

	ROA	BS	BGD
Mean	0.017455	10.36667	2.933333
Median	0.019673	10.00000	3.000000
Maximum	0.236242	15.00000	6.000000
Minimum	-0.300952	6.000000	1.000000
Std. Dev.	0.104257	2.399473	1.257620
Skewness	-0.767212	0.212892	0.338231
Kurtosis	4.581848	2.217652	2.422695
Jarque-Bera	6.070871	0.991701	0.988604
Probability	0.048054	0.609053	0.609997
Sum	0.523640	311.0000	88.00000
Sum Sq. Dev.	0.315214	166.9667	45.86667
Observations	30	30	30

Source: Eviews computation (2025)

The descriptive statistics provide preliminary insights into the distributional properties of the study variables return on assets (ROA), board size (BS), and board gender diversity (BGD) over 30 observations obtained. The mean ROA is 0.0175 (1.75%), with a median of 0.0197, indicating that on average, firms generated modest positive returns relative to their total assets. However, the minimum value of -0.301 (-30.1%) suggests that some manufacturing firms documented substantial losses, while the maximum of 0.236 (23.6%) points to high profitability in others. The relatively high

standard deviation (0.1043) reflects substantial variation in profitability across manufacturing firms. The negative skewness -0.767 shows that the distribution is left-skewed, with more extreme negative values (losses) than positive outliers. The kurtosis 4.58, which exceeds the normal value of 3, suggests the presence of heavy tails (leptokurtic distribution), indicating higher than normal risk of extreme outcomes. The Jarque-Bera test ($p = 0.048 < 0.05$) rejects the null hypothesis of normality, confirming that ROA is not normally distributed, which is consistent with the presence of volatility and extreme profitability outcomes in the firms under investigation.

The mean board size is approximately 10 directors, with a range from 6 to 15. This suggests that banks tend to maintain boards that align with international corporate governance guidelines, which often recommend between 7 and 15 members. The standard deviation 2.40 reveals moderate variation across manufacturing firms, reflecting different governance preferences and regulatory compliance levels. An asymmetry of data distribution 0.213 is close to zero, indicating near-symmetry, while the kurtosis 2.22 suggests a slightly flatter distribution than normal (platykurtic). The Jarque-Bera probability (0.609 > 0.05) indicates that board size is normally distributed, which is statistically advantageous for regression analysis. The average number of women on boards is approximately 2.93 (about 3 members), with a minimum of 1 and maximum of 6. This suggests some degree of gender inclusion, though disparities remain across firms. The standard deviation 1.26 shows moderate variability in gender representation across the sample. The distribution is positively skewed (0.338), suggesting more manufacturing firms have fewer female directors, while only a few have relatively higher female representation. The kurtosis (2.42) indicates a slightly flatter distribution than the normal curve. The Jarque-Bera probability (0.610 > 0.05) shows no evidence of non-normality, meaning BGD is normally distributed.

4.2. Pre-Test Analysis - Unit Root Test

So much has been said on financial data and specific industry been described by stochastic trend, the statistical activities of the estimator is influence by such inclination if left unattended to. As a result, in examining the relationship between board characteristics and financial performance of listed manufacturing firms, this study advanced to examine the stochastic features of the series considered in the model by analyzing their order of integration on the basis of a series of unit root tests. At a 5% level of significance, the unit root tests reveal that board size (BS) and board gender diversity are stationary at level, that is, integrated of order one or 1(0) while return on asset (ROA) was inactive at first difference, that is incorporated of order one or 1(1).

Table 2. Showing the Unit Root Test.

Variables	Level	First Difference	Order of Integration
	LEVIN, LIN & CHU	LEVIN, LIN & CHU	
ROA	0.47414	-5.06419	1(1)
BS	-3.63672	-4.77652	1(0)
BGD	-3.61285	-3.75764	1(0)

Source: Eviews Computation, (2025)

4.3. Regression Analysis

Table 3, presents the result of the regression analysis based on pooled, fixed effects and random effects models. The

outcome provides insights into the relationship between board characteristics board size (BS) and board gender diversity (BGD) and the financial performance of manufacturing firms as measured by return on assets (ROA).

Table 3. Results of Static Panel Regression Analysis for ROA Model.

Variables	Pooled OLS			Fixed Effects Model			Random Effects Model		
	Coef.	Std. Error	P-Value	Coef.	Std. Error	P-Value	Coef.	Std. Error	P-Value
C	0.058431	0.083639	0.4897	0.164922	0.129617	0.2137	0.058431	0.084298	0.4931
BS	0.012649	0.009221	0.1794	0.008576	0.013508	0.5307	0.012649	0.009294	0.1827
BGD	-0.065572	0.016112	0.0003	-0.086088	0.022914	0.0008	-0.06557	0.016239	0.0003
R-Square	0.343488			0.434139			0.343488		
Adj R-Square	0.303699			0.292674			0.303699		
Prob (F-Stat)	0.000965			0.015767			0.000965		
Durbin Watson	1.183367			1.592354			1.183367		

Source: Eviews Computation, (2025)

The outcome on board size from the pooled OLS model reveals a positive coefficient of 0.012 but insignificant at p-value = 0.4897. In both fixed effects model and random effects model the association remains positive at 0.1649 and 0.0584 respectively and the relationship remained insignificant in both models p = 0.5307 (fixed effect model) and p = 0.1827 (random effect model). The positive coefficients in all models suggest that larger boards are associated with a slight increase in the dependent variable. However, the insignificant association evidence suggests that board size does not exert a strong or consistent influence on ROA in the sampled manufacturing firms. The finding could indicate that both smaller

and larger boards may offer advantages that cancel each other out, while larger boards may propose diverse expertise and resources, they may also suffer from coordination problems and slower decision-making, thereby diluting their effect on profitability.

Board Gender Diversity (BGD) shows a negative and statistically significant effect -0.0655 and p-value = 0.0003 under the ordinary least square model. This implies that firms with higher female representation on boards tend to report lower ROA, holding other factors constant. Likewise, the fixed effects and random effects model reveals negative coefficient -0.0860 and -0.0655 and significant p-values = 0.022

and 0.0003 respectively. The significant negative results across estimators could reflect the short period adjustment costs of integrating gender diversity into board decision making or symbolize appointments that do not fully leverage female directors' expertise. Also, the negative direction of the relationship might not necessarily imply causation; it may be as a result of a contextual or the structural differences amongst firms.

Fixed effect model demonstrated *R-Square value of 0.43 (43%)*. This suggests improves the explanatory power of the model, including firm specific effects i.e much of the variation in ROA is explained by firm precise characteristics such as size, age, or industry specialization, rather than governance factors alone. *Prob (F-statistic)* indicates that all models have statistically significant F-statistics ($p < 0.05$), indicating that the models, as a whole, are jointly significant, which means, the independent variables together have a statistically significant effect on the dependent variable. The *Durbin-Watson statistics* ranges from 1.18 to 1.59, suggesting mild positive autocorrelation but within acceptable limits.

4.4. Hausman's Specification

In order to determine the appropriate model that best suit the discussion of the analysis and the purpose of valid inference, it is compulsory to conduct a Hausman specification test between fixed effect model or the random effect model (Hausman's 1978) specification test was conducted. Therefore Table 4 presents the result of Hausman's specification test:

Table 4. Hausman's Specification Tests on Panel Model Result.

HAUSMAN TEST

Correlated Random Effect - HAUSMAN TEST

Equation: EQ01

Test cross-section and period random effect

Test Summary	Chi-Sq Statistics	Chi-Sq.d. f	Prob.
Cross-section random	1.883125	2	0.39
Period random	0.499088	2	0.7792
Cross-section and period random	2.784185	2	0.2486

Source: Eviews Computation, (2025)

The Hausman test was conducted to determine the appropriate model specification between the Fixed Effects Model and the Random Effects Model. The test result presented an outcome of the Chi-Sq. statistics and the p-value of the cross-section random indicates 1.88312 and 0.3900 respectively. The null hypothesis of the test is that the preferred model is random effects, while the alternative hypothesis supports the use of fixed effects i.e., the individual effects are correlated with the regressors.

4.5. Post Estimation Test Results-Coefficient Diagnostic Test Result– Histogram– Normality Test

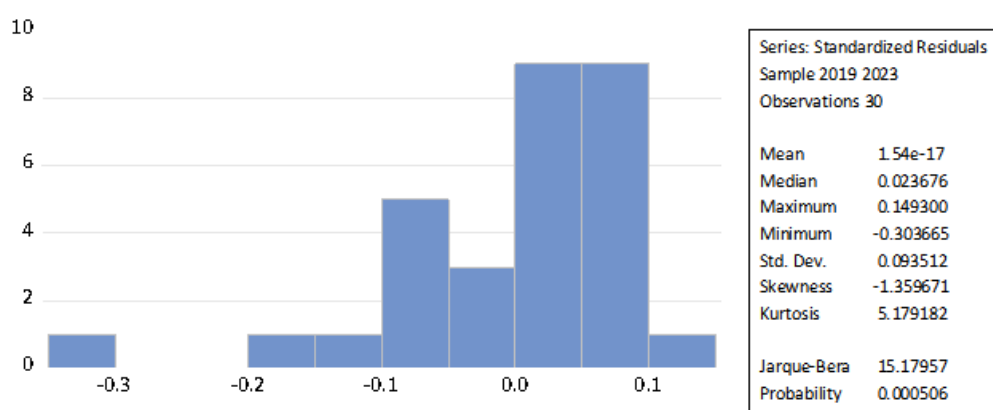


Figure 2. Residual Diagnostics Test Result – Histogram – Normality Test.

The histogram displays the distribution of standardized residuals from the regression analysis. Ideally, for regression assumptions to hold, residuals should approximate a normal distribution with mean zero and constant variance. Mean

1.54e-17 and median 0.0237, both values are close to zero, suggesting residuals are centered appropriately. The standard deviation 0.0935, indicates a relatively tight spread of residuals around the mean. The negative skewness suggests the

distribution is moderately left-skewed, implying that there are more extreme residuals on the lower end compared to the higher end. Higher than the normal benchmark of 3, the kurtosis suggest, the distribution is leptokurtic i.e. has heavier tails and a sharper peak than a normal distribution, in other words, has kurtosis greater than three. The p-value is below 0.05, this means the null hypothesis of normality is rejected, confirming that the residuals are not normally distributed.

5. Discussion of Findings

The findings provide nuanced insights into the determinants of firm performance in the Nigerian manufacturing sector. The analysis revealed that governance variables such as board size (BS) and board gender diversity (BGD) exert mixed effects on return on assets (ROA), with some models indicating insignificant or even negative associations. On board size, the result of this study aligns with prior studies conducted by Abu and Bamidele (2022) and Gatehi and Nasieku (2022), suggesting, in the Nigerian manufacturing context, increasing board size or enhancing gender representation does not automatically translate into improved profitability [1, 21]. Rather, the effectiveness of these governance mechanisms depends on how boards mobilize their collective expertise, networks, and oversight capacity to align with the firm's operational realities. Also, it can also be explained as the existence of other factors with the ability of controlling the impact board size on financial performance and it might have to do so by affecting these factors which in turn affect return on asset (ROA).

The findings on board gender diversity, aligns with recent mixed findings in governance literature, while some studies [6, 40, 41] reports increase costs associated with increased monitoring by diverse boards and very weak association between board gender diversity and performance, others studies [42]; [34] highlight long-term benefits such as innovation and better stakeholder engagement. From the perspective of stakeholder theory, these results carry important implications. Stakeholder theory posits that firms should create value not only for shareholders but also for a broader set of stakeholders, including employees, suppliers, customers, regulators, and communities [36]. Contained by Nigerian manufacturing firms, the observed weak influence of board structure on ROA may reflect a governance environment in which boards prioritize compliance or symbolic legitimacy over substantive engagement with stakeholder interests. For instance, appointing more directors or increasing female representation on boards may satisfy external expectations of inclusivity and accountability, but unless these directors are empowered to shape risk management, resource allocation, and strategic decision-making, their presence may not materially enhance financial outcomes.

Overall, the study extends the stakeholder theory argument by showing that governance structures must be evaluated not merely by their formal attributes for example board size or

gender diversity but by their functional capacity to safeguard diverse stakeholder interests in a volatile environment. Nigerian manufacturing firms, operating under systemic constraints, require boards that move beyond symbolic compliance and adopt proactive strategies to balance shareholder wealth maximization with broader stakeholder sustainability.

6. Managerial and Policy Implications

The findings of this study hold significant implications for managers, boards, and policymakers within the Nigerian manufacturing sector. First, the weak and sometimes negative effect of board size and board gender diversity on firm performance (ROA) implies that governance reforms should focus less on numerical board composition and more on the quality of board engagement. Boards must be equipped with industry-specific expertise and empowered to translate stakeholder needs into strategic actions that enhance operational efficiency and long-term resilience. Second, the evidence of residual non-normality suggests that manufacturing firms are highly exposed to systemic shocks such as exchange rate fluctuations, infrastructure bottlenecks, and regulatory uncertainty. This underscores the need for stronger corporate risk management frameworks that integrate stakeholder concerns into firm-level strategies. For regulators, the results suggest that imposing governance prescriptions for example quotas or minimum board sizes without ensuring capacity building may yield only symbolic compliance rather than substantive performance improvements.

7. Future Research Directions

While this study advances understanding of governance-performance dynamics in the Nigerian manufacturing context, several gaps remain open for exploration. First, future research should employ longitudinal datasets to capture the dynamic role of boards over different economic cycles, including periods of macroeconomic shocks. Second, since stakeholder theory emphasizes the interconnectedness of diverse actors, future studies could extend the analysis by incorporating non-financial performance indicators, such as sustainability reporting, employee productivity, and supply-chain resilience, to provide a more holistic view of stakeholder value creation. Third, comparative studies across emerging economies could illuminate whether the observed patterns are unique to Nigeria's institutional environment or generalizable to other contexts. Finally, qualitative approaches, such as case studies or boardroom ethnographies, could provide deeper insights into how directors interpret and enact their responsibilities in practice, beyond what quantitative measures reveal.

8. Conclusion

This study examined the impact of board characteristics—specifically board size and board gender diversity on the financial performance of Nigerian manufacturing firms, measured by return on assets (ROA). The regression results demonstrated that these governance variables have limited or inconsistent explanatory power, with board size and gender diversity showing statistically weak or even negative associations with ROA in certain models. The findings suggest that in the Nigerian manufacturing context, governance mechanisms cannot be assessed solely on structural attributes but must be evaluated in terms of their functional contributions to stakeholder engagement and risk management.

The study concludes that manufacturing firms in Nigeria operate in a complex environment where governance reforms must balance shareholder wealth maximization with the broader interests of employees, regulators, suppliers, and communities. The persistence of residual non-normality highlights the structural vulnerabilities faced by the sector, further reinforcing the need for robust governance mechanisms that go beyond symbolic compliance. Overall, this research contributes to the ongoing debate on corporate governance and financial performance by demonstrating that valuable stakeholder engagement and contextualized governance practices are critical drivers of sustainable performance in emerging economies.

Abbreviations

BS	Board Size
BGD	Board Gender Diversity
CEO	Chief Executive Officer
EPS	Earnings Per Share
FEM	Fixed Effect Model
GLS	Generalised Least Square
OLS	Ordinary Least Square
ROA	Return On Asset
TQ	Tobin's Q

Conflicts of Interest

No conflict of interest.

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