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Board Diversity and Financial Performance of Oil and Gas Firms Listed in the Nigerian Exchange Group

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ABSTRACT

This study investigated how board diversity affects the financial performance of oil and gas firms listed on the Nigerian Exchange Group using a panel data regression approach. Data covering a decade (2014–2023) were collected from the financial statements of listed companies under study. The Hausman test was used to choose between fixed and random effects models. The results revealed that gender, age, nationality, and tenure diversity showed statistically insignificant relationships with ROA and ROE, while educational and professional diversity negatively affected ROE and EPS significantly. However, tenure diversity demonstrated a significant positive relationship with EPS. The study concluded that while diversity is essential, excessive diversity in educational and professional backgrounds can hinder financial performance, whereas tenure diversity positively influences earnings and recommended the adoption of a strategic approach to board diversity, ensuring alignment with organizational goals, and leveraging tenure diversity's benefits to enhance shareholder value.

INTRODUCTION

The financial performance (FP) of oil companies in Nigeria plays a pivotal role in the country's economic stability, as the oil and gas (O&G) sector is a major contributor to government revenue, exports, and GDP (Aluko et al., 2024). Nigeria's oil industry is susceptible to global commodity price fluctuations, resulting in significant revenue swings and influencing profitability (Ezuem & Ejeka, 2024). Moreover, the sector faces challenges such as high operational costs, regulatory uncertainties, and the complexities of managing large-scale exploration and production projects (Koroteev & Tekic, 2021).

Despite these challenges, Nigerian oil companies are crucial for providing energy, employment, and technological development. The financial performance of these companies is often evaluated through traditional metrics like Return on Assets (ROA), Return on Equity (ROE), and Profit Margin (Anozie et al., 2023), external factors, such as currency exchange rates and global oil demand, also play a significant role in shaping their financial outcomes (Yusoff et al., 2024). Understanding Nigerian oil firms' financial dynamics is essential for stakeholders and policymakers striving to ensure lasting sustainability and growth in the industry.

Financial performance is a critical measure for evaluating the success and sustainability of oil and gas firms in Nigeria (Anozie et al., 2023). However, measuring financial performance accurately can be challenging due to external factors such as fluctuations in commodity prices, regulatory changes, and the level of debt (Koroteev & Tekic, 2021). In addition, earnings per share (EPS) and earnings before interest and taxes (EBIT) can be influenced by non-operational factors like capital structure decisions and tax policies, which may distort the true reflection of a company's operational efficiency (Awan & Sharif, 2024). Thus, isolating the effect of the board diversity (BD) on FP requires careful consideration of these confounding factors.

The O&G industry in Nigeria is a key contributor to the national economy, and companies in this sector are under constant scrutiny regarding their governance structures (Aluko et al., 2024). According to Wright et al. (2024), board diversity tends to improve decision-making, innovation, and overall performance. Board diversity encompasses gender (G_D), age (A_D), nationality N_D, educational and professional career (EP_D), and tenure diversity (T_D) among the board members of O&G firms in Nigeria. Research has shown that diverse boards can improve decision-making processes by bringing in a variety of perspectives, enhancing

problem-solving, and fostering innovation (Escandon-Barbosa & Salas-Paramo, 2024; Yakubu & Oumarou, 2023). These factors can lead to improved governance practices, further informed strategic decisions, and improved financial outcomes.

Board diversity is expected to address several challenges associated with measuring financial performance, such as the distortion caused by non-operational influences like management practices or external economic factors (Aziekwe & Okegbe, 2024). For instance, having a more diverse board can improve oversight, leading to improved risk management and operational efficiency, which could positively impact financial metrics like ROA**,** ROE**,** and EPS significantly**.**

Board diversity may help companies overcome external challenges such as market uncertainty, regulatory variations, and the impact of commodity price fluctuations. The improved governance structure stemming from a more diverse board can foster better long-term planning, operational strategies, and investment decisions, which are critical for sustaining financial performance in a volatile industry (Dimingu & Mogaji, 2024).

Furthermore, board diversity could mitigate issues related to capital structure, as diverse boards might be more prudent in balancing debt and equity, thereby improving financial stability (Hordofa, 2023). Generally, board diversity is expected to address the complexities of evaluating FP by enhancing strategic decision-making, better risk management, and optimizing FP in the presence of external market fluctuations.

Although there is an increasing worldwide acknowledgment of board diversity as a factor that enhances FP, research examining this connection in Nigeria's crucial O&G industry is scarce. Current research mainly centers on advanced economies, as found in Gharios et al. (2024) and Hosny and Elgharbawy (2022), or broad corporate governance issues without isolating the impact of specific diversity dimensions like gender, age, nationality, education, and tenure on firm performance, as was the case of Al Ismaili et al. (2024) and Saidat et al. (2024). This creates a significant knowledge gap in comprehending the influence of these board attributes on financial outcomes like ROA, ROE, and EPS in Nigerian O&G companies. Without these insights, companies cannot optimally structure their boards to respond to risks and opportunities specific to their sector. As a result, without context-specific analysis, oil and gas companies might not capitalize on the potential of diverse boards as strategic resources for enhancing governance and financial sustainability.

Moreover, the majority of empirical research concerning board diversity and performance focuses on sectors outside of O&G or industries characterized by lower operational complexity, as done by Masa'deh et al. (2024) and Purwito (2024). Due to the volatility of the Nigerian O&G industry, marked by changing commodity prices, uncertain regulations, and socio-political instability, it is crucial to examine the workings of BD in this context. Nonetheless, the exact ways in which diversity factors contribute to strategic decision-making and resilience in this capital-intensive sector have not been the focus of much scrutiny. The existing literature frequently generalizes findings across various industries without taking into account the specific dynamics of oil and gas operations, resulting in a lack of actionable insights for stakeholders in this high-risk environment.

In addition, contradictory findings from the existing literature reveal additional gaps that require targeted investigation. Some studies demonstrate that gender and foreign diversity positively influence financial performance (Gharios et al., 2024; Yunusa et al., 2024), while others reveal insignificant or even negative impacts (Almaqtari et al., 2024; Saidat et al., 2024), emphasizing the necessity of contextual validation in developing markets such as Nigeria. Furthermore, there has been no thorough investigation into the joint effects of various aspects of BD on performance within Nigeria's O&G industry. This oversight hampers a distinct understanding of whether diversity improves governance or simply meets regulatory requirements without providing real financial benefits. This study sought to address these gaps by supplying empirical evidence regarding the relationship between BD and FP in Nigeria's O&G sector, providing insights essential for policy reforms and enhanced corporate practices.

1.2 The Objective of the Study

This study aimed to investigate the influence of BD on the FP of O&G firms listed on the Nigerian Exchange Group (NGX).

Specific objectives are to:

i. evaluate the influence of BD on the ROA of O&G firms listed on the NGX;
ii. assess the influence of BD on the ROE of O&G firms listed on the NGX;
iii. examine the effect of BD on the EPS of O&G firms listed on the NGX.

2.0 LITERATURE REVIEW

2.1 Conceptual review

2.1.1 Financial Performance

Financial performance is a key measure of a firm's success and sustainability, particularly for oil and gas firms in Nigeria (Obioha, 2024), where external factors such as commodity price fluctuations and government regulations play a significant role. In the context of this study, and according to Oktavianti et al. (2024), financial performance is evaluated through specific metrics, namely return on assets (ROA), return on equity (ROE), and earnings per share (EPS), to determine how board diversity influences these outcomes in the face of the externalities. These metrics indicate the efficiency in the use of resources by an entity, in generating profit for its shareholders, and creating value for its stakeholders.

Return on Assets (ROA)

Oktavianti et al. (2024) described return on assets (ROA) as a measure of a company's ability to generate profit relative to its total assets. It is arrived at by dividing net income by total assets. In the context of this study, ROA will be used to assess how board diversity influences the effectiveness with which a concern uses its resources to create profit. A more diverse board may bring varied perspectives that lead to better decision-making, improving the firm's operational efficiency and, ultimately, its ROA (Dimingu & Mogaji, 2024).

Return on Equity (ROE)

Return on equity (ROE) is another important indicator of financial performance, calculated by dividing net income by shareholders' equity (Oktavianti et al., 2024). According to Oktavianti et al. (2024), ROE measures a company's ability to generate profit from the investments made by its shareholders. This study sought to investigate how diversity in board composition, such as gender, age, nationality, education, and professional and tenure diversity affects a firm's ability to generate returns for its equity investors. Dimingu and Mogaji (2024) asserted that diverse boards are often linked with improved governance practices and better strategic decisions, which can positively impact ROE.

Earnings Per Share (EPS)

Earnings per share (EPS) is a widely used metric that indicates the portion of a company's profit allocated to each outstanding share of common stock (Pikūnas, 2023). The measure is obtained by calculating the net income divided by the number of the firm's ordinary shares. In this study, EPS will be examined to determine how the composition of board members might affect profitability per share. A diverse board could potentially drive strategies that enhance profitability and increase shareholder value, leading to improved EPS.

2.1.2 Board Diversity (BD)

Khan et al. (2024) stated that board diversity plays a crucial role in shaping governance practices and influencing the overall financial performance of firms. This study focused on various sizes of board composition; gender, nationality, age, educational and professional, and tenure diversities, to understand their effects on the FP of O&G entities in Nigeria. Diverse boards are often linked to improved decision-making, better risk management, and enhanced innovation, which can ultimately contribute to a firm's profitability and long-term success (Dimingu & Mogaji, 2024). The following sub-sections explore each facet of board diversity:

Gender Diversity (G_D)

G_D is indicated by the presence of females on the board, usually represented by the ratio of female members relative to the total number of members on the board. Arnardottir et al. (2023) opined that gender-diverse boards are believed to bring varied perspectives, promote inclusivity, and improve corporate governance practices. Research has shown that gender-diverse boards are more likely to consider a wider range of strategic options, leading to better decision-making and financial outcomes (Laique et al., 2023).

National Diversity (N_D)

National diversity refers to the representation of various national groups within the board of directors. This form of diversity can provide firms with insights into different consumer preferences, market opportunities, and risk mitigation strategies that may not be apparent in a more homogeneous board (Kong et al., 2023). Considering the study's population, national diversity could also reflect the company's responsiveness to nationality composition and social dynamics. Ortlieb and Sieben (2013) believed that firms may be better equipped to move through local and international markets, potentially leading to enhanced financial performance by promoting a board with diverse national backgrounds. The influence of N_D on financial metrics such as ROA, ROE, and EPS requires exploration in this study.

Age Diversity (A_D)

Age diversity means the age range of the board members, encompassing both younger and more senior individuals. According to Katsiampa et al. (2024), a mix of age groups on a board can lead to a balance between innovation and experience, fostering both creative and well-informed decision-making. Younger board members may bring fresh perspectives and a forward-thinking approach, while older members may provide wisdom and a long-term strategic vision (Katsiampa et al., 2024). Age diversity in board composition may enhance governance by promoting a balanced approach to risk and opportunity, thus potentially improving the financial performance of oil and gas firms (Katsiampa et al., 2024).

Educational and Professional Diversity (EP_D)

According to Issa et al. (2024), educational and professional diversity denotes the variety of academic qualifications, professional attainment, and expertise represented on the board. A board with diverse educational and professional experience spanning fields such as business, engineering, accounting, law, finance, and technology can contribute to more holistic decision-making and more effective oversight (Issa et al., 2024). In the oil and gas industry, such diversity can help address the complex challenges related to operations, regulatory compliance, and financial management (Issa et al., 2024). Escandon-Barbosa and Salas-Paramo (2024) opined that firms may make more strategic decisions that lead to improved financial performance by having a well-rounded board with different skill sets. This study will evaluate the role of educational and professional diversity in shaping the ROA, ROE, and EPS of the population of this study.

Tenure Diversity (T_D)

T_D pertains to the differences in the duration of time that members have served on the board. According to Nerdrum (2024), some members may be relatively new, bringing fresh ideas and perspectives, while others may have served for a longer time, offering continuity, institutional knowledge, and experience. A balance of short-term and long-term board members can contribute to effective corporate governance by combining innovation with stability (Nerdrum, 2024). In the oil and gas sector, where strategic decisions frequently have long-term implications, tenure diversity can help companies adapt to changes while maintaining a solid foundation.

2.2 Theoretical Review

Several theories explain the interplay between BD and the FP of entities; resource dependency, agency, and systems theories are part of the most prominent.

2.2.1 Resource Dependence Theory (RDT)

Resource dependency theory was introduced by Jeffrey Pfeffer and Gerald R. Salancik in their seminal work, 'The external control of organizations: A resource dependence perspective', published in 1978 (Pfeffer & Salancik, 2015). Resource dependence theory (RDT) suggests that organizations are not self-sufficient and must interact with their external environment to acquire critical resources needed for survival and growth (John, 2024). Boards of directors play a pivotal role in linking firms to external resources, such as expertise, connections, and access to capital (Danso et al., 2024). A diverse board can offer a broader array of perspectives, networks, and knowledge for O&G companies in Nigeria, helping the organization overcome complex regulatory, environmental, and operational challenges.

Firms can effectively reduce uncertainty and dependence on external entities, ultimately enhancing their financial performance by including individuals with varied experiences and backgrounds (Danso et al., 2024). Critics argue that resource dependency theory (RDT) overemphasizes the role of external resources in shaping organizational behaviour, often neglecting internal dynamics and managerial agency (Hillman et al., 2009).

The study finds RDT especially pertinent because it offers a framework for comprehending how greater diversity among board members can improve the FP of O&G companies in Nigeria. Firms can access critical resources to manage stakeholder expectations, comply with regulations, and innovate in response to market demands by incorporating directors with diverse expertise, such as legal, engineering, environmental, accounting, or financial backgrounds. For instance, gender and national diversity can enhance the firm's reputation and foster better relationships with local communities and international partners (Danso et al., 2024). Thus, RDT emphasizes the strategic importance of BD as an avenue to secure and optimize the resources necessary for financial success in a competitive and resource-intensive industry.

2.2.2 Agency Theory (AT)

Agency theory, introduced by Jensen and Meckling in 1976, focuses on the relationship between principals (shareholders) and agents (managers), emphasizing the potential conflicts of interest that arise when agents prioritize their goals over the principals' interests (Jensen & Meckling, 1976). The theory argues that a firm's governance structure, including the board of directors, is crucial for monitoring management and ensuring alignment with shareholder objectives (Tekin, & Polat, 2020). Concerning O&G firms in Nigeria, it is believed that a diverse board expands oversight by ushering in various viewpoints and decreasing the chances of groupthink (Orumwense & Osa-Izeko, 2023).

This diversity can strengthen accountability, improve strategic policymaking, and eventually result in better financial performance. Critics of agency theory argue that it often overlooks the potential for principals to exploit agents, focusing predominantly on agent misconduct (Lane & Kivisto, 2008).

AT's relevance to this study lies in its provision of a theoretical basis for understanding how board diversity impacts financial performance by enhancing governance. A diverse board can mitigate agency problems by incorporating independent directors who bring varied expertise and are less likely to align with management's interests (Sierra-Morán et al., 2024). For oil and gas firms in Nigeria, where governance challenges are common, board diversity may improve accountability and transparency, fostering investor confidence and better financial outcomes (Briano, et al., 2023). Thus, the theory emphasizes the significance of diversity as a mechanism to strengthen oversight and align management actions with shareholder value.

2.2.3 Systems theory (ST)

ST was initially propounded by Ludwig von Bertalanffy, a biologist, in the 1940s. Bertalanffy developed the General Systems Theory (GST) to explain how different parts of a system interact and function as a whole (Guberman, 2004). The theory has since been adapted and expanded upon in various disciplines, including sociology, management, and organizational studies, to analyze the interdependence of components within complex systems (Skyttner, 2005).

Systems theory is a multidisciplinary framework that views organizations as complex, interdependent entities functioning within broader environments. It emphasizes the interconnections between various components, suggesting that changes in one part of the system affect the entire system (Scott & Davis, 2007). Applied to corporate governance, systems theory posits that board diversity introduces diverse perspectives, fostering better decision-making, creativity, and adaptability in dynamic environments. For O&G firms, which operate in a volatile and complex international market, a diverse board can provide the strategic insight needed to

navigate challenges and enhance financial performance. This holistic perspective underscores the relevance of systems theory in examining how diversity in board composition impacts organizational outcomes (Luciano et al., 2020).

Critics of systems theory argue that its broad applicability makes it less predictive and difficult to operationalize in empirical research. They contend that the theory often lacks specificity in identifying causal mechanisms or defining boundaries between systems and their environments (Midgley & Rajagopalan, 2020). In addition, skeptics note that systems theory may overemphasize interdependence, overlooking individual agency or contextual factors unique to specific industries. Despite these criticisms, the theory's adaptability and focus on interrelatedness have proven valuable in studying governance structures and performance outcomes, as they align with the multifaceted nature of operations (Guberman, 2004).

2.2.4 Theoretical Framework

RDT and AT underpin this study, offering essential perspectives on the link between BD and FP in Nigeria's O&G firms. According to RDT, organizations rely on external resources to thrive, and diverse boards serve as key conduits for accessing expertise, networks, and opportunities (Pfeffer & Salancik, 2015). In the context of Nigerian oil and gas firms, a board with members of diverse gender, national, and professional backgrounds can help navigate complex regulatory and operational landscapes, secure critical resources, and improve stakeholder relationships (Danso et al., 2024). RDT brings to light the strategic role of diversity in driving financial success by mitigating environmental uncertainties and enhancing decision-making capabilities.

Agency theory, on the other hand, emphasizes the importance of governance in aligning managerial actions with shareholder interests (Jensen & Meckling, 1976). A diverse board can enhance oversight and reduce agency conflicts by bringing varied perspectives and independent judgment to decision-making processes (Sierra-Morán et al., 2024). This is particularly significant in Nigerian oil and gas firms, where governance challenges are prevalent, and robust monitoring mechanisms are essential (Briano et al., 2023). Agency theory underscores how board diversity serves as a tool for mitigating risks, improving governance, and enhancing financial performance in this resource-intensive sector by fostering accountability, transparency, and strategic rigor.

2.3 Empirical Review

While empirical studies on the link between BD and FP show varied results across different contexts, several studies indicate a positive association of diverse boards with FP. For example, gender diversity, foreign representation, and independent directors are frequently associated with improved performance indicators such as ROA, ROE, and Tobin's Q (Gharios et al., 2024; Hosny & Elgharbawy, 2022; Purwito, 2024; Yunusa et al., 2024). The studies contend that board deliberations are enriched and governance strengthened by diversity.

However, studies with opposing results indicate that in certain contexts, G_D may have a detrimental effect on performance or no significant effect at all (Almaqtari et al., 2024; Saidat et al., 2024), indicating that the advantages of diversity are contingent on the organizational context and the extent of genuine inclusion. These studies aimed at assessing the impact of various types of BD, like G_D, N_D, EP_D, skills, and independence on FP. Research indicates that independent directors and foreign board members consistently improve corporate outcomes (Al Ismaili et al., 2024; Purwito, 2024), while the influence of G_D varies.

In certain instances, G_D serves as a positive moderator for the relationships between other variables, like capital structure and FP (Kandie et al., 2024). However, in other cases, increased G_D is associated with diminished FP, potentially due to factors such as tokenism or ineffective integration (Almaqtari et al., 2024). Moreover, it seems that larger board sizes adversely impact performance, indicating the significance of an optimal board composition (Saidat et al., 2024).

In general, the empirical evidence reveals that BD is not universally advantageous and is influenced by relative factors such as governance structures, industry characteristics, and countrywide environments. Numerous academics suggest that companies implement balanced diversity strategies, emphasize independent oversight, and foster the authentic inclusion of women and foreign directors to fully realize the potential of diverse boards (Gharios et al., 2024; Hosny & Elgharbawy, 2022; Yunusa et al., 2024). Thus, without a supportive governance framework and meaningful roles for diverse members, BD alone may not automatically result in higher FP.

3.0 METHODOLOGY

3.1 Research Design

To explore the link between BD and FP in Nigeria's listed O&G companies, a panel data regression approach was utilized. This method incorporates both cross-sectional and time-series aspects, facilitating a more thorough examination of the variables' changes over time and their differences among the oil companies being studied.

3.2 Population and Sample Size

This study focused on the O&G industry in Nigeria as its population, with a sample made up of six O&G firms listed on the NGX.

3.3 Data Source

This study utilized data from the financial statements of listed O&G firms on the NGX, spanning a period of ten years (2014 - 2023). The reports provided thorough details about different types of board composition and the FP of the companies.

3.4 Method of Data Analysis

The research carried out a pre-analysis test to identify the appropriate estimation method for efficient coefficient estimation of the independent variables; a Hausman (HM) test was used to choose between random and fixed effects.

3.5 Model Specification

This study's model specification was developed to align with its objectives of assessing the effect of BD (represented by G_D, A_D, N_D, EP_D, and T_D) on FP (represented by ROA, ROE, and EPS) in the O&G sector. The model's implicit form is specified as follows:

financial performance $= f(board\ diversity)$……..……..…...3.1

Explicitly:

$ROA = f(G\_D, E\_D,\ A\_D, EP\_D, T\_D)$……'...3.2

$ROE = f(G\_D, E\_D,\ A\_D, EP\_D, T\_D)$……...…3.3

$EPS = f(G\_D, E\_D,\ A\_D, EP\_D, T\_D)$…… ……..…...3.4

Econometrically:

$ROA_{it} = \beta_0 + \beta_1 G\_D_{it} + \beta_2 E\_D_{it} + \beta_3 A\_D_{it} + \beta_4 EP\_D_{it} + \beta_5 T\_D_{it} + \mu_{1it}$ ……..…...3.5

$ROE_{it} = \theta_0 + \theta_1 G\_D_{it} + \theta_2 E\_D_{it} + \theta_3 A\_D_{it} + \theta_4 EP\_D_{it} + \theta_5 T\_D_{it} + \mu_{1it}$ ……..…...3.6

$EPS_{it} = \delta_0 + \delta_1 G\_D_{it} + \delta_2 E\_D_{it} + \delta\beta_3 A\_D_{it} + \delta_4 EP\_D_{it} + \delta_5 T\_D_{it} + \mu_{1it}$ ……3.7

Where;

ROA is return on assets

ROE is return on equity

EPS is earnings per share

$\beta_0,\ \theta_0, \delta_0$ are the intercepts of the model

$\beta_{1-5}, \theta_{1-5}, \delta_{1-5}$ are the coefficients of the independent variables to be estimated.

i – are the oil and gas firm

t- time period (2014 to 2023)

μ_{it} are the error terms of the model.

Table 1: Variable Measurement

Variables	Description	Measurement
G_D (Gender Diversity)	The board's representation of different genders.	$\frac{Number\ of\ female\ directors}{Total\ number\ of\ Board\ Members}$
N_D (National Diversity)	Board member diversity is founded on nationality or country of origin.	The number of foreign members to the total board members.
A_D (Age Diversity)	The variation in board members' ages.	The difference between the oldest and youngest board members. A wider range suggests greater diversity.
EP_D (Educational and Professional Diversity)	The diversity in board members' academic backgrounds and professional experience.	The number of distinct educational fields and professional backgrounds.
T_D (Tenure Diversity)	Difference in the length of service of board members within a company.	Standard Deviation of Tenure: Shows the dispersion of board members' length of service in years. A higher value indicates greater diversity.
ROA (Return on Assets)	Measure the effectiveness of asset use in generating income for the company.	$\frac{Net\ Income}{Total\ Assets}$
ROE (Return on Equity)	Measure how the company efficiently generates profit from its shareholders' investments.	$\frac{Net\ Income}{Total\ Equity}$
EPS (Earnings Per Share)	Measures the part of the entity's profit that is assigned to one equity share.	$\frac{Net\ Income}{Number\ of\ Equity\ Shares}$

4.0 DATA ANALYSIS AND INTERPRETATION

4.1 Hausman Test and Panel Regression Analysis

Table 2: Result of Hausman (HM) Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Equation 3.2	5.532634	5	0.3544
Equation 3.3	10.024349	5	0.0445
Equation 3.4	5.906233	5	0.3155

Source: Authors' Computation (2025)

According to the HM test results in Table 2, preferences for the fixed and random effects models differ depending on the outcomes of the three equations. The p-value for Equation 3.2 is 0.3544, which is > 0.05. This indicates acceptance of the null hypothesis, which states that the random effects model is appropriate for Equation 3.2.

The p-value for Equation 3.3 is 0.0445, which is less than 0.05. This indicates the rejection of the null hypothesis and acceptance of the fixed effects model. The p-value for Equation 3.4 is 0.3155, which is > 0.05; thus, the null hypothesis is accepted, and the random effects model is more suitable for Equation 3.4.

Table 3: Result of Panel Regression Analysis (Random Effect) for Equation 3.2

Dependent Variable: ROA				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
A_D	-0.106343	0.470572	-0.225988	0.8221
N_D	0.192206	0.555139	0.346231	0.7305
EP_D	-0.482174	0.376314	-2.281307	0.0056
G_D	0.249765	0.502487	0.497058	0.6212
T_D	0.413832	0.422102	0.980406	0.3313
C	-0.245056	0.605975	-0.404400	0.6875
R-squared	0.044456	Mean dependent var		0.013899
Adjusted R-squared	-0.044020	S.D. dependent var		0.421473
S.E. of regression	0.430650	Sum squared resid		10.01480
F-statistic	0.502464	Durbin-Watson stat		2.200374
Prob(F-statistic)	0.773048			

Source: Authors' Computation (2025)

The random effects model is used in the panel regression analysis shown in Table 3 to assess how the board diversity measure correlates with G_D, A_D, N_D, EP_D, and T_D in relation to ROA. The analysis reveals that A_D has a coefficient of -0.1063, suggesting that a 1 unit rise in A_D would lead to a 0.11 unit decrease in ROA. This association, however, is not statistically significant, as shown by the p-value of 0.8221. Likewise, N_D possesses a positive coefficient of 0.1922, indicating that a 1 unit rise in N_D would result in a 0.19 unit rise in ROA; however, the effect is statistically insignificant as well (p-value = 0.7305).

A coefficient of -0.4822 with a p-value of 0.056, EP_D shows that a rise of 1 unit in this area would significantly decrease ROA by 0.48 units. With a positive coefficient of 0.2498, G_D reveals that a 1 unit rise in G_D would lead to a rise of 0.25 units in ROA; however, this effect is statistically insignificant (p-value = 0.6212). The coefficient for T_D is 0.4138, which signifies that a 1-unit rise in T_D would result in an increase of ROA by 0.41 units. Nonetheless, this connection is statistically insignificant as well (p-value = 0.3313).

An R^2 value of 0.0445 indicates that the independent variables (A_D, N_D, EP_D, G_D, and T_D) account for just 4.45% of the variation in ROA. With a value of 2.2004, the Durbin-Watson statistic points to the non-existence of notable autocorrelation in the residuals. An F-statistic of 0.5025 and a p-value of 0.7730 show that the overall model lacks statistical significance, implying that the diversity metrics do not have a significant influence on ROA when considered together.

Table 4: Result of Panel Regression Analysis (Random Effect) for Equation 3.3

Dependent Variable: ROE				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
A_D	-0.656474	2.044696	-0.321062	0.7494
N_D	2.179751	2.412150	0.903655	0.3702
EP_D	-4.183981	1.635133	-2.558802	0.0133

G_D	-0.175267	2.183369	-0.080274	0.9363
T_D	2.889364	1.834088	1.575368	0.1210
C	-0.102377	2.633039	-0.038882	0.9691
R-squared	0.122942	Mean dependent var		0.287996
Adjusted R-squared	0.041733	S.D. dependent var		1.918077
S.E. of regression	1.877627	Sum squared resid		190.3761
F-statistic	5.513894	Durbin-Watson stat		2.543432
Prob(F-statistic)	0.020883			

Source: Authors' Computation (2025).

The panel regression analysis in Table 4 evaluates the relationship between BD proxies (G_D, A_D, N_D, EP_D, and T_D) and ROE by employing the random effects model. The examination reveals that A_D relates negatively to ROE, presenting a coefficient of -0.6565; however, this relationship lacks statistical significance. This suggests that a rise in A_D would make ROE fall by 0.66 units; however, this impact is not significant, as reflected by the p-value of 0.7494. Likewise, N_D shows a positive correlation with ROE, indicated by a coefficient of 2.1798 and a p-value of 0.3702; however, the association is statistically insignificant.

Conversely, the relationship between educational and professional Diversity (EP_D) and ROE is statistically significant and negative, characterized by a coefficient of -4.1840 and a p-value of 0.0133. The indication of this is that a rise in EP_D correlates with a fall in ROE by 4.18 units, implying that EP_D has a negative impact on performance. The impact of G_D on ROE is negative, as indicated by a coefficient of -0.1753 and a p-value of 0.9363; however, this effect is not significant. T_D shows a positive correlation with ROE, characterized by a coefficient of 2.8894. However, this link is insignificant, as shown by a p-value of 0.1210, suggesting that T_D does not influence ROE significantly.

With an R-squared value of 0.1229, it can be inferred that the independent variables (A_D, N_D, EP_D, G_D, and T_D) account for approximately 12.29% of the variation in ROE. With a value of 2.5434, the Durbin-Watson statistic means no considerable autocorrelation in the residuals. An F-statistic of 5.5139 and a p-value of 0.0209 indicate that the independent variables have significantly explained the dependent variable, suggesting the model is fit and that the diversity measures have a significant relationship with ROE.

Table 5: Result of Panel Regression Analysis (Fixed Effect) for Equation 3.4

Dependent Variable: EPS				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
A_D	-34.26079	220.0757	-0.155677	0.8769
N_D	39.65101	244.3983	0.162239	0.8718
EP_D	-519.7861	224.0475	-2.319982	0.0246
G_D	40.18050	287.4990	0.139759	0.8894
T_D	470.7030	175.1042	2.688131	0.0098
C	-74.53149	442.6537	-0.168374	0.8670
R-squared	0.266604	Mean dependent var		-17.73550
Adjusted R-squared	0.116931	S.D. dependent var		179.1076
S.E. of regression	168.3105	Akaike info criterion		13.25364
Sum squared resid	1388093.	Schwarz criterion		13.63760
Log-likelihood	-386.6092	Hannan-Quinn critter.		13.40383
F-statistic	1.781248	Durbin-Watson stat		2.707343
Prob(F-statistic)	0.089305			

Source: Authors' Computation (2025).

The panel regression results in Table 5 illustrate the association between Age Diversity (A_D), National Diversity (N_D), Educational and Professional Diversity (EP_D), Gender Diversity (G_D), Tenure Diversity (T_D), and EPS of the listed O&G companies. The results show that A_D has a negative association with EPS, characterized by a coefficient of -34.2608. However, this relationship is statistically insignificant, indicating that while a 1-unit rise in A_D will correspond to a fall of 34.26 units in EPS, this effect should not be considered meaningful. Nonetheless, the effect is not substantial, as revealed by the p-value of 0.8769. This means that A_D has an insignificant influence on EPS.

Likewise, N_D (national Diversity) reveals a positive relationship with EPS, though it is statistically insignificant. Its coefficient is 39.6510, suggesting that an increase of 1 unit in N_D would result in an increase of 39.65 units in EPS. Nonetheless, this effect

lacks statistical significance, as revealed by the p-value of 0.8718. This implies that national diversity does not significantly impact EPS.

In contrast, EP_D demonstrates a statistically significant negative link with EPS, having a coefficient of -519.7861. This suggests that a rise of 1% in EP_D would result in a decrease of EPS by 519.79 units, with a p-value of 0.0246, which demonstrates the statistical significance of the relationship. G_D shows a positive link with EPS, indicated by a coefficient of 40.1805. This suggests that a rise of 1 unit in G_D would result in an increase of 40.18 units in EPS, although the relationship is statistically insignificant with the p-value of 0.8894.

In contrast, T_D (Tenure Diversity) demonstrates a positive correlation with EPS that is statistically significant, having a coefficient of 470.7030 and a p-value of 0.0098. This reveals that increasing T_D by 1 unit would result in a significant increase of 470.70 units in EPS.

An R-squared value of 0.2666 means that around 26.66% of the variation in EPS can be attributed to the independent variables (A_D, N_D, EP_D, G_D, and T_D). With a value of 2.7073, the Durbin-Watson statistic suggests that the model's residuals do not exhibit significant autocorrelation. With an F-statistic of 1.7812 and a p-value of 0.0893, the overall model demonstrates statistical significance at the 10% level.

4.2 Discussion of Findings

This study examined how factors related to board diversity affect the FP of O&G companies listed on the NGX, utilizing panel regression analyses with fixed and random effects models from 2014 to 2023. Table 3 shows that Age diversity (A_D), national diversity (N_D), gender diversity (G_D), and tenure diversity (T_D) all have coefficients that are statistically insignificant, as their p-values exceed 0.05. Yet, the coefficient for educational and professional diversity (EP_D) is negatively significant at the 5% level. suggesting that companies with boards comprising individuals from varied educational and professional backgrounds experience a lower ROA. This discovery is consistent with agency theory, which posits that excessive diversity can result in heightened agency costs stemming from conflicts, misaligned interests, and challenges in achieving consensus on strategic decisions. The discovery concerning the connection between G_D and ROA corroborates the results of Saidat et al. (2024); Hosny & Elgharbawy (2022), and Purwito (2024) but is in contrast to the results of Gharios et al. (2024) and Masa'deh et al. (2024), which identified a significantly positive correlation between G_D and ROA; and Al Ismaili et al. (2024) and Hosny & Elgharbawy (2022), which identified a significant negative correlation between G_D and ROA.

In Table 4, the ROE variable demonstrates a statistically significant inverse correlation with educational and professional diversity (EP_D), as revealed by its coefficient of -4.1839 and p-value of 0.0133. This indicates that a rise of 1 unit in EP_D results in a reduction of ROE by 4.18. This implies that enhancing the diversity of education and profession among board members may lead to a decrease in ROE, possibly because differing strategic viewpoints hinder decision-making speed. This discovery aligns with resource dependency theory (RDT), which posits that although diversity can grant firms access to a wider range of knowledge and expertise, an excess of variation in educational and professional backgrounds may lead to inefficiencies. Companies in the oil and gas industry work within a highly specialized and technical setting, where a uniformity of expertise may prove more advantageous than an overabundance of diversity. Meanwhile, A_D, N_D, G_D, and T_D demonstrate relationships with ROE that lack statistical significance. The finding regarding the connection between G_D and ROE contradicts that of Yunusa et al. (2024), which identified a significant positive relationship between the two. Furthermore, the result concerning N_D and ROE negates the finding of Al Ismaili et al. (2024), which discovered a positive effect of N_D on ROE. The finding of this study, however, supports the conclusion drawn by Al Ismaili et al. (2024) regarding the negative and significant relationship between EP_D and ROE.

As indicated in Table 5, for EPS, a statistically significant negative relationship exists with EP_D, characterized by a coefficient of -519.7861 and a p-value of 0.0246. Excessive diversity in educational and professional backgrounds adversely impacts firms' earnings performance, a phenomenon that can be understood through the lens of systems theory. An organization operates as a connected whole from a systems perspective, and if board diversity disrupts cohesion and decision-making efficiency, it may lead to reduced financial performance. When a company has an excess of divergent perspectives, it may find aligning corporate strategies challenging; this can result in diminished shareholder value. In contrast, tenure diversity (T_D) shows a noteworthy positive relationship with EPS, as revealed by a coefficient of 470.703 and a p-value of 0.0098. This means a rise in T_D has a beneficial impact on EPS. This implies that the presence of directors with differing lengths of tenure enhances financial outcomes by providing a blend of seasoned experience and innovative viewpoints in decision-making. This discovery is in accordance with RDT, which proposes that a board made up of both experienced and newer members can effectively balance stability and innovation, resulting in improved financial outcomes. However, A_D, N_D, and G_D demonstrate relationships with EPS that lack statistical significance.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The findings of this study show that board diversity has a mixed impact on the FP of listed O&G companies in Nigeria. In particular, the results demonstrate that BD factors A_D, N_D, and G_D do not have a statistically significant association with ROA, ROE, and

EPS. Nonetheless, EP_D shows a statistically significant adverse effect on ROA, ROE, and EPS, implying that excessive diversity in educational and professional backgrounds may hinder the effectiveness of board decisions and reduce financial performance. Conversely, tenure diversity (T_D) indicates a positive and notable relationship with EPS but no significant relationship with ROA and ROE, implying that diverse board tenure aids in the improvement of company earnings per share, probably as a result of combining experienced insights with new viewpoints, but has no influence on ROA and ROE.

The results emphasize the significant effect of BD on FP and suggest that while diversity is a critical governance consideration, its impact may vary across dimensions and performance metrics. Companies should approach diversity strategically, focusing on balancing different forms of diversity to optimize decision-making without undermining cohesion or effectiveness. The significant negative impact of educational and professional diversity underscores the need for oil and gas firms to align diverse qualifications with organizational goals while leveraging the positive effects of tenure diversity to enhance shareholder value. Policymakers and practitioners should consider these insights when designing corporate governance frameworks to foster sustainable financial growth in the industry

5.2 Contribution to Knowledge

This study adds to the existing knowledge base by investigating how board diversity influences financial performance in Nigeria's O&G industry. It highlights that while educational and professional diversity negatively affects ROA, ROE, and EPS, tenure diversity positively influences EPS, providing critical insights into board composition strategies. The study offers context-specific evidence to guide governance practices by focusing on a decade-long analysis. It also enriches corporate governance literature in emerging economies, particularly within vital industries like oil and gas.

5.3 Recommendations

Balanced Board Diversity: Companies should strive for a balanced approach to board diversity by integrating varied perspectives while ensuring alignment with organizational goals. Excessive diversity in educational and professional backgrounds should be managed to avoid potential decision-making inefficiencies that could negatively impact financial performance.

Leverage Tenure Diversity: Firms should promote tenure diversity on boards to harness the benefits of experience and fresh perspectives. The considerable beneficial effect of tenure diversity on EPS underscores the importance of having both experienced and newer board members in fostering innovative and effective decision-making.

Tailored Governance Practices: Policymakers and practitioners should tailor corporate governance frameworks to address industry-specific dynamics. For oil and gas firms, this includes focusing on diversity dimensions that positively influence financial outcomes while ensuring board cohesion and effectiveness.

Continuous Monitoring and Evaluation: Companies should implement mechanisms to regularly assess how board diversity affects financial performance. Periodic evaluations can help identify the optimal diversity mix, enabling firms to make informed adjustments that enhance governance and drive sustainable financial growth.

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