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BOARD GENDER, BOARD FINANCIAL EXPERTISE AND LIQUIDITY OF MANUFACTURING FIRMS IN NIGERIA: MODERATED BY FIRM SIZE

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Abstract

This study analyzed the effect of board gender and board financial expertise on the liquidity of listed manufacturing firms in Nigeria, with a moderating role of firm size. A sample of 31 listed firms were selected for a period of 15 years from 2009 to 2023. Data were sourced secondarily from annual reports and accounts of listed manufacturing firms in Nigeria. The data gathered were analyzed using multiple regression technique and diagnostic tests were conducted in order to validate the data. This study found that board gender and board expertise has a negative significant effect on liquidity of listed manufacturing firms in Nigeria. The moderating role of firm size on both variables has a negative significant effect on liquidity. It concluded that board gender and board financial expertise has a negative significant effect on liquidity of listed manufacturing firms in Nigeria. Hence, no policy implication with relation to the Nigerian manufacturing firm's corporate boards.

Keywords: board gender, financial expertise, firm size, listed manufacturing firms, Nigeria

1. Introduction

A manufacturing company's financial well-being includes sustainability on a long-term basis, capacity to handle uncertainty, harness business or financial opportunities, and fulfill short-term obligations all depends on liquidity, which is a crucial component of financial management. Business entities usually use liquidity to evaluate the value of firms, given that adequate liquidity to meet the demands and smooth operations of a manufacturing firm usually signals a positively thriving firm, while inadequate liquidity could portend that there are possible problems faced by the firm (Omegbeoji & Onuora, 2025).

Additionally, an excess in the liquidity level is undesirable as it is disadvantageous to the firms; hence, the need for a liquidity level that is adequate. Furthermore, liquidity problems have been linked to the various economic challenges faced by the manufacturing sector in Nigeria. For example, many manufacturing companies like Procter and Gamble, Global Pharma, amongst others encountered different levels of liquidity constraint, which affected the smooth running of their firms subsequently resulting in their exiting the Nigerian market (Aluh et al., 2024). The possible role that the board could play during such challenging period to mitigate the impact of this dwindling liquidity position inspired this study.

BOARD GENDER, BOARD FINANCIAL EXPERTISE AND LIQUIDITY OF MANUFACTURING FIRMS IN NIGERIA: MODERATED BY FIRM SIZE

Some manufacturing firms in Nigeria, such as UTC Foods and GlaxoSmithKline Nigeria, have faced significant challenges, culminating in their extinction primarily due to liquidity issues (Anudu, 2022). This decline has resulted in a heightened dependence on imported goods, contributing to rising unemployment rates and subsequently, an increase in crime, fluctuations in foreign exchange rates, and a range of economic imbalances. Historically, Nigeria was recognized for its robust manufacturing sector, producing numerous goods for domestic consumption while locally sourcing a substantial portion of the materials required for production. This self-sufficiency allowed for favorable exchange rates for Nigerian citizens. However, the situation has deteriorated as manufacturing companies have struggled to maintain profitability, leading to considerable economic repercussions.

According to Omegboji and Onuora (2025), adequate liquidity is desirable, while excessive liquidity is also undesirable and may be the result of poor management of current assets. A weak liquidity situation endangers the company's solvency and makes it unable to meet its financial obligations. This calls for prompt action from management to address and resolve disparities in the company's liquidity position.

The role of board gender within corporate boardrooms has emerged as a topic of heightened interest, spurred by a global call for inclusivity and recognition of the manifold benefits diverse perspectives bring to decision-making processes. Although some studies propose that more women on board have no significant effect on the board with regards to liquidity, others argue that it has a significant effect on the liquidity of the firms and therefore require that more women be included on the board (Ummah & Yuliana, 2023; Awino, 2015). However, despite this call for inclusivity, some boards of manufacturing firms in Nigeria have women present on their board, while some are without women on their board.

Research on corporate governance has examined the financial expertise of board members since having members with financial experience may help the board to better comprehend liquidity and make more intelligent choices. Previous studies have indicated that boards with members who are financially aware do better with the finances of the firm, especially when the economy is struggling. (Lee et al., 2023; Davidson, Xie & Xu 2015; Lee et al., 2017). By understanding the impact of these board gender and board financial expertise on liquidity, manufacturing firms can optimize their board composition and decision-making processes for liquidity and drive long term success.

Firm size is the aggregate of the revenue, assets and market capitalization that is capable of moderating the liquidity in Nigerian manufacturing firms since the liquidity requirements of large firms are not likely the same with those of smaller firms, therefore there is the need to access the moderating role of firm size on the manufacturing firms (Mustapha 2025; Mardessi & Fourati 2020). Thus, this study seeks to portray how board gender and board financial expertise influences liquidity, with a moderating role of firm size. Studies such as Salawudeen and Dandago (2020) and Adegbogun and Igbekoyi (2020) assessed how other variables and board characteristics interplayed. However, the combination of the specific variables of board gender, board financial expertise and the liquidity of listed manufacturing firms in Nigeria, moderated by firm size as used in this study is uncommon.

The country's manufacturing sector, characterized by its resilience and adaptability, plays a pivotal role in shaping economic outcomes (Effiong & Udonwa, 2024). An insight into how the gender makeup of boards' affects liquidity within the manufacturing firms will be of essence as the sector is essential to job provision and the general well-being of the economy amongst others necessities (Asemota, 2023; Dahiyat et al. 2021). Manufacturing firms in Nigeria are sometimes faced with the problem of liquidity, which is vital for their going concern.

Many Nigerian manufacturing firms have had problem with liquidity, which has affected their going concern and subsequently led to their extinction; companies like GlaxoSmithKline and UTC Foods amongst others (Anudu, 2022). Consequently, this has made it necessary to carry out this study and assess the interplay amongst board gender, board financial expertise and liquidity, with regards to manufacturing firms. Hence, a study on the liquidity of the listed manufacturing firm is of benefit to the firms and stakeholders because an adequate liquidity level of these manufacturing firms could promote financial stability in the companies as it is a critical aspect for running a successful business in any clime (Vu et al. 2020). Therefore, having a board functioning properly to maintain an adequate liquidity of the firms, the firm size is bound to grow making it difficult to fail.

In other to fill this gap, this study examines board gender and board financial expertise on the liquidity of listed manufacturing firms in Nigeria. Furthermore, to fill the literature gap as most past studies were focused on other countries and not the Nigerian manufacturing sector. Unlike most prior studies, their focus was on board characteristics and other firm's financial performance analysis (Ojo 2021; Iliyasu 2020; Aifuwa 2019). The few studies (Agwu & Ogbulu 2020; Ajibolade 2020; Akintoye & Ayanda 2019; Alhassan & Ibrahim 2019) that had a similar focus on board characteristics and liquidity of manufacturing firms failed to use a moderating variable. Hence this study introduced the firm size as a moderating variable.

Nevertheless, the methodological gap was filled with a robust data set being used in the methodology section of the study. The choice of manufacturing sector for this study was made based on the availability of an ample size of data from the numerous firms existing in the sector and had their necessary financial information present in the Nigerian Exchange website. Past researchers have considered the sector beneficial in their research (Adegboyegun & Igbekoyi 2020; Owolabi et al. 2021; Muhammed & Salawudeen 2020). The findings from this study hold implications for policymakers, corporate leaders, and stakeholders keen on fostering sustainable and inclusive governance practices within the fabric of Nigeria's corporate sector.

To analyze this study, the following research questions have been raised to be answered;

i. To what extent does board gender affect the liquidity of manufacturing firms in Nigeria, moderated by firm size?
ii. How does board financial expertise affect the liquidity of manufacturing firms in Nigeria, moderated by firm size?
iii. What is the moderating role of firm size on the effect of board gender and on the liquidity of manufacturing firms in Nigeria?
iv. What is the moderating role of firm size on board financial expertise and on the liquidity of manufacturing firms in Nigeria?

The main objective of this study is to examine the effect of board gender and board financial expertise on the liquidity of manufacturing firms in Nigeria, moderated by firm size. Other specific objectives are to:

i. Evaluate the effect of board gender on the liquidity of manufacturing firms in Nigeria.
ii. Assess the effect of board financial expertise on the liquidity of manufacturing firms in Nigeria.
iii. Evaluate the moderating role of firm size on the effect of board gender on the liquidity of manufacturing firms in Nigeria.
iv. Examine the moderating role of firm size on the effect of board financial expertise on the liquidity of manufacturing firms in Nigeria.

Based on these objectives, the following hypotheses was formulated and tested in this study.

H_{01}: Board gender has no significant effect on the liquidity of the manufacturing firms in Nigeria.

H_{02}: Board financial expertise has no significant effect on the liquidity of the manufacturing firms in Nigeria.

H_{03}: Firm size does not significantly moderate the effect of board gender on the liquidity of listed manufacturing firms in Nigeria

H_{04}: Firm size does not significantly moderate the effect of board financial expertise on the liquidity of listed manufacturing firms in Nigeria

This study is significant because the liquidity of manufacturing firms is an important factor in the going concern of these firms, in order for these firms to remain in existence, the issue of adequate liquidity is paramount. Consequently, the findings and recommendations will contribute to the existing body of knowledge and serve as a reference for further research. Furthermore, the result of this study would be of benefit to investors, management of companies, policy makers and the Manufacturer Association of Nigeria.

2. Literature Review

This section explores the concepts, theories and empirical reviews of board gender, board financial expertise, liquidity, and the moderating role of firm size in relation to manufacturing firms.

Conceptual Review

This subsection discusses the concepts of board gender, board financial expertise, liquidity, and firm size as it relates to manufacturing firms in Nigeria.

Liquidity

Liquidity, which is essential to a manufacturing firms going concern, is defined as the ease with which assets can be turned into cash (Omemgboji & Onuora, 2025). It is impacted by things like anticipated operating cash flows after taxes, debt, equity, and the liquidity of its securities. A company's ability to manage day-to-day operations, fulfill obligations, and optimize profit and shareholder wealth depends on its liquidity.

According to Barako et al. (2016), because liquidity is directly related to a company's day-to-day operations, study on it is crucial for both internal and external analysts. This study uses the current ratio, which compares current assets to current liabilities, to quantify liquidity, which is defined as the ease with which an asset can be turned into cash, as employed in the studies of Okoro 2020 and Amarjit 2011.

Board Gender

Board gender refers to the number of women on a company's board of directors. Studies show that organizations with more gender diverse boards perform better financially and have better corporate governance (Yahaya, 2026; Agbeyinka 2024; Mohammed & Kurawa 2021; Musa & Aifuwa 2020). Diversity leads to a greater independence and enhances the supervisory function of the boardroom. However, there are still few women on boards of manufacturing firms in Nigeria due to issues such as lack of qualified female candidates, unconscious bias in hiring, societal and cultural hurdles.

Initiatives like quotas and objectives for female board representation and measures to support women's growth and advancement have been used to boost board gender diversity (Oyianna, 2021). Gender diversity benefits a firm's success by enhancing the financial performance of the company and improving the orderliness of the board. Studies have shown that teams with a higher percentage of female members are more adept at solving complex issues (Post & Byron 2014; Terjesen et al. 2016).

A board made up of female members is more likely to incorporate the interests of numerous customers, stakeholders, and employees' performance-based interests. Female board members are more likely to have inclusive relationships with relevant firm stakeholders and have a greater understanding of a market, which improves the board's judgments. Further research on boards and board roles suggests that having female directors on board can improve board effectiveness and firm performance (Mohammed & Kurawa, 2021; Musa & Aifuwa, 2020).

Board Financial Expertise

Board financial expertise is the number of directors on the boards that have professional qualifications in either, finance, accounting, management, insurance or other finance related courses. It is referred to as the percentage of board members having professional capabilities in finance related areas (Oseghale et al., 2026; Gambo et al., 2019). Board members in the manufacturing sector typically have diverse financial expertise backgrounds that reflect the different skill sets and expertise needed to effectively oversee the company's operations.

According to Adegboyegun and Igbekoyi (2022), such professional abilities should be in marketing, information technology, accounting, and legal matters affecting the firm. Financial specialists can add value to a company by applying their knowledge of financial instruments and project valuation; as a result, the company will profit from their presence and experience an increase in value.

Furthermore, having a thorough understanding of the financial industry can assist managers to avoid taking on too much risk and hiring of the financial specialist may benefit the company's reputation. Experts can therefore affect a variety of firm performance traits, including investment opportunities, selecting projects more carefully, and stock performance by offering better knowledge of financial instruments; and firm value, which can be influenced by all the aforementioned factors.

Firm Size

Firm size refers to the proportionate scale of an organization's operations, which are typically quantified in terms of total assets, sales, or labor size (Hanaffy, 2025). Nigerian manufacturing companies often assess their size using total revenue, staff counts, and fixed asset valuations (Idogho et al., 2024). For instance, in the manufacturing industry, a company's size may be determined by the value of its fixed assets, the number of its personnel, or other elements that are more important to its operations. A company's size has a significant influence on its profitability, risk profile, and access to the financial markets. Due to the fact that they occasionally have more financial and political clout, larger businesses may have a competitive edge over smaller ones (Hanaffy, 2025; Oshinowo et al., 2022).

In addition to higher regulations and compliance requirements, larger companies may also be more susceptible to changes in the market or economic shocks. Larger companies typically exhibit greater diversification, which results in higher returns and reduced risk levels (Serrasqueiro & Nunes, 2008; Yang & Chen, 2009). Additionally, large enterprises benefit from economies of scale, which draw in more investments and increase the value of the company's market shares. In this study, firm size is defined as the sum of total assets of a manufacturing firm.

Theoretical Review

The relevant theories that this study reviewed are the stewardship theory and the theory of the firm. However, the study is anchored on stewardship theory because it is most suitable for this research, since having women on board could bring a different perspective to how the firm is being managed and the maximum utility of the resources available to the firm. These theories were adapted in previous studies by (Kolawole et al., 2022; Awino 2015) respectively.

Stewardship Theory

Stewardship theory was propounded by Donaldson and Davis (1991) as a proxy to agency theory. In contrast to the agency theory, stewardship theory holds an optimistic view of human managerial behavior, arguing that agents are not necessarily motivated by individual goals and that rather they are inherently trustworthy and not prone to misappropriate corporate resources and they are motivated to work in the interest of their principals (Barney, 1990; Davis 1991; Nicholson & Kiel, 2007).

As a result of this, stewardship theorists suggest the consolidation of power by insiders. They suggest that the optimal stewardship role can only be exercised when the board has the ultimate power and authority (Donaldson & Davis, 1991). Stewardship theory further suggests that outside independent directors are unnecessary because agents are the best stewards for their corporations and are not motivated by individual goals (Luan & Tang 2007). Ramadani and Witteloostuijin (2010) propounded that stewardship theory is of the stance that board of directors should consist of more inside directors because they are more conversant about the firm than the outsiders and therefore can make better decisions in the interest of the firm.

Theory of the Firm

Managerial theories of the firm as propounded by Oliver Willamson, (1966); Robin Maris 1964 and William Baumol 1959 and 1962 proffers that managers would aspire to maximize their own utility and weigh the implications of this for firm's behavior in contrast to the profit-maximizing case. The theory of the firm according to the microeconomic approach formulated by the neoclassical economics states that every firm operates to maximize profits. Usually, various companies determine the demand and price of the product in the market and make optimum allocation of scarce resources for increasing their net profits.

Furthermore, the theory backing the firm promulgates that every business organization is motivated by the urge to maximize profits. This theory impacts the decisions for apportioning resources, production procedures, price adjustments and manufacturing in high quantity. Both theories of consumers and the theory of the firm are simultaneously linked because they go together. In the theory of the consumer, the customer is prone to increase their total utility obtained from the product to the maximum.

Utility in economics terminology refers to the estimated value a customer uses for gauging the level of satisfaction or fulfillment obtained from the consumption of a particular product or service. When a customer purchases a particular product for a given amount of money, the customer usually will expect to receive utility of at least the same amount from the product. However, there is a short-run motivation and long-term motivation for a company, according to the contemporary approach.

The long-run motivation includes the activities that pertain to the growth of the firm, while the short run activities are those involved in profit maximization. Other areas whereby this theory seems to establish its influence is in making it more adaptable to the economic and market environment, how they influence what organizations do, why they are in specific business and the motivating factors for their decisions with regards to their allocations to capital and labor.

Review of Empirical Studies

This sub-section reviews past empirical research on board gender, board financial expertise and liquidity of manufacturing firms with an emphasis on the scope, techniques and the various conclusions published in both local and international publications.

Board Gender and Liquidity of Listed Manufacturing Firms in Nigeria

Ummah and Yuliana (2023) in their study Liquidity relations, current ratio, profitability, gender diversity, company size, and company value: Studies in Indonesia. In addition to examining profitability moderation, gender diversity, and firm size, their study assessed the impact of dependent variables (capital structure, current ratio, and profitability) on independent variables (company value). Their research credentials comprise companies that employ research data and are listed on the Indonesia Stock Exchange for the years 2017 through 2021 taken from the websites of IDX and the firm. Their research findings indicate that the company's worth is influenced by both profitability and the current ratio.

Both the capital structure and the company's size have an adverse effect on its value. While profitability cannot mitigate the impact of capital structure on firm value, it can amplify the current ratio's effect on it. In an opposite way, gender diversity can reduce the impact of capital structure and the current ratio on the value of the company. Their study noted that there is no way that gender diversity can lessen the impact that profitability has on corporate principles. The company's size also affects the value of the company, and the capital structure of the business might limit its worth, they further opined that the company's size cannot lessen the effect of the profitability and current ratio on the enterprise value, having conducted their study at Indonesia for a five years period, there emerged an obvious geographical and time frame gap that this study filled.

Nwaorgu and Iormbagah (2021) carried out a study on the effect of board diversity on financial performance of listed firms in Nigeria and found that gender diversity had no significant impact on the liquidity and leverage ratio of listed firms. They employed the use of multiple regression analysis on the data extracted from the financial statements of some of the selected listed firms in the Nigerian Exchange group from 2014 to 2018. Their findings showed that gender diversity, nationality diversity and educational diversity have no significant effect on leverage ratio of the listed firms in Nigeria.

They suggested that Nigerian listed firms should consider including more female board members to achieve a balanced gender diversity ratio. Their study revealed that if the women on board had specific qualification and experience in risk assessment those companies are less likely to go bankrupt as they bring in their expertise to manage the liquidity of those firms. They recommended that more female board members with risk assessment knowledge could reduce the risk of bankruptcy and that board composition should consider gender, nationality and education when deciding on board composition. Although their study was conducted here in Nigeria, the same geographical domain as this one, they employed the multiple regression technique as used in this study. However, they used only data generated for five years, which this study extended to a fifteen years period to have a robust data for a more reliable result.

Atif et. al (2019) in their study does board gender diversity affect corporate cash holdings? Examined the relationship between corporate cash holdings and board gender diversity using the US S&P 1500 index companies from 2006 to 2015. They found a strong inverse link between cash holdings and gender diversity on boards. Additionally, they discovered a significant adverse impact of female independent directors that is in line with the monitoring function. Furthermore, they observe a detrimental impact of female directors' presence and voice on cash holdings in line with the critical mass theory. Their results hold up well to other econometric parameters, propensity score matching, two-stage least squares, alternative measures of cash holdings and corporate governance. As evidenced above, their research provides insightful information about the current global discussion surrounding gender diversity and how it affects businesses. However, since their study was not carried out in Nigeria, it provided a geographical gap for the same study to be replicated in Nigeria. The time frame of their study was 2006 to 2015, this gap will be filled in this study's 2009-2023 time span and the use of a multiple regression analytical tool.

Imade et al. (2019) in their study on the evidence of Nigerian listed firms, non-executive director's composition, board gender diversity and corporate performance, studied the relationship between non-executive director diversity, return on assets and gender diversity of boards of listed companies on the Nigerian Exchange Group. Data obtained from 2006 to 2016 was analyzed via ordinary least square technique. Their study found that board gender diversity significantly impacts the return on assets of companies listed on the Nigerian Exchange Group and recommended that public companies placed a higher value on board diversity, and regulatory agencies should establish guidelines for the inclusion of a sufficient proportion of women on the boards of listed companies in Nigeria. Their study employed the least square method in analyzing their data while this study used the multiple regression technique. Furthermore, both studies' findings are contrary to each other.

Ilaboya and Ashafoke (2017) conducted studies on the impact of board diversity on Nigerian listed companies' financial performance. They used panel data from 1991 to 2008 and applied Fixed Effect Generalized Least Square Regression to analyze the relationship between board diversity and company performance. They analyzed the association between board diversity in Nigerian listed firms and their performance, using multiple regression technique for data analysis. The study of Ilaboya and Ashafoke (2017) found a negative relationship between nationality, diversity and firm performance, while (Nwakoby & Ugbam 2021) suggested that management and regulatory bodies should encourage the inclusion of more women to improve company performance. Their findings emphasized the importance of understanding board diversity as a critical partner rather than viewing it from an agency theory perspective, however they analyzed other variables like board nationality and board ethnicity not included in this study, but the moderating role of firm size introduced to this study was a variable that made it differ from their study, although both studies had similar findings.

Terjesen et al. (2016) conducted a study on how independent and female directors impact the performance of firms in different countries. Data from three thousand, eight hundred and seventy-six firms that are publicly owned in forty-seven countries were analyzed with Tobin's Q and accounting return on assets measures. Their study found that the female directors contributed to the efficiency of the board of directors. They encouraged more inclusion of women on board.

Awino (2015) carried out research on the Relationship between board structure and liquidity of listed companies in the Nairobi securities. The strategic direction of a firm ultimately affects its financial performance and the board of directors is crucial in setting that direction. Their study set out to ascertain how board structure and listed business liquidity relate to one another. All of the companies listed at the Nigerian Exchange Group made up their study's population. Their study made use of the census survey. The annual reports of those companies provided secondary data, which was gathered, and regression analysis was employed to ascertain the correlation between board structure and liquidity. They discovered that while the percentage of women on the board has a positive but negligible link with listed company's liquidity, the percentage of independent directors and board members in the audit committee had a negative but small impact on listed company liquidity. They advised shareholders of companies eager to increase their companies' liquidity to place less emphasis on the board structure as a way to strengthen the companies' liquidity position.

Post and Byron (2014) research was focused on women on boards and firms' financial performance: a meta-analysis. A comparative approach was used to statistically combine the results from 140 studies and it was found that the percentage of female board members is positively correlated with accounting returns and this correlation is higher in nations with stronger shareholder protections. Furthermore, the connection between female board representation and market performance was positive in nations with higher gender parity and negative in nations with lower gender parity. These results of various researchers showed that the more women are featured on the board, the more likely their impact are to be positively significant to such firms, while the boards that featured fewer women on boards usually record an insignificant impact. Their study recommended that more women should be included on board.

Ujunwa et al. (2012) conducted their study on corporate board diversity and firm performance using the fixed effect random generalized least square regression to examine the impact that board diversity had on firm performance. They found that gender diversity was negatively related to firm performance and recommended that there be more women on board.

Board Financial Expertise and Liquidity of Manufacturing Firms

Li et al. (2023) carried out a study on board financial expertise and firm liquidity: evidence from china. Their study assessed how the board financial expertise affected the liquidity of Chinese firms, via empirical analysis of data from diverse Chinese firms. They found that the relationship was significantly positive between the two variables, whereby directors with a solid financial background exhibited a high liquidity level and good cash handling skills, which led to more investment opportunities for the firms. Their study further opined that board financial expertise is more evident in state owned firms than in privately owned firms in China, when moderated by state owned versus non-state-owned enterprise. They recommended that individuals with a strong financial expertise be given top priority in board appointments, as it will enhance the liquidity management of such firms.

Kumar et al. (2023) conducted a study on the impact of board financial expertise on liquidity management: evidence from Indian manufacturing firms. With the aid of empirical data, a correlation analysis was used to arrive at the findings that a positive relationship existed between board financial expertise and liquidity management. They found that boards with good financial knowledge made intelligent financial decisions, monitored financial performances and were able to quickly detect cash flow problems early enough to curtail unpleasant outcome. Their study suggested the need to have board members with financial expertise to enhance the firm's liquidity position amongst other benefits.

Kim et al. (2021) conducted a study on board financial expertise and firm liquidity, evidence from South Korean manufacturing firms. With the aid of current ratio, quick ratio, a regression model was used to analyze data from the listed public companies in South Korea. They found that having board members with financial expertise significantly enhanced the liquidity of such firms and recommended that having a strong financial expertise should be a priority for appointing board members. Although their study was carried out in South Korea, the similarity in the variables studied made their study of value to this study conducted in Nigeria.

Matsumoto et al. (2021) carried out a study on board financial expertise liquidity management: evidence from Japanese manufacturing firms. A regression analysis was conducted using data from selected Japanese firms and they found that the there is a positive correlation between board financial expertise and liquidity management which portends that the presence of a financially knowledgeable board members ensured that cash flow was maximized and the financial obstacles were positively handled.

The studies of Li et al. (2023), Kumar et al. (2023), Kim et al. (2021), and Matsumoto et al. (2021) all agreed that boards wherein members are knowledgeable in financial expertise enhanced the liquidity of manufacturing firms in different parts of the world. Arguing that boards with members having educational qualifications in finance enabled them to navigate the challenges posed by liquidity in the manufacturing firms, given the sensitive nature of the sector to dwindling liquidity. Hence, they established the need to have board members with finance related educational qualifications to enable them surmount such challenges when the need arises.

Firm Size and Liquidity of listed Manufacturing firms

Mustapha (2025) carried out a study on the moderating role of firm size in the relationship between liquidity and financial performance among Nigeria's listed healthcare and pharmaceutical manufacturing firms for a time frame of 2014 to 2023. Their study applied the generalized least squares (GLS) analytical tool to examine the cash ratio, quick ratio and current ratio on return on assets of 10 listed firms; that were moderated by firm size. Their study found that current ratio has a significantly negative effect on return on assets, while firm size moderations on these interactions were found to be positive amongst other findings. Although their study had a prolonged sampling years but they only focused on ten healthcare and pharmaceuticals manufacturing companies that are listed, this sampling style does not fully represent the totality of the manufacturing sector in Nigeria; given its diversified nature. However, their study established that firm size positively moderated the aforementioned variables and their findings are at variance with the findings of this study.

Idogho et al. (2024) examined the moderating effect of firm size on firm characteristics and profitability of listed industrial goods firms in Nigeria. They analyzed data from ten listed companies' financial reports from 2013 to 2022 using the panel corrected standard error for the random effect model and found that liquidity negatively affected profitability, while leverage and firm age have positive but negligible impacts. Notably, firm age may reduce profitability, but younger firms can improve financial performance as they mature. Their study highlights that firm size significantly moderates the aforementioned relationships. Although their study focused on a different manufacturing sector, most of their variables are similar to the ones used in this study. However, their results on the moderating role of firm size are opposed to those of this study.

Sudyniyatno (2022) examined the role of liquidity in influencing firm performance, especially for manufacturing companies operating in Indonesia. They employed firm performance as the dependent variable, capital structure and firm size as independent variables, operating assets as a control variable, and liquidity as a moderating variable. Their study was conducted on 123 manufacturing companies in Indonesia from 2019-2021. The data collection method used purposive sampling, while the data analysis used multiple regression techniques. The results revealed that liquidity had a negative effect, and operating assets and firm size had a positive effect on firm performance. While the capital structure had a negative effect on firm performance at a significance of less than 10%, liquidity played an important role as a moderating variable on firm size and capital structure in influencing firm performance

3. Methodology

This study employed an ex post facto research strategy due to the historical nature of the data and has been used in some previous studies of a similar nature (Ibrahim &

Yusuf, 2021). In order to understand the complex links between board gender, board financial knowledge, and liquidity, this study uses multiple regression statistical analyses. Fifty (50) manufacturing companies registered on the Nigerian Exchange (NGX) as of December 31, 2023, made up the study's population. The modified filter sampling method was used to determine a sample size of thirty-one (31) to represent the population. In their individual studies, Kolawole et al. (2022) and Lawal et al. (2024) effectively employed the technique.

The firms that were listed on the Nigerian Exchange (NGX) Group on or before December 31, 2009, served as the basis for filtering the samples in order to determine the sample size. These firms had to stay listed during the sample period, have their annual financial report available during the study period (Lawal et al., 2024) and have the data needed for this study. To analyze the data, multiple regression was performed using STATA 15.

Model Specification

This study adapted the model specified in the study carried out by Dioha et al. (2018) because of the similarity in both studies data analysis techniques. However, there are some modifications in the variables used to accommodate the additional variables. The model used is expressed mathematically as follows in Equations 1 and 2:

$L_{i,t}= \alpha + \beta_1 BGD_{i,t}+ \beta_2 BFE_{i,t} + \beta_3 FSZ_{i,t} + e_{i,t}$ - - - - - - - - - - - - - - -(1);

$L_{i,t}= \alpha + \beta_1 BGD_{i,t}+ \beta_2 BFE_{i,t} + \beta_3 FSZ_{i,t} + \beta_4 BGD*FSZ_{i,t}+ \beta_5 BFE*FSZ_{i,t}+ e_{i,t}$ - - - (2);

where: LQR = Liquidity (Dependent variable); i= Firm; t = Time; α= Constant; β_{1-} β_5= Coefficient;

BGD = Board gender (Independent variable); BFE= Board financial expert (Independent variable); FSZ = Firm size (moderating variable); e = Error is the value of the dependent variable; α, the constant term; β, the coefficient of the function. BGD is the value of independent variables; e, error term.

Thus, regression equation becomes: $L_{i,t} = \alpha + \beta_1 BGd_{i,t} + \beta_2 FSz + \beta_3 (BGd \times FSz)_{i,t} + e$ - (3); $L_{i,t} = \alpha + \beta_2 Bfe_{i,t} + \beta_2 FSz + \beta_3 (BFinancial \times FSz)_{i,t} + e$ - - - - - (4); where: LQR = Liquidity; BGD = Board Gender; BFE = Board Financial Expertise; FSZ = Firm Size. This study made use of secondary data that was retrieved using content analysis, mostly from the Nigerian Exchange Group website's annual reports of the sampled companies.

Table 1
Variables, Definition, Measurement and Sources

Variables	Definition	Measurement	Sources
Independent Variables			
Board Gender (Bgd)	Defined as the percentage of female directors on the company's board	Calculated as the number of women board members divided by the total number of directors	Yahaya (2026); Agbeyinka (2024)
Board financial expertise (Bfe)	Is the set of all the formal education in areas that are finance related that board members have acquired	Calculated by the number of board members that have degrees and experiences in finance related fields, divided by the board size.	Oseghale et al. (2026); Tseng & Jiang (2016)
Dependent Variable Liquidity (Lqr)	It is how simple it is to turn an asset into cash. If an asset is simple to buy and sell, it is said to be liquid.	It is calculated by dividing current assets by current liabilities.	Emegboji and Onuora 2025; Hanaffy 2025
Moderating Variable Firm size (FSz)	The sum of total assets	The sum of total assets	Mustapha (2025); Folorunsho et al. (2025) Idogho et al. 2024

Source: Field Work, 2026

Methods of Data Analysis

This study uses descriptive statistics to analyze the data, describing the fundamental variables that make up the study. As a result, it provided straight forward summaries of the sample and the measurements about the mean, minimum, maximum, standard deviation, kurtosis, and skewness. In order to investigate the impact of board gender and board financial knowledge on the liquidity of listed manufacturing firms. A panel data estimate method is used in the study. By allowing for individual-specific characteristics, this will address the variability related to the listed manufacturing firm.

This study's panel design necessitates the use of multiple regression techniques, including the Diagnostic and Pre Estimation Test, the Test for Normality of Residuals, the Test for Coefficient of Determination, the Multi-collinearity Test, the Heteroskedasticity

Test, the Outliers Test, the Linearity and Additivity Test, the Model Specification Test, and the Hausman Test.

4. Results and Discussion

Table 2

Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min.	Max
LQR	465	1.286872	0.739681	0.0157	3.78799
BGD	465	0.162857	0.142459	0	0.67
BFE	465	0.122624	0.039887	0.05	0.51
FSZ	465	788.608	11803.1	10.2354	191746

Source: STATA 15 outputs (2026)

From Table 2, the liquidity as the dependent variable of this study shows a minimum and maximum values of 0.0157 and 3.7899 respectively. Also, the mean value of the liquidity of listed manufacturing companies in Nigeria is 1.2868 with the standard deviation of 0.7397. This means there is a low level of dispersion from the liquidity data of this study.

While board gender maintains a mean value of 0.162857, standard deviation of 0.142459, minimum 0 and maximum 0.67 respectively. This means, on the average 40.9 is the proportion of female on board, while the minimum proportion level is 0. The maximum level of proportion of female on board is 29. But the dispersion is due to the difference in number of female members of the selected firms in Nigeria. While, board financial expertise has a mean value of 0.122624, standard deviation of 0.039887, minimum 0.05 and maximum 0.51 respectively. This means that on the average 35.5 is the proportion of board members with financial expertise.

Table 3

Variance Inflation Factor (VIF)

Variables	VIF	1/VIF
BGD	1.00	0.995680
BFE	1.00	0.995743
FSZ	1.00	0.999138

Source: STATA 15 outputs (2026)

Table 3 indicates that there is no multicollinearity issue because the tolerance value is less than 1 (one) and the VIF is less than 10, indicating that the independent variable is suitable and well-fitted into the model. Given that the p-values for the study's variables are negligible at 5%, the results of the normality test showed that the data are normally distributed. Because the tolerance values are greater than 0.10 and the VIF is less than 10, the multicollinearity test also showed that the variables are unaffected by multicollinearity. The Hausman specification test suggests that random effect might be used on the models, while the heteroskedasticity test showed that heteroskedasticity does not exist.

Table 4

Correlation Result

VARIABLES	LQR	BGD	BFE	FSZ
LQR	1.0000			
BGD	0.0105	1.0000		
BFE	0.0662	-0.0623	1.0000	
	0.1543	0.1806		
FSZ	0.0442	0.0221	-0.0208	1.0000
	0.3411	0.6349	0.6552	

Source: STATA 15 outputs (2026)

Table 4 explains the link amongst the variables. It reveals the inter-connectivity amongst board gender, board financial expertise, liquidity and the moderating role of firm size. With reference to the result, if board gender changes by 1%, the liquidity will change by 0.0105, whereas for the board financial expertise, when it changes by 1%, the liquidity will change by 0.0662 as well. This result reveals that board gender has a negative significant effect on liquidity and board financial expertise as well has a negative significant effect on liquidity of manufacturing firms in Nigeria.

Table 5

Regression Result

Lqr	Coef.	Std. Err.	T	P>1t1	[95% conf.	Interval]
Bgd	-0.25876	0.172436	-1.5	0.134	-597683	0.080166
Bfe	1.066555	0.625933	1.7	0.089	-0.16372	2.296832
Fsz	6.91e-07	1.72e-06	0.4	0.688	-2.70e-06	4.08e-06
_cons	1.201671	0.085279	14.09	0	1.034055	1.369288

Source: STATA 15 outputs (2024)

The findings from Table 5 indicates that board gender, financial expertise on the board and firm size do not significantly impact the liquidity of the chosen listed manufacturing companies in Nigeria, with P-values of 0.134, 0.089, and 0.688 respectively. This indicates that a 1% variation in any of the variables will result in a corresponding rise in the liquidity level. For instance, a 1% rise in board gender diversity, board financial expertise, and firm size will result in a -0.25876, 1.066555, and 6.91e-07 increase in liquidity respectively.

The R-squared (R^2) coefficient of determination indicates that the effect of the independent variable on the dependent variable is under 2%. This indicates that the combined effect of all variables accounts for fewer than 2% of the liquidity. The other 98% of the impact arises from variables that are not part of the model.

With reference to the narration above, board gender has a significant negative effect on liquidity and this discovery aligns with the study of Ashafoke and Ilaboya (2017). However, it contradicts the study Osaze and Imade (2019) and Anazonwu (2018), which discovered a significantly positive effect. Furthermore, board financial expertise has a significantly negative effect on liquidity and the moderating role of firm size on liquidity was found to be insignificant. Additionally, this finding does not align with the study of

Mustapha (2025) which proposed that firm size has a positively moderating effect on liquidity.

5. Conclusion and Recommendations

This study has shown that board gender and board financial expertise has a negative significant effect on the liquidity of listed manufacturing firms in Nigeria. This portrays that the presence of women on board does not improve the liquidity of Nigerian firms. While board financial expertise also does not enhance the liquidity of firms. Furthermore, the findings indicate that using firm size as the moderator of board gender and board financial expertise does not equally improve liquidity in these firms.

Based on the conclusion, the study recommends that:

(i) Undue emphasis should not be placed on board gender and liquidity with regards to manufacturing firms in Nigeria, but the focus should be on how to maximize the liquidity of these firms.

(ii) Listed manufacturing firms in Nigeria should prioritize having members with past
records of excellent performance on board rather than bringing them on board based
solely on having degrees in finance related fields.

(iii) The moderating role of firm size on the relationship between board gender and liquidity indicates that firm size does not significantly affect the liquidity of listed manufacturing firms in Nigeria. Therefore, changes in firm size do not impact the liquidity levels of these firms.

(iv) The moderating role of firm size on the relationship between board financial expertise and liquidity suggests that there is no significant influence of firm size on the liquidity of listed manufacturing firms in Nigeria. As a result, manufacturing firms in Nigeria should prioritize increasing their size to enhance other factors aside from liquidity.

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Appendix A1
Population and Sample Size (*) of the Study

1. Austin LAZ & company
2. Berger Paint Plc (*)
3. Beta Glass Plc (*)
4. BUA Cement Plc
5. Cadbury Nig Plc (*)
6. CAP Plc (*)
7. Cement Company of Northern Nig Plc (*)
8. Champion Breweries Plc (*)
9. CUTIX Plc (*)
10. Dangote Cement Plc (*)
11. Dangote Flour Plc (*)
12. Dangote Sugar Plc (*)
13. DN Tyres & Rubber Plc
14. Eko Corp Plc
15. Ellah Lakes Plc
16. Enamel Ware Nig Plc (*)
17. Evans Medicals Plc
18. Fidson Health Care
19. First Aluminum Plc (*)
20. Flour Mills Nig. Plc (*)
21. FTN Cocoa Processor Plc
22. Glaxo smithkline Plc
23. Guinness NigPlc (*)
24. Golden Guinea Brewery Plc
25. Grief Nigeria Plc
26. Honeywell Flour Mill Plc (*)
27. International Breweries Plc (*)
28. Larfarge Africa Plc (WAPCO) (*)
29. Livestock FeedsPlc (*)
30. May & Baker Plc
31. McNichols Plc
32. Meyers plc (*)
33. Morrison Industries Plc (*)
34. Multi-trex integrated foods Plc
35. Nascon Allied Plc (*)
36. Nestle Nig Plc (*)
37. Neimeth International Pharmaceuticals
38. Nigerian Breweries Plc (*)
39. Nigerian German chemicals
40. Notore Chemical Industries Plc

41. Okomu Oil Palm Plc (*)
42. Portland Paints Products (*)
43. Premiere Paints Plc (*)
44. Presco Plc
45. PZ Cussons Nig Plc (*)
46. Unilever Nig. Plc (*)
47. Union Diagnostic & Clinical Services
48. Union Dicon Salt (*)
49. UACN (*)
50. Vita Foam Plc (*)

Key: (*) – Sampled Company
Source: Field work 2024