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# OPTIMIZING SCALE EFFICIENCY: EXAMINING AUDIT COMMITTEE SIZE AND DILIGENCE IN NIGERIAN MANUFACTURING FIRMS

**Osarenren Aigienohuwa[1] and Osasogie Irowa-Omoregie[2]**
[1]Department of Business Administration, Unibersity of Benin, Benin City, Edo, Nigeria
[2]Department of Accounting, University of Benin, Edo, Nigeria

**Corresponding Email Address:** blessedosas@yahoo.com

***Abstract***

*This study investigates the relationship between audit committee size, audit committee diligence, and scale efficiency in Nigerian manufacturing firms. Audit committee size influences the breadth of expertise and oversight capacity, while diligence, measured by the frequency of meetings, reflects the committee's commitment to effective monitoring and decision-making. Using a panel dataset, the study analyzed data from 50 listed Nigerian manufacturing firms between 2012 and 2022. Panel regression models were used to evaluate the impact of these audit committee attributes on scale efficiency, measured through scale efficiency based on turnover and scale efficiency based on assets. The findings reveal that audit committee diligence has a positive and statistically significant impact on scale efficiency based on assets, highlighting the importance of regular and structured meetings in enhancing operational efficiency. However, diligence showed an insignificant relationship with scale efficiency based on turnover, indicating that frequent meetings alone may not directly influence revenue-based efficiency. Audit committee size exhibited a negative and statistically significant relationship with scale efficiency based on assets, suggesting that excessively large committees may hinder operational performance. These results contribute to the existing literature on corporate governance by providing empirical evidence on the role of audit committee attributes in promoting scale efficiency in Nigerian manufacturing firms.*

***Keywords:*** *Audit committee size, Audit committee diligence, Scale efficiency, Nigerian manufacturing firms.*

## INTRODUCTION

The audit committee plays a critical role in ensuring financial oversight, maintaining accountability, and enhancing the accuracy of financial reporting in modern organizations. As firms navigate increasingly complex business environments, the effectiveness of audit committees has gained prominence in academic and professional discourses. Audit committees are tasked with monitoring internal controls, reviewing financial statements, and liaising with external auditors to minimize financial irregularities (Adegbite et al., 2013). Their effectiveness hinges on several factors, including size and diligence, both of which influence operational efficiency and financial performance.

Audit committee size is a critical determinant of the committee's ability to fulfill its responsibilities effectively. Larger committees often bring diverse expertise and perspectives, improving the ability to identify operational inefficiencies and mitigate financial risks (Aigienohuwa & Irowa-Omoregie, 2025). However, excessively large committees may

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encounter challenges such as slow decision-making, coordination difficulties, and diluted accountability, which can undermine their effectiveness in promoting scale efficiency. Conversely, smaller committees may operate more efficiently but may lack the breadth of knowledge and expertise needed to address complex governance issues. Identifying the optimal audit committee size is crucial for ensuring that committees can effectively oversee financial management and enhance operational efficiency in Nigerian manufacturing firms.

Audit committee diligence, often measured by the frequency of meetings and the quality of deliberations, is another key factor influencing scale efficiency. Diligent audit committees meet frequently to review financial statements, assess internal controls, and address emerging risks, thereby promoting timely and informed decision-making. Regular and focused meetings allow audit committees to identify inefficiencies and recommend corrective actions, contributing to improved scale efficiency. However, excessive diligence may result in diminishing returns, with overly frequent meetings leading to administrative inefficiencies and increased operational costs (Adamu & Ugwudioha, 2025). Therefore, striking a balance between diligence and efficiency is essential for maximizing the effectiveness of audit committees in Nigerian manufacturing firms.

In Nigeria, the importance of audit committees has been highlighted by several high-profile corporate failures, including the collapse of Cadbury Nigeria and the banking crises of the early 2000s. These events exposed weaknesses in financial oversight and governance structures, prompting regulatory bodies such as the Securities and Exchange Commission (SEC) and the Financial Reporting Council of Nigeria (FRCN) to introduce stricter requirements for audit committees. These reforms mandate a minimum number of independent members and set guidelines for meeting frequencies to enhance diligence. Despite these efforts, the effectiveness of audit committees in achieving scale efficiency remains a subject of debate, particularly in the Nigerian manufacturing sector, (Eyenubo, et al, 2017).

Scale efficiency, which measures a firm's ability to optimize the use of available resources relative to its turnover and total assets, is a critical indicator of operational performance. Firms that achieve high levels of scale efficiency are better positioned to generate profits, manage costs, and sustain long-term growth. Audit committee size and diligence play pivotal roles in enhancing scale efficiency by ensuring that resources are allocated efficiently and that operational inefficiencies are promptly addressed. However, empirical findings on the relationship between audit committee characteristics and scale efficiency are mixed, with some studies highlighting positive effects while others report negligible or even negative outcomes (Aigienohuwa & Irowa-Omoregie, 2025).

This study seeks to address these gaps by examining the impact of audit committee size and diligence on scale efficiency in Nigerian manufacturing firms. By focusing on these critical audit committee attributes, the study aims to provide a nuanced understanding of how governance practices influence operational efficiency in the Nigerian manufacturing sector. The findings are expected to offer valuable insights for policymakers, regulators, and corporate leaders seeking to enhance the effectiveness of audit committees and promote sustainable growth in the manufacturing industry.

In conclusion, this study underscores the nuanced impact of audit committee characteristics—specifically size and diligence—on scale efficiency within Nigeria's manufacturing sector. While diligence positively correlates with improved asset-based efficiency, excessively large audit committees may impede effective oversight, emphasizing the importance of balanced

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committee composition. These findings contribute to existing literature by contextualizing audit committee effectiveness within an emerging economy marked by regulatory and operational complexities. The study not only reinforces agency theory in explaining governance mechanisms but also calls for regulatory reforms and corporate policies that encourage optimal audit committee structuring.

The rest of the paper is organized as follows. Section 2 presents the literature review, highlighting key empirical studies and theoretical underpinnings related to intellectual capital and market valuation. Section 3 outlines the methodology, detailing the research design, model specification, variable definitions, and data sources. Section 4 discusses the empirical results, including descriptive statistics, correlation analysis, and regression findings. Finally, Section 5 concludes the study by summarizing key findings, offering policy recommendations, and suggesting directions for future research

## REVIEW OF LITERATURE AND HYPOTHESES DEVELOPMENT

### 2.1 Conceptual Review

Scale Efficiency

Scale efficiency measures a firm's ability to optimize resource utilization for maximum output, reflecting operational effectiveness and financial stability. It indicates how well a company uses its available resources relative to its size and operational capacity. Higher scale efficiency suggests that the firm is generating significant output with minimal waste, signifying effective cost management and streamlined operations. In Nigerian manufacturing firms, scale efficiency is particularly critical due to resource constraints, infrastructural challenges, and fluctuating production costs. Achieving high scale efficiency enables firms to enhance profitability, withstand economic pressures, and maintain competitiveness in the marketplace.

Scale efficiency is often evaluated using two proxies: scale efficiency based on turnover (SEt) and scale efficiency based on assets (SEa). SEt measures the firm’s ability to convert turnover into gross profit, while SEa assesses the utilization of total assets to generate revenue. These indicators provide insights into the firm’s operational efficiency and its ability to optimize production processes and asset management, (Odjaremu & Jeroh, 2019). For Nigerian manufacturing firms, where production inefficiencies and inconsistent energy supply pose significant challenges, maintaining scale efficiency is essential for long-term sustainability.

Audit Committee Size and Diligence

Audit committee size refers to the number of members on the audit committee and plays a significant role in influencing the committee’s effectiveness. Larger committees bring diverse perspectives, skills, and expertise, enabling them to identify financial inefficiencies and strengthen oversight. However, excessively large committees may experience challenges related to slow decision-making and coordination difficulties, potentially undermining their effectiveness (Yahaya, 2025). Optimal audit committee size balances inclusivity with efficiency, ensuring that the committee can effectively oversee financial management without compromising operational speed.

Audit committee diligence, measured by the frequency and quality of meetings, reflects the committee’s commitment to its oversight responsibilities. Diligent audit committees meet

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regularly to review financial reports, assess internal controls, and address emerging risks. Increased meeting frequency enhances the committee's capacity to identify operational inefficiencies, improve financial accuracy, and implement corrective measures (Essien, 2024). However, excessive diligence may lead to administrative inefficiencies and increased costs, highlighting the need for a balanced approach. In the context of Nigerian manufacturing firms, where operational complexities often challenge governance structures, the interplay between audit committee size and diligence is essential for optimizing scale efficiency and sustaining long-term performance.

## 2.2 Empirical Review

Audit Committee Size and Scale Efficiency

Audit committee size, defined by the number of members on the committee, significantly affects its capacity to provide effective oversight. Scale efficiency, a measure of operational performance, evaluates a firm's ability to maximize output relative to resource inputs. Empirical research on the relationship between audit committee size and scale efficiency presents mixed findings, categorized as positive and significant, negative and significant, and non-significant.

Several studies have established a positive and significant relationship between audit committee size and scale efficiency. Larger audit committees typically bring diverse expertise and perspectives, which enhance monitoring and decision-making. Odjaremu & Jeroh (2019) found that larger audit committees in Nigerian manufacturing firms contributed to improved scale efficiency by identifying inefficiencies and ensuring prudent resource utilization. Similarly, Yahaya (2025) reported that Nigerian firms with larger committees experienced higher gross profit margins and resource optimization due to enhanced financial oversight. Farhan et al. (2020) also observed that larger audit committees provided more rigorous scrutiny, preventing operational inefficiencies and fostering scale efficiency.

However, some studies report a negative and significant relationship between audit committee size and scale efficiency. Kurawa and Shuaibu (2022) argued that overly large committees in Nigerian firms often encountered coordination difficulties and slow decision-making, leading to reduced scale efficiency. (Aigienohuwa & Irowa-Omoregie, 2025) noted that large audit committees sometimes struggled to reach a consensus, resulting in delayed operational decisions and diminished effectiveness. (Eyenubo, et al, 2017) highlighted that excessive diversity within large committees may lead to conflicting priorities, further impairing scale efficiency.

Conversely, other studies indicate no significant relationship between audit committee size and scale efficiency. Bako (2024) found a weak positive relationship in Nigerian firms but concluded that size alone was insufficient to determine effectiveness. Similarly, (Adegbite et al., 2013) reported that committee size had no direct impact on scale efficiency, suggesting that factors such as expertise and diligence were more influential. (Essien, 2024) argued that firms with strong internal controls and governance frameworks may not necessarily benefit from larger audit committees, leading to non-significant findings.

The mixed findings on audit committee size and scale efficiency suggest that size alone may not be a definitive factor in determining scale efficiency. While larger committees may enhance oversight, excessive size may lead to inefficiencies. To evaluate this relationship, the following hypothesis is formulated:

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*$H_{01}$: Audit committee size has no significant effect on the scale efficiency of Nigerian manufacturing firms.*

Audit Committee Diligence and Scale Efficiency

Audit committee diligence, measured by the frequency and quality of meetings, reflects the committee's commitment to its oversight responsibilities. Scale efficiency measures how effectively a firm utilizes its resources, and empirical evidence suggests mixed findings on the relationship between audit committee diligence and scale efficiency.

Numerous studies report a positive and significant relationship between audit committee diligence and scale efficiency. Aigienohuwa & Irowa-Omoregie (2025) found that frequent and well-structured audit committee meetings enhanced operational efficiency by identifying inefficiencies and implementing corrective actions. (Odjaremu & Jeroh, 2019) also demonstrated that diligent audit committees in Nigerian manufacturing firms improved scale efficiency by addressing emerging challenges and ensuring efficient resource management. Yahaya (2025) observed similar outcomes in sub-Saharan Africa, where diligent audit committees played a critical role in improving operational performance.

On the other hand, some studies suggest a negative and significant relationship between audit committee diligence and scale efficiency. Essien (2024) argued that overly frequent meetings led to administrative inefficiencies and increased operational costs, which negatively impacted scale efficiency in Nigerian firms. Hassan, et al, (2021) observed that excessive diligence overwhelmed management, disrupting day-to-day operations and reducing operational efficiency. Kurawa and Shuaibu (2022) reported that in some contexts, diligent audit committees focused excessively on compliance issues, neglecting broader operational concerns that affect scale efficiency.

Other studies report non-significant relationships between audit committee diligence and scale efficiency, suggesting that diligence alone may not guarantee improved performance. (Adegbite et al., 2013). found a weak positive relationship but concluded that its insignificance was due to other overriding factors such as committee expertise and independence. Yahaya (2024) reported a non-significant negative relationship, arguing that firms with robust internal controls may not rely heavily on audit committee diligence to drive scale efficiency. Adamu & Ugwudioha (2025) emphasized that in highly regulated industries, external oversight often complements internal governance, making diligence less impactful on scale efficiency.

Given the mixed findings on audit committee diligence and scale efficiency, it is evident that diligence alone may not be sufficient to guarantee operational efficiency. The effectiveness of diligence may depend on complementary factors such as expertise and independence. To assess this relationship, the following hypothesis is proposed:

*$H_{02}$: Audit committee diligence has no significant effect on the scale efficiency of Nigerian manufacturing firms.*

The empirical evidence on audit committee size, diligence, and scale efficiency remains inconclusive. Positive results highlight the benefits of larger and more diligent committees, while negative findings emphasize the risks of inefficiencies associated with excessive size and diligence. Non-significant findings suggest that other factors, such as expertise and independence, may mediate the relationship between audit committee attributes and scale

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efficiency. This study contributes to this debate by exploring the nuanced dynamics of audit committee size and diligence in Nigerian manufacturing firms, where operational efficiency is crucial for sustained growth and competitiveness.

### 2.3 Theoretical Framework

The relationship between audit committee size, audit committee diligence, and scale efficiency can be analyzed through two prominent theoretical frameworks: agency theory and resource dependence theory. These frameworks provide valuable insights into how audit committees contribute to operational efficiency and ensure effective resource utilization (Jensen and Meckling, 1976; Pfeffer and Salancik, 1978).

Agency theory, developed by Jensen and Meckling (1976), addresses the conflicts of interest that arise between managers (agents) and shareholders (principals). Managers may prioritize personal objectives that conflict with shareholder interests, creating the need for oversight mechanisms such as audit committees. Audit committee size, which ensures a diversity of expertise and perspectives, and diligence, reflected in frequent and well-structured meetings, serve as critical governance attributes that mitigate agency conflicts. Larger and more diligent audit committees strengthen monitoring, reduce information asymmetry, and promote scale efficiency by minimizing operational inefficiencies and enhancing decision-making processes, Jensen and Meckling (1976).

Resource dependence theory, proposed by Pfeffer and Salancik (1978), suggests that organizations depend on external resources and expertise to maintain stability and improve performance. In the context of audit committees, diversity in expertise and perspectives provided by larger committees, coupled with a strong commitment to diligence, equips firms with the skills and knowledge necessary to address complex operational challenges. Diligent and well-composed audit committees contribute to better scale efficiency by ensuring thorough evaluation of financial decisions and optimal allocation of resources. The combination of diverse knowledge and consistent oversight helps mitigate risks, reduce inefficiencies, and promote operational excellence, Pfeffer and Salancik, (1978).

While both frameworks offer valuable insights, agency theory is the most applicable to this study, given the Nigerian corporate environment, which is characterized by weak governance structures, regulatory lapses, and managerial opportunism. This framework provides a solid foundation for understanding how audit committee size and diligence mitigate agency conflicts and enhance scale efficiency by promoting accountability and improving oversight. Larger committees, with their diverse expertise, and diligent committees, through their active engagement, serve as effective mechanisms for reducing operational inefficiencies and enhancing resource management in Nigerian manufacturing firms.

In conclusion, agency theory offers a compelling lens through which to understand how audit committee size and diligence influence scale efficiency in Nigerian manufacturing firms. By highlighting the value of effective oversight and diverse expertise, this framework helps explain how well-structured and active audit committees can reduce inefficiencies, strengthen accountability, and support the drive for sustainable growth across the manufacturing sector, (Aigienohuwa & Irowa-Omoregie, 2025)

ISSN: 2795-3831
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## RESEARCH METHODOLOGY

This study investigates the relationship between audit committee size, audit committee diligence, and scale efficiency in Nigerian manufacturing firms. A quantitative research design is adopted, employing a panel research approach that integrates cross-sectional and time-series data from 50 firms listed on the Nigerian Exchange Group (NGX) between 2012 and 2022. This approach accounts for firm-specific differences and assesses the longitudinal effects of audit committee attributes on scale efficiency, providing a robust framework for analyzing how these factors influence operational performance over time.

The study is guided by a positivist research philosophy, which emphasizes empirical evidence and statistical analysis to test the formulated hypotheses. Purposive sampling is utilized to select 49 firms based on the availability of complete and consistent financial data. Secondary data is sourced from annual reports and financial statements, ensuring reliability and validity through the use of audited financial disclosures. This method enhances the accuracy of the analysis and minimizes potential biases associated with incomplete or inconsistent data.

This study adopts an unbalanced panel regression model. This approach is particularly useful because it allows us to track individual firms over time, capturing both their unique characteristics and the changes they experience. This study adopts an unbalanced panel regression model to accommodate variations in data availability across firms and years, ensuring that all usable observations are included despite missing values for some time periods Two different aspects of scale efficiency are analyzed: one based on turnover ($SE_t$) and the other based on total assets ($SE_a$). This dual approach helps paint a fuller picture of how efficiently firms are using their resources from different operational perspectives.

The model used for the analysis is structured as follows:

$$SE_{it} = \beta 0 + \beta_1 ACI_{it} + \beta_2 ACG_{it} + \beta_3 FS_{it} + \beta_4 LEV_{it} + \varepsilon_{it}$$

In this equation, SE represents the scale efficiency of a firm in a given year; ACI stands for audit committee independence, measured by the proportion of non-executive directors on the committee; ACG reflects gender diversity, calculated as the percentage of female members on the audit committee. The model also includes firm size (FS), which is captured through the natural log of total assets, and leverage (LEV), measured as the ratio of total liabilities to total assets, expressed as a percentage. These variables are included to control for firm-specific factors that might affect efficiency.

To make sense of the data, we begin with descriptive statistics to understand the overall trends and patterns in the sample. A correlation matrix follows, helping us assess the relationships between variables and ensuring that none are too closely related (which could distort our results). The core analysis involves panel regression, using both fixed and random effects models to account for firm-level differences. The Hausman test guides the choice between these models, based on whether unobserved characteristics are likely to influence the results.

We also run several important diagnostic checks to ensure the reliability of our findings. These include tests for heteroskedasticity (unequal variances), autocorrelation (patterns in residuals over time), and normality of residuals. Multicollinearity is also assessed using the Variance Inflation Factor (VIF). All these steps are conducted using STATA version 17, a powerful tool for panel data analysis. The goal is to ensure the robustness of the results while giving a well-

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rounded view of how audit committee characteristics relate to operational efficiency in real-world settings.

## DATA PRESENTATION, ANALYSES AND INTERPRETATIONS

This section presents the empirical results of the study, analyzing the relationship between audit committee size, audit committee diligence, and scale efficiency in Nigerian manufacturing firms. The data is examined using descriptive statistics, correlation analysis, and panel regression models to evaluate how these audit committee attributes influence scale efficiency. The findings are compared with existing literature, offering insights into the role of audit committee size and diligence in enhancing operational efficiency and optimizing resource utilization in Nigerian manufacturing firms.

### Descriptive Statistics

The descriptive statistics summarize the key variables, providing insights into their central tendencies and variability

**Table 1: Descriptive statistics**

| *Variable* | *Mean* | *Median* | *Maximum* | *Minimum* | *Std. Dev* | *N* | *JB (Normality)* |
|---|---|---|---|---|---|---|---|
| *SEt* | *30* | *29* | *93* | *-198* | *21* | *476* | *0.0000**** |
| *SEa* | *3.1* | *3.6* | *617* | *-256* | *36* | *487* | *0.0000**** |
| *ACS* | *5.5* | *6* | *9* | *0* | *1* | *476* | *56.68 (0.0000***)* |
| *ACD* | *3.8* | *4* | *8* | *0* | *0.8* | *474* | *0.0000**** |
| *FSA* | *16* | *16* | *22* | *11* | *2.2* | *487* | *13.80 (0.0010**)* |
| *LEV* | *91* | *59* | *2354* | *12* | *206* | *487* | *0.0000**** |

*Note: SEt – Scale Efficiency (Turnover); SEa: Scale Efficiency (Assets); ACS: Audit Committee Size; ACD: Audit Committee Diligence; LEV: Leverage; FSA: Firm Size. (FSA and LEV are Control Variables).*
*Source: Researcher Computation (2024)*

The descriptive statistics offer a snapshot of the key variables in this study, helping to paint a clearer picture of how Nigerian manufacturing firms operate in terms of efficiency and governance. On average, scale efficiency based on turnover (SEt) stands at 30, with a typical firm falling just below that at 29. The standard deviation of 21 suggests noticeable differences across firms, while the extreme values—ranging from -198 to 93—imply that although many firms operate efficiently, a few struggle significantly with resource utilization. Similarly, scale efficiency based on assets (SEa) has a relatively low average of 3.1, but a much wider spread, with a standard deviation of 36 and values spanning from -256 to 617. These wide variations point to stark differences in how well firms convert assets into output, revealing both high performers and those lagging behind.

Turning to audit committee characteristics, the average size (ACS) of about 5.5 members with little variation suggests a fairly consistent governance structure across the sampled firms. Audit committee diligence (ACD), measured by meeting frequency, averages around four meetings per year—a sign that many firms are meeting the minimum recommended standards for oversight engagement. Firm size (FSA) is relatively uniform across the sample, suggesting a somewhat comparable operating scale, while leverage (LEV) reveals more diverse financial structures. With a mean of 91 and a very high standard deviation of 206, some firms are heavily

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debt-laden, whereas others are more conservatively financed. Finally, the Jarque-Bera normality tests show that none of the variables follow a normal distribution, emphasizing the need for robust or non-parametric techniques in the analysis to ensure reliable and valid results.

**Correlation Analysis**

The correlation analysis assesses the strength and direction of relationships between the study variables.

**Table 2a: Correlation Analysis for Scale Efficiency by Turnover**

| *Var* | *SEt* | *ACS* | *ACD* | *FS* | *LEV* |
|---|---|---|---|---|---|
| *SEt* | *1* | | | | |
| *ACS* | *0.046* | *1* | | | |
| *ACI* | *0.0165* | *-0.1233* | | | |
| *ACG* | *0.1068* | *0.049* | *-0.0343* | | |
| *FS* | *0.1859* | *0.4604* | *0.1573* | *1* | |
| *LEV* | *-0.0594* | *-0.0063* | *-0.0393* | *-0.1058* | *1* |

*Source: Researcher Computation (2024)*

**Table 2b: Correlation Analysis for Scale Efficiency by Assets**

| *Var* | *SEa* | *ACS* | *ACD* | *FS* | *LEV* |
|---|---|---|---|---|---|
| *SEa* | *1* | | | | |
| *ACS* | *0.0307* | *1* | | | |
| *ACI* | *-0.0714* | *-0.1233* | | | |
| *ACG* | *0.1452* | *0.049* | *-0.0343* | | |
| *FS* | *0.2323* | *0.4604* | *0.1573* | *1* | |
| *LEV* | *-0.7382* | *-0.0063* | *-0.0393* | *-0.1058* | *1* |

*Source: Researcher Computation (2024)*

The correlation analysis presented in Tables 2a and 2b offers valuable insights into the relationships among the study variables, particularly in relation to scale efficiency based on turnover (SEt) and scale efficiency based on assets (SEa). These results help illuminate how key audit committee characteristics and firm-specific variables interact with different aspects of operational efficiency in Nigerian manufacturing firms.

From Table 2a, scale efficiency measured by turnover (SEt) shows a weak but positive correlation with audit committee size (ACS) at 0.0460 and a similarly weak positive correlation with audit committee diligence (ACD) at 0.0165. These suggest that increases in audit committee size or meeting frequency have only a mild association with turnover-based efficiency. Interestingly, the relationship between SEt and audit committee gender diversity (ACG) is slightly stronger (0.1068), indicating a small potential efficiency gain from having a gender-diverse audit committee. The firm size (FS) also correlates modestly with SEt (0.1859), implying that larger firms may experience better turnover efficiency. In contrast, leverage (LEV) displays a weak negative correlation with SEt (-0.0594), hinting that higher debt levels could marginally hinder a firm's ability to generate revenue efficiently.

Table 2b focuses on scale efficiency measured by assets (SEa). Here, audit committee size (ACS) again shows a very weak positive correlation (0.0307) with SEa, while audit committee diligence (ACD) appears slightly negatively associated at -0.0714, although the strength of these relationships is minimal. Notably, audit committee gender diversity (ACG) correlates with

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SEa at 0.1452, stronger than its association with SEt, suggesting that gender diversity may play a more meaningful role in asset-based efficiency. Firm size maintains a modest positive correlation (0.2323) with SEa, reinforcing the idea that larger firms are better positioned to convert assets into productive output. The most striking relationship in this table is between leverage and SEa, with a strong negative correlation of -0.7382. This clearly indicates that heavily leveraged firms are significantly less efficient in managing their assets, underlining the risk that excessive debt poses to operational effectiveness in the manufacturing sector.

**Regression Analysis**

The regression analysis assesses how audit committee effectiveness influences corporate financial performance by examining the significance and direction of these relationships.

The regression results presented in Tables 3a and 3b provide meaningful insights into how internal governance mechanisms—specifically audit committee characteristics—affect the operational efficiency of Nigerian manufacturing firms, measured through two dimensions of scale efficiency: turnover-based (SEt) and asset-based (SEa).

Starting with the turnover-based model (Table 3a), the analysis reveals that audit committee size (ACS) has a negative coefficient of –1.63, suggesting that larger committees may be counterproductive to scale efficiency. However, this relationship is not statistically significant ($p = 0.138$), implying that while increased size may introduce coordination and oversight challenges, the evidence is not strong enough to draw definitive conclusions. Similarly, audit committee diligence (ACD), measured by the frequency of meetings, has a positive but statistically insignificant effect (coefficient = 0.95, $p = 0.397$). This indicates that although more frequent meetings are expected to enhance oversight, they may not automatically translate into better operational outcomes unless the meetings are focused, strategic, and backed by expertise.

Firm size (FS) exhibits a positive association with efficiency (coefficient = 1.62), aligning with the expectation that larger firms enjoy scale advantages. Yet, this effect is also not statistically significant ($p = 0.404$), pointing to the possibility that size alone is not enough to drive efficiency without effective resource deployment. Leverage (LEV), however, tells a different story. With a statistically significant negative coefficient of –0.0217 ($p = 0.003$), it clearly suggests that firms with higher debt burdens tend to suffer from reduced scale efficiency. This may be due to financial strain or inefficient allocation of borrowed funds.

The overall model fit, while statistically significant ($F = 3.00$, $p = 0.007$), explains a relatively small portion of the variation in scale efficiency, as indicated by the within R-squared of 0.0419. This suggests that other unobserved or unmeasured factors may also influence turnover-based efficiency.

Turning to the asset-based model (Table 3b), the results are more pronounced and informative. Audit committee size (ACS) again shows a negative impact on efficiency (–1.91), and this time the effect is statistically significant ($p = 0.050$). This finding reinforces concerns that overly large audit committees may become inefficient, possibly due to diffused responsibility or slower decision-making processes. In contrast, audit committee diligence (ACD) emerges as a strong positive force (coefficient = 2.23, $p = 0.024$), suggesting that more active and engaged committees play a vital role in enhancing the efficient use of firm assets. This affirms the importance of not just having audit committees but ensuring they are proactive and involved in oversight activities.

ISSN: 2795-3831
E-ISSN: 2795-3823

**Table 3a: Scale Efficiency (Turnover) – Panel Fixed Effect Regression Results**

| Variable | Expected Sign | Coefficient | Std. Error | t-Statistic | P-values |
|---|---|---|---|---|---|
| ACS | - | -1.634627 | 1.098653 | -1.49 | 0.138 |
| ACD | - | 0.9532077 | 1.123678 | 0.85 | 0.397 |
| FS | + | 1.615321 | 1.934752 | 0.83 | 0.404 |
| LEV | + | -0.0217339 | 0.007164 | -3.03 | 0.003 |
| _cons | - | 14.11887 | 30.88446 | 0.46 | 0.648 |
| F-value (p-value) | | 3 | | | 0.007*** |
| Breusch-Pagan LM Test (p-value) | | 357.37 | | | 0.000*** |
| Portmanteau Test (p-value) | | 45 | | | 0.472 |
| Ramsey RESET (p-value) | | 14.44 | | | 0.000*** |
| Hausman Test (p-value) | | 275.42 | | | 0.000*** |
| Multicollinearity test | | 1.19 | | | N/A |
| Heteroskedasticity Test (p-value) | | 269.81 | | | 0.000*** |
| R-square: within | | 0.0419 | | | |
| R-square: between | | 0.0408 | | | |
| R-square: overall | | 0.0297 | | | |
| Observations | | 466 | | | |

**Table 3b: Scale Efficiency (Assets) – Panel Fixed Effect Regression Results**

| Variable | Expected Sign | Coefficient | Std. Error | t-Statistic | P-Values |
|---|---|---|---|---|---|
| Audit Committee Size (ACS) | - | -1.9119 | 0.974447 | -1.96 | 0.050* |
| Audit Committee Diligence (ACD) | - | 2.2339 | 0.988131 | 2.26 | 0.024* |
| Firm Size (FS) | + | 0.315147 | 1.689783 | 0.19 | 0.852 |
| Leverage (LEV) | + | -0.11038 | 0.006246 | -17.67 | 0.000*** |
| Constant | - | 10.32825 | 26.96962 | 0.38 | 0.702 |
| F-value (p-value) | | 57.81 | | | 0.000*** |
| Breusch-Pagan LM Test (p-value) | | 42.08 | | | 0.000*** |
| Portmanteau Test (p-value) | | 46.74 | | | 0.483 |
| Ramsey RESET (p-value) | | 73.21 | | | 0.000*** |
| Hausman Test (p-value) | | 118.99 | | | 0.000*** |
| Multicollinearity test | | 1.2 | | | 1.2 |
| Heteroskedasticity Test (p-value) | | 2414.22 | | | 0.000*** |
| R-square: within | | 0.4541 | | | |
| R-square: between | | 0.3184 | | | |
| R-square: overall | | 0.3239 | | | |
| Observations | | 472 | | | |

p-values in parentheses indicates significance at the 5% level, ** at 1%, and *** at 0.1%.
*Source: Researcher Computation (2024)*

Firm size remains positively associated with efficiency, although the relationship remains insignificant ($p = 0.852$), again indicating that size alone does not guarantee better performance. Leverage stands out once more as a major negative determinant of efficiency, with a highly significant coefficient of –0.1104 ($p < 0.001$). This consistency across both models underscores the detrimental effects of excessive debt on operational performance.

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Importantly, the fixed-effects model is justified for both analyses, based on the results of the Hausman tests. The tests strongly reject the random-effects model in favor of fixed effects (p-values < 0.001 in both cases), confirming that unobserved firm-level characteristics are correlated with the explanatory variables. The Breusch-Pagan LM test also supports the use of panel data by rejecting the null hypothesis of no panel effect. In addition, the Ramsey RESET tests are significant, suggesting the need for careful model specification, which the fixed-effects model helps address by accounting for unobserved heterogeneity.

Overall, the asset-based model performs considerably better, with a within R-squared of 0.4541, indicating that nearly half the variation in efficiency is explained by the model. This, compared to just 4.2% in the turnover-based model, suggests that governance variables such as audit committee structure and diligence have a stronger influence on how well firms manage their assets than on how they generate revenue.

In conclusion, these results highlight the importance of carefully structured and actively engaged audit committees in enhancing operational efficiency, especially in contexts like Nigeria, where corporate governance frameworks are still evolving. They also underscore the risks associated with high financial leverage, reinforcing the need for prudent capital structure decisions in pursuit of efficient and sustainable operations.

## DISCUSSION OF FINDINGS

The discussion of findings provides an in-depth interpretation of the regression results, comparing them with existing literature to identify consistencies, discrepancies, and potential explanations for the observed relationships.

### Audit Committee Size and Scale Efficiency

The regression results indicate that audit committee size has a negative but statistically insignificant relationship with scale efficiency based on turnover (SEt) (-1.63, p = 0.138) and a negative and statistically significant relationship with scale efficiency based on assets (SEa) (-1.91, p = 0.050). These findings suggest that larger audit committees may hinder asset-based scale efficiency, likely due to slower decision-making processes, coordination challenges, and potential bureaucratic inefficiencies. This is consistent with Kurawa and Shuaibu (2022) who reported that overly large audit committees in Nigerian manufacturing firms led to reduced operational efficiency due to difficulties in reaching consensus and increased administrative burdens. Similarly, Eyenubo, et al, (2017) observed that excessively large committees diluted accountability, leading to slower responses to emerging operational challenges and ultimately affecting scale efficiency.

Conversely, other studies argue that larger audit committees can enhance scale efficiency by providing a broader range of expertise and perspectives, which facilitates better oversight and decision-making. Yahaya (2025) found that larger audit committees in manufacturing firms improved operational performance by fostering more rigorous financial scrutiny and minimizing inefficiencies. Odjaremu & Jeroh (2019) similarly reported that firms with larger audit committees experienced improved resource allocation and operational efficiency due to enhanced monitoring and governance capabilities. These conflicting findings suggest that while larger committees can offer diverse perspectives, their effectiveness in improving scale efficiency depends on balancing inclusivity with streamlined decision-making. This study adds to the literature by emphasizing that audit committee size should be optimized to ensure that

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governance structures do not impede operational efficiency, particularly in asset management.

**Audit Committee Diligence and Scale Efficiency**

The regression results show that audit committee diligence has a positive but statistically insignificant effect on scale efficiency based on turnover (SEt) (0.95, p = 0.397) and a positive and statistically significant relationship with scale efficiency based on assets (SEa) (2.23, p = 0.024). These findings suggest that diligent audit committees enhance asset-based scale efficiency by ensuring timely oversight, identifying operational inefficiencies, and promoting effective resource management. This aligns with the findings of Aigienohuwa & Irowa-Omoregie (2025) who noted that frequent and well-structured audit committee meetings contributed to improved operational performance by facilitating regular financial reviews and prompt decision-making. Similarly, Odjaremu & Jeroh, (2019) found that diligent audit committees in Nigerian manufacturing firms enhanced operational efficiency by regularly engaging with management and auditors to address emerging financial challenges.

However, other studies highlight potential downsides of excessive diligence, where overly frequent meetings may lead to diminishing returns and increased operational costs. Kurawa and Shuaibu (2022) reported that excessively diligent audit committees sometimes created administrative inefficiencies that undermined scale efficiency. Essien (2024) also noted that while diligence is generally beneficial, excessive focus on compliance and formalities may divert attention from broader operational concerns. These mixed findings emphasize the importance of balancing diligence with strategic oversight to ensure that audit committees effectively contribute to operational efficiency without imposing excessive administrative burdens. This study contributes to the discourse by underscoring that while diligence enhances governance effectiveness, its impact on scale efficiency depends on the quality of deliberations and the relevance of committee engagements.

## CONCLUSIONS AND RECOMMENDATIONS

This study investigated the relationship between audit committee size, audit committee diligence, and scale efficiency in Nigerian manufacturing firms. The findings revealed that audit committee size had a negative and statistically significant relationship with scale efficiency based on assets, indicating that larger committees may hinder operational efficiency due to coordination challenges and slower decision-making processes. Conversely, audit committee diligence exhibited a positive and statistically significant relationship with scale efficiency based on assets, suggesting that frequent and well-structured meetings enhance oversight and promote better resource utilization. The study also found that leverage negatively impacted scale efficiency, highlighting the financial risks associated with high debt levels. The study underscores the need for Nigerian manufacturing firms to adopt governance practices that promote scale efficiency and ensure long-term sustainability.

In addition, the Nigerian manufacturing firms should maintain an optimal audit committee size that balances inclusivity and efficiency to avoid coordination challenges and decision-making delays. Audit committees should meet regularly and engage in high-quality deliberations to identify inefficiencies and enhance operational efficiency, while avoiding excessive meetings that may create administrative burdens. Regulatory bodies such as the Financial Reporting Council of Nigeria (FRCN) and the Securities and Exchange Commission (SEC) should strengthen oversight to ensure compliance with audit committee guidelines, fostering improved governance practices. Additionally, firms should moderate their leverage levels to prevent

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excessive debt from undermining scale efficiency while promoting financial discipline. Lastly, continuous capacity-building initiatives should be undertaken to equip audit committee members with the necessary expertise to address evolving operational challenges and enhance their effectiveness in driving scale efficiency.

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