**Original Research Article**

**Internal control mechanism and operating efficiency of manufacturing firms in Nigeria**

# Abstract

The study examined the effect of internal control mechanism on operating efficiency of manufacturing firms in Nigeria. The specific objective was to ascertain the effect of control environment and information and communication on operating efficiency of manufacturing firms in Nigeria. Cross-sectional survey design was used in the study. A sample size of 246 respondents was selected from a population comprising employees in the internal control units of manufacturing firms in Nigeria. A structured questionnaire was used to collect primary data for the study. Analysis of research questions was done using frequency distribution. Multiple regression analysis was conducted to test the hypotheses. It was found that: control environment has a positive and significant effect on operating efficiency of manufacturing firms in Nigeria (β = 0.273, p = 0.000); information and communication positively and significantly affect the operating efficiency of manufacturing firms in Nigeria (β = 0.171, p = 0.002). In conclusion, the implementation of effective internal controls is the key to unlocking greater operational performance and ensuring that manufacturing firms are well-positioned to thrive in a changing global marketplace. The study recommends that management teams in manufacturing firms should prioritize the development and implementation of clear organizational policies, ethical guidelines, and accountability structures in order to enhance operational efficiency by fostering a conducive work environment that promotes responsibility and compliance among employees.

*Key words:* Internal control mechanism, Operating efficiency, Control Environment, Information and Communication

# 1.0 Introduction

The business environment of today is getting more competitive and this re-echoes the need for organizations to maintain effective and efficient operations (Nworie, Anaike & Onyeka, 2023). In fact, operating efficiency which refers to the ability of a firm to deliver products or services with minimal waste of resources, such as time, money, and labor, is a sine-qua-non for firms that seek to maintain or improve the quality of their output amidst global competition and scarcity of productive resources. Manufacturing firms, in particular, face numerous challenges in achieving this efficiency due to their complex and resource-intensive processes (Tijani, 2022). These firms often deal with large inventories, supply chain intricacies, compliance requirements, and fluctuating demand. As such, operating efficiently in the manufacturing sector is crucial for maintaining competitiveness, profitability, and long-term sustainability. This is where internal control mechanisms become pivotal. Okafor, Okoroji, Joseph, Njideka, and Mathias (2025) submitted that internal control systems refer to the policies, procedures, and structures put in place by an organization to ensure its objectives are achieved, operations are effective, resources are safeguarded, and financial reporting is accurate.

Internal control mechanisms are not a new concept but have evolved significantly over time. The importance of internal controls within organizations, particularly manufacturing firms, gained prominence with the increasing number of financial scandals, frauds, and operational inefficiencies witnessed globally. It was increasingly recognized that a well-structured and implemented internal control system is essential in safeguarding assets, ensuring the accuracy of financial records, and preventing fraud or errors in business processes (Ogunwale & Isibor, 2024). The adoption of internal control mechanisms not only serves as a preventive measure but also enhances the overall performance of the organization by streamlining operations and minimizing risk exposure. In Nigeria, where manufacturing firms are striving to adapt to both local and global market demands, implementing robust internal controls is becoming indispensable for navigating the complex regulatory landscape, managing resources effectively, and achieving operational excellence.

Effective internal controls provide a framework that enables businesses to operate with a high degree of efficiency, accuracy, and compliance (Onwuchekwa, Onwuzuligbo, Ifeanyi & Ukamaka, 2024; Doyle, Ge & McVay, 2007). In the context of manufacturing firms, internal control systems help ensure that all operations, from procurement and production to sales and distribution, are conducted in an orderly and efficient manner. The global business environment is increasingly marked by uncertainties such as fluctuating raw material prices, economic recessions, political instability, and technological disruptions. As such, firms must be prepared to handle both external and internal risks that could affect their performance. Internal control mechanisms act as a safeguard against such risks by ensuring that business processes are optimized and that any deviations from expected performance are quickly identified and corrected (Ogunwale & Isibor, 2024). In essence, these systems are central to managing operational risks, maintaining financial integrity, ensuring compliance with laws and regulations, and fostering overall business continuity.

Moreover, the business environment today is characterized by rapid technological advancements and increasing reliance on automated processes (Ikwuo, Ukoha & Nworie, 2025). Internal control mechanisms need to adapt to these advancements to ensure they remain effective in safeguarding assets, managing risks, and maintaining operational efficiency. As manufacturing firms integrate more technology into their operations, there is a growing need for internal controls to address cybersecurity risks, data management challenges, and operational disruptions caused by system failures or human errors. In light of these developments, Onwuchekwa, Onwuzuligbo, Ifeanyi and Ukamaka (2024) argued that effective internal control systems have become a cornerstone of successful business practices, particularly in ensuring that operational processes are not only protected from fraud or mismanagement but also optimized for efficiency and competitiveness.

For manufacturing firms, operating efficiency is not merely a matter of reducing costs or optimizing resource utilization—it is about creating a resilient framework where the right decisions are made at the right time to ensure sustainable growth. Egbea, Oyong, and Kechi (2020) argued that internal control mechanisms play a key role in achieving this goal. These mechanisms encompass a wide range of practices, including inventory management, financial reporting, risk assessments, and operational audits, all of which are essential to the effective functioning of manufacturing operations. In a manufacturing firm, the effectiveness of internal controls directly influences the ability to streamline production processes, minimize downtime, ensure quality control, and improve decision-making. Control activities such as segregation of duties, authorization procedures, and reconciliation of accounts ensure that resources are allocated efficiently, waste is minimized, and potential fraud or mismanagement is mitigated.

By maintaining a system of checks and balances, internal control mechanisms help reduce inefficiencies in production (Ogunwale & Isibor, 2024). For instance, when inventory management is controlled through regular stock audits and reconciliations, firms can avoid overproduction or underproduction, thus ensuring that resources are utilized optimally and production schedules are adhered to. Similarly, control mechanisms that monitor the procurement process can help avoid unnecessary costs or delays in sourcing raw materials, ensuring that production runs smoothly and on time. The role of internal control in improving operating efficiency extends beyond the immediate production processes. Effective control systems also help improve communication and coordination across different departments within a manufacturing firm (Ajala, Ololade, Olaleye & Abass 2023). For example, by implementing a clear chain of command and approval processes, internal controls help ensure that all departments are aligned with the company’s strategic objectives and operational priorities. This alignment is crucial for improving efficiency, as it minimizes misunderstandings and ensures that each function operates in harmony with the others. Additionally, regular monitoring activities, such as performance evaluations and internal audits, ensure that any inefficiencies or performance gaps are identified and addressed promptly, leading to continuous improvements in operational processes (Odunko, 2022).

However, in spite the growing awareness of the importance of internal controls, many manufacturing firms still struggle to implement robust internal control systems (Ogunwale & Isibor, 2024). This is often due to factors such as limited resources, lack of skilled personnel, weak governance structures, and inadequate investment in technology. As a result, these firms often experience inefficiencies, wasteful practices, poor inventory management, and insufficient oversight. Many small and medium-sized enterprises (SMEs) in the manufacturing sector particularly face difficulties in setting up comprehensive internal control mechanisms, which leaves them vulnerable to operational and financial risks. Additionally, there is often a lack of proper monitoring and regular assessment of existing controls, further compounding the inefficiencies in the system (Eniola, Tonade & Adeniji, 2021). Manufacturing firms that do not effectively manage their internal controls face a multitude of challenges that ultimately hinder their operational efficiency. Inefficient resource allocation, production delays, overstocking, understocking, and inaccurate financial reporting are some of the most common consequences of weak internal control systems. These inefficiencies not only lead to increased operational costs but also affect the firm’s ability to meet market demands, respond to changes in customer preferences, and maintain profitability. Furthermore, poor internal controls increase the risk of fraud and financial mismanagement, which can result in financial losses and damage to the firm’s reputation. In a competitive market like Nigeria, where firms are under constant pressure to improve their performance, such inefficiencies can significantly undermine their long-term viability and growth. Therefore, it is crucial to understand how internal control mechanisms can be optimized to improve operating efficiency in the manufacturing sector.

# 1.1 Objectives of the Study

The main aim of the study is to examine the effect of internal control mechanism on operating efficiency of manufacturing firms in Nigeria. The specific objectives are as follows:

1. To ascertain the effect of control environment on the operating efficiency of manufacturing firms in Nigeria.

2. To examine the degree to which information and communication affect operating efficiency of manufacturing firms in Nigeria.

# 1.2 Hypotheses

H01. Control environment has no significant effect on the operating efficiency of manufacturing firms in Nigeria.

H02. Information and communication do not significantly affect operating efficiency of manufacturing firms in Nigeria.

# 2.0 Literature Review

# 2.1 Conceptual Review

# 2.1.1 Internal Control Mechanism

An internal control mechanism refers to the systems, processes, and procedures put in place by an organization to safeguard its assets, ensure the accuracy of financial records, and promote operational efficiency (Ogunwale & Isibor, 2024). These mechanisms are designed to prevent errors, fraud, and inefficiencies by establishing checks and balances within the organization’s daily operations. The primary aim of internal control mechanisms is to provide reasonable assurance that the firm’s goals and objectives are achieved through the proper use of resources, adherence to legal and regulatory requirements, and the protection of stakeholders’ interests. The effectiveness of internal control mechanisms depends on the design and implementation of these systems, as well as the commitment of the organization’s leadership to maintaining an ethical and transparent culture (Okafor, Okoroji, Joseph, Njideka & Mathias, 2025).

Internal control systems encompass a wide range of activities, including authorization of transactions, segregation of duties, access control, periodic reviews, and compliance checks (Alawiye-Adams & Afolabi, 2014). While they are often associated with financial control, they also extend to operational controls, such as ensuring the efficiency of production processes, proper inventory management, and adherence to industry standards. For manufacturing firms, internal control mechanisms are crucial in ensuring that the firm’s physical assets are protected, production processes are efficient, and inventory is properly managed. Moreover, these systems help prevent fraud by ensuring that no individual has unchecked access to company resources, thus reducing the risk of misappropriation or mismanagement (Ogunwale & Isibor, 2024). Internal controls are an integral part of corporate governance, as they provide the structure for accountability, transparency, and organizational integrity (Egbea, Oyong & Kechi, 2020). By ensuring that the operational processes and financial systems are functioning effectively, internal control mechanisms support an organization in achieving its long-term sustainability and competitiveness in the market.

# 2.1.2 Control Environment

The control environment is a foundational aspect of the internal control system that shapes the overall attitude and behavior of an organization towards internal controls (Eniola, Tonade & Adeniji, 2021). It encompasses the culture, values, and ethical standards that the organization upholds, as well as the overall tone set by the management. The control environment influences how employees perceive and engage with internal control procedures and directly impacts the effectiveness of the control mechanisms in place. A strong control environment begins with leadership and management, who are responsible for setting the example in terms of ethical behavior, accountability, and commitment to compliance (Teshome, 2021). If management places high importance on integrity and transparency, this attitude is likely to be mirrored by employees, leading to greater adherence to control procedures.

Additionally, the control environment includes the organization’s policies regarding human resources, such as hiring, training, and performance evaluation, which further impact how effectively internal controls are implemented (Rizaldi, 2015). A company that fosters an open, transparent, and ethical control environment is more likely to establish a culture of accountability where employees are aware of their responsibilities and the importance of compliance. This sense of responsibility can significantly reduce the likelihood of errors, fraud, and operational inefficiencies. The organizational structure also plays a vital role in the control environment, as it determines how authority and responsibility are distributed. Clear roles and responsibilities, a well-defined chain of command, and appropriate segregation of duties all contribute to a robust control environment. Furthermore, the tone set at the top, particularly by senior management and board members, dictates the level of commitment to internal controls within the organization. If management’s commitment to the control environment is strong, it leads to improved adherence to internal controls by all employees, thus positively influencing operational efficiency.

# 2.1.3 Information and Communication

Information and communication refer to the processes through which an organization collects, shares, and distributes information necessary to carry out its activities, make informed decisions, and evaluate the effectiveness of its operations (Teshome, 2021). In the context of internal controls, this concept is vital because accurate, timely, and accessible information enables effective decision-making, operational planning, and risk management. Proper information flow within an organization ensures that relevant data regarding financial transactions, operational processes, and compliance activities are communicated to the right people at the right time. The effective exchange of information across all levels of an organization allows for the timely identification of potential issues, enabling management to take corrective actions and ensure the smooth running of operations (Abu Naser, Al Shobaki & Ammar, 2017).

For manufacturing firms, communication plays an essential role in linking the various departments, such as procurement, production, sales, and finance, and ensuring that everyone is aligned toward common goals. Information flows through both formal and informal channels, including reports, meetings, memos, and internal systems like enterprise resource planning (ERP) software. The quality of information shared also determines the efficiency and effectiveness of internal control mechanisms (Herliana & Kuntadi, 2023). If the information is inaccurate, incomplete, or delayed, it can lead to poor decision-making, errors in the production process, financial mismanagement, or even fraud. Additionally, the communication of internal control policies and procedures is crucial to ensuring that all employees understand their roles in maintaining these controls (Teshome, 2021). Without clear and effective communication, internal controls become meaningless, as employees may not be aware of the importance of following the processes in place. Therefore, organizations must establish formal channels of communication that ensure that relevant information flows freely between management, staff, auditors, and other stakeholders, while also safeguarding the confidentiality and integrity of sensitive data.

# 2.1.4 Operating Efficiency

Operating efficiency refers to an organization’s ability to deliver goods and services while minimizing resource usage, time, and costs without compromising quality (Alawiye-Adams & Afolabi, 2014). It involves optimizing processes, minimizing waste, and maximizing the productivity of both human and material resources to achieve the desired outputs. In manufacturing firms, operating efficiency is critical because it directly affects the firm’s profitability, competitiveness, and long-term sustainability (Tijani, 2022). A firm that operates efficiently is able to produce more with fewer resources, reducing operational costs and improving profit margins. This is achieved through the effective use of technologies, streamlined production processes, proper inventory management, and the elimination of redundant or inefficient practices. Operating efficiency also includes the firm’s ability to respond swiftly to changes in market conditions, customer preferences, and technological advancements while maintaining consistent quality (Okafor, Okoroji, Joseph, Njideka & Mathias, 2025).

Manufacturing firms that prioritize operating efficiency typically focus on continuous improvement and process optimization (Tijani, 2022), incorporating feedback from employees and customers to identify areas for enhancement. Key factors that influence operating efficiency include the utilization of advanced machinery, employee training and engagement, efficient supply chain management, and adherence to industry standards and best practices. Firms that operate efficiently also benefit from better resource management, such as the optimal use of raw materials, energy, and labor, which helps in minimizing costs and reducing environmental impact. Ultimately, operating efficiency is a measure of how well a firm uses its resources to achieve its objectives and maintain a competitive edge in a dynamic market environment (Onwuchekwa, Onwuzuligbo, Ifeanyi & Ukamaka, 2024). Efficient operations enable firms to meet customer demand more effectively, maintain financial health, and sustain growth over time. Therefore, organizations must continuously assess and improve their operational processes to remain competitive in the ever-evolving global marketplace.

# 2.2 Theoretical Framework

Systems Theory originated in the 1940s through the work of biologist Ludwig von Bertalanffy, who sought to create a framework that could be applied across disciplines, including biology, engineering, and social sciences (Von Bertalanffy, 1972). Bertalanffy introduced the concept of a "system" as a set of interconnected components that work together toward a common goal. This interdisciplinary approach eventually evolved into what is now known as General Systems Theory (GST). The key idea behind Systems Theory is that the behavior and outcomes of a system cannot be fully understood by analyzing its individual parts in isolation; instead, the focus must be on the relationships and interactions between these parts (Adams, 1993). In the years following Bertalanffy’s work, the theory was extended and applied to various fields, including organizational theory, where it gained significant traction in the study of businesses, management, and control mechanisms. In organizational settings, Systems Theory is often used to understand the interconnected nature of a company's processes and structures, which is particularly relevant when examining how internal controls function within an organization.

The main postulations of Systems Theory revolve around the idea that organizations are complex systems composed of multiple interrelated components (Adams, 1993). These components—such as processes, people, policies, and resources—must be aligned and work together to achieve the organization's objectives. One of the central tenets of Systems Theory is that any change or disruption in one part of the system can have far-reaching effects on the entire organization (Von Bertalanffy, 1972). The theory emphasizes the importance of feedback loops, where output from one component of the system is used to inform and adjust the functioning of other components. Another key postulation is the concept of synergy, which suggests that the collective output of the system as a whole is greater than the sum of its individual parts. Additionally, Systems Theory posits that organizations operate in an open environment, meaning they interact with and are influenced by external factors, such as market conditions, regulations, and competition (Adams, 1993). The theory also highlights the importance of continuous monitoring, adaptation, and improvement to ensure that the system functions effectively and efficiently.

Systems Theory is highly relevant to the topic of internal control mechanisms and operating efficiency in manufacturing firms because it provides a framework for understanding how various organizational components—such as internal controls, processes, and personnel—are interconnected and contribute to overall operational efficiency. Internal controls, when designed and implemented correctly, act as a key component of a firm's broader system, ensuring that resources are managed effectively, risks are mitigated, and operational processes are aligned with the firm's strategic objectives. According to Systems Theory, the effectiveness of internal controls is not determined by each control measure in isolation but by how well these controls interact with other processes within the organization. For manufacturing firms, this means that internal control mechanisms—such as segregation of duties, risk assessment, and monitoring activities—must be integrated into the firm's operations and continuously evaluated to ensure that the entire system functions efficiently. Systems Theory suggests that, when the components of the internal control system work in harmony with other organizational processes, manufacturing firms can achieve higher levels of operating efficiency, minimize waste, and reduce the likelihood of errors or fraud. By taking a holistic view of the organization and focusing on the interactions between various components, Systems Theory helps explain how internal controls can drive improvements in operational performance.

# 2.3 Empirical Review

Okafor, Okoroji, Joseph, Njideka, and Mathias (2025) investigated how internal control systems influence the operational performance of agricultural cooperatives in Anambra State, Nigeria. Their study was structured around four key research questions and employed a correlational research design. The population consisted of 2,891 cooperative members across the state, from which a sample of 351 participants was selected using Taro Yamane’s sampling formula. Data collection was carried out through a structured questionnaire. Analytical methods included simple percentages, mean statistics, Pearson Product Moment Correlation, and simple linear regression at a 5% significance level. Results revealed a strong connection between internal controls and operational efficiency. The study emphasized the importance of environmental controls in ensuring compliance with environmental standards, which in turn enhances farming practices and reduces pollution. It also found that risk assessment helps in identifying and mitigating threats to cooperative operations, financial controls support transparent financial reporting, and communication mechanisms enable smooth coordination during cooperative activities.

Onwuchekwa, Onwuzuligbo, Ifeanyi, and Ukamaka (2024) assessed how internal control mechanisms contribute to the operational efficiency of supermarkets in Awka, Anambra state. The researchers focused on several factors, including regular updates to job descriptions, record-keeping practices, reporting systems for time and leave, task segregation, access controls, and cybersecurity measures. Using a quantitative design, data was gathered from 192 supermarket employees in Awka, Anambra State. The sample size was calculated with the Krejcie and Morgan formula. Data analysis was carried out using multiple linear regression to determine relationships between the dependent and independent variables, alongside descriptive statistics for exploratory purposes. The results indicated that various internal control components positively influence operational efficiency. The study recommended that supermarkets implement systematic updates of employee roles and responsibilities to eliminate ambiguity and enhance clarity, thereby improving operational outcomes.

Ogunwale and Isibor (2024) conducted a study on how internal control structures affect the performance of manufacturing firms in Nigeria. The study examined ten selected firms, focusing on internal control variables such as board size, audit committee size, and board independence. Secondary data were extracted from the financial statements of the firms and analyzed using panel data regression. Although both fixed and random effect models were estimated, the Hausman test identified the fixed effect model as the more appropriate. Findings showed that all three internal control variables significantly influenced firm performance, particularly return on equity. The researchers recommended diversifying the board membership to enhance independence and improve organizational decision-making.

Ajala, Ololade, Olaleye, and Abass (2023) explored the influence of internal control systems on the performance of small and medium-sized enterprises (SMEs) in Ondo State, Nigeria. The study relied on primary data collected through a questionnaire distributed to 323 SMEs selected through stratified and random sampling. Analytical techniques included descriptive statistics and multiple regression analysis. Results indicated a significant positive relationship between internal control systems and various performance indicators such as business growth, continuity, and operational effectiveness. When these indicators were combined, the overall performance was also positively associated with internal controls. The study concluded that implementing robust internal control mechanisms is crucial for improving productivity, sustainability, and general performance in SMEs.

Odunko (2022) evaluated how internal control practices affect the performance of selected Nigerian firms. The study focused on three specific control areas: cash management, risk evaluation, and inventory control. Using secondary data sourced from the Nigerian Stock Exchange (NSE) Fact Book and Daily Official List, the study adopted an ex-post facto research design. Statistical methods included descriptive analysis, correlation, and Ordinary Least Squares (OLS) regression. The results demonstrated that each of the control components had a significant and positive effect on firm performance. The study concluded that internal control systems are instrumental in enhancing financial and operational outcomes and recommended that organizations adopt effective cash control strategies to boost overall performance.

Eniola, Tonade, and Adeniji (2021) conducted a study to evaluate how internal control mechanisms influence the financial performance of listed firms in Nigeria’s southwestern region. Employing a multi-level random sampling technique and multiple regression analysis, the research assessed whether elements such as internal audit control, risk management, control activities, control environment, and monitoring practices had any impact on performance outcomes. The findings demonstrated a positive relationship between internal audit control, risk management, and monitoring practices with operational efficiency. However, control environment and monitoring practices were found to negatively affect asset returns. These results provide useful insights for corporate managers by highlighting frequently neglected components within internal control frameworks and offering recommendations for enhancing internal control systems to improve performance.

Teshome (2021) explored the role of internal control components in influencing the operational performance of selected private commercial banks in Ethiopia. The study focused on banks including the Cooperative Bank of Oromiya, Anbessa International Bank, Berhan Bank, Abay Bank, and Debub Global Bank. Guided by the COSO integrated internal control framework, the study examined five components: control environment, risk assessment, control activities, information and communication, and monitoring. Employees from the internal audit and finance departments of these banks were surveyed using a stratified random sampling technique. The results indicated that while all five control components were effectively implemented, only control activities and risk assessment had a significant positive influence on operational performance. Conversely, control environment and information and communication showed an insignificant positive relationship, whereas monitoring exhibited a slightly negative and insignificant effect on performance.

Adegboyegun, Ben-Caleb, Ademola, Oladutire, and Sodeinde (2020) investigated how various elements of internal control systems affect the operating performance of small and medium-sized enterprises (SMEs) in Ondo State, Nigeria. The study employed a sample of 120 SMEs and utilized a questionnaire for data collection. Logistic regression was used to analyze the relationship between internal control components and actual annual profit. Findings showed that improvements in the control environment and control activities marginally increased the likelihood of higher profits, while enhancements in risk assessment, communication, and monitoring led to slight decreases in this probability. Overall, the study concluded that although internal control systems do not have a statistically significant effect on SME performance, certain components like control environment and control activities still exert a modest positive influence.

Abiodun (2020) focused on evaluating internal control processes and their impact on firm performance in the southwestern region of Nigeria. The study was grounded in stakeholder theory and followed a qualitative descriptive research design. Through multiple regression analysis, the study examined whether internal audit, control practices, risk management, control environment, and monitoring activities influenced financial performance. Results indicated that internal audit control, risk management, and monitoring activities had a positive relationship with firm success. However, control practices and control environment were found to have a significant negative effect on performance. Based on these findings, the study recommended regular oversight of internal audit functions and emphasized the need for auditors to continuously review the structure and effectiveness of control systems. It also stressed the importance of identifying and managing risks in a proactive manner.

Egbea, Oyong, and Kechi (2020) assessed the impact of internal control compliance on the viability of selected manufacturing firms in Nigeria. The research aimed to determine how adherence to internal control measures and the role of internal audit affect organizational sustainability. Data was collected using a structured questionnaire distributed among 85 staff members in the internal audit, budget, and accounts departments of six manufacturing firms. Analysis revealed a strong and statistically significant relationship between compliance with internal control measures and organizational viability. Additionally, internal audit was also found to have a significant and positive influence on sustaining firm operations.

# 2.4 Gap in Literature

The existing empirical literature highlights various studies examining the role of internal control mechanisms in enhancing organizational performance, with a specific focus on firms operating in Nigeria. While much of the research has focused on the positive effects of internal control systems on operational efficiency across different sectors, there is a gap in understanding how specific components of internal control—such as control environment and information and communication—affect the operational efficiency of manufacturing firms in Nigeria. For instance, Okafor, Okoroji, Joseph, Njideka, and Mathias (2025) found that internal control systems in agricultural cooperatives in Anambra State positively influenced operational efficiency, with a particular focus on environmental controls and risk assessment. On the other hand, Onwuchekwa, Onwuzuligbo, Ifeanyi, and Ukamaka (2024) emphasized the role of systematic updates and task segregation in supermarkets in enhancing operational efficiency, but did not specifically address control environment and information flows. Additionally, Ogunwale and Isibor (2024) noted the significant influence of internal control variables like audit committee size and board independence on firm performance, but these findings did not directly examine how internal control components, such as communication mechanisms, affect the manufacturing sector. Studies by Ajala, Ololade, Olaleye, and Abass (2023) and Odunko (2022) also observed that internal control systems contribute to operational efficiency in SMEs and larger firms, but their focus was primarily on broader indicators of firm performance, rather than specifically looking at control environment and communication as separate components. Furthermore, research by Teshome (2021) and Adegboyegun, Ben-Caleb, Ademola, Oladutire, and Sodeinde (2020) indicates varying results on the importance of communication and control environment in different sectors, with some studies highlighting minimal or insignificant impacts. This existing body of literature reveals a significant gap in understanding how the specific internal control components, especially control environment and information and communication, directly impact the operational efficiency of manufacturing firms in Nigeria, thus justifying the need for further exploration in this area.

# 3.0 Methodology

This study adopts a cross-sectional survey design to examine the effect of internal control mechanisms on the operating efficiency of manufacturing firms in Nigeria. The cross-sectional survey design is well-suited for this research as it allows for the collection of data at a single point in time from a wide range of manufacturing firms operating in Nigeria. This approach is effective in capturing a diverse set of perspectives across various manufacturing sectors and firm sizes, thereby offering a representative sample of the Nigerian manufacturing sector. The population of this study includes employees in the internal control units of manufacturing firms in Nigeria. The population is vast, covering manufacturing firms of different sizes across Nigeria’s diverse regions. Given that the study will examine the internal control mechanisms within manufacturing firms, the target population is comprised of individuals who are familiar with the internal control systems and practices of their respective organizations, particularly those related to the control environment and information communication. Given the theoretical infiniteness of the population, the researcher will use Cochran’s formula to calculate an appropriate sample size. The formula for sample size determination is as follows:

​ n = $\frac{z^{2} X p X q}{e^{2}}$

Where:

**n** represents the required sample size,

**e** denotes the accepted margin of error,

**p** stands for the assumed proportion of the population that exhibits the characteristic of interest,

**q** indicates the proportion of the population that does not exhibit the characteristic (i.e., 1 – p),

**Z** refers to the standard score obtained from the normal distribution table at the chosen confidence level.

The study assumes that approximately 80% of individuals such as business owners, finance and accounting staff, and ICT personnel within different organizations in Nigeria fall within the target population. With a 95% confidence level, the corresponding Z-score is 1.96. Based on this, the estimated proportion of the population possessing the desired characteristics (**p**) is 0.80, while the remaining 20% (**q**) do not. A 5% margin of error (0.05) is considered acceptable for this research. Using these parameters, the sample size was derived using Cochran’s formula, as shown below:

n = $\frac{\left(1.96\right)^{2} X 0.80 X 0.20}{\left(0.05\right)^{2}}$

Sample size ​=246

Primary data were collected using structured questionnaires that were administered to the selected respondents. The use of self-administered questionnaires allowed for efficient data collection and provide a consistent means of gathering information across different respondents. The questionnaire contains research questions developed based on the use of a four-point Likert scale ranging from "strongly agree" to "strongly disagree" to assess the respondents’ views on the effectiveness of internal control mechanisms, specifically the control environment and information and communication, and their impact on the firm's operating efficiency.

The reliability of the research instrument was tested using Cronbach’s alpha coefficient, which measures the internal consistency of the scale. A Cronbach’s alpha value of 0.833 was ascertained which was higher than 0.7 and so considered acceptable for the study. Frequency distribution was used to analyse the research questions while the hypotheses were tested using multiple regression analysis to assess the effect of internal control mechanisms on operating efficiency of manufacturing firms in Nigeria. Multiple regression is appropriate for this study as it allows for the examination of the simultaneous effects of several independent variables on a single dependent variable. In this case, the independent variables are the control environment and information and communication, while the dependent variable is the operating efficiency of manufacturing firms.

The multiple regression model to be used in this study is specified as follows:

OEi = β0 + β1CEi + β2ICi +ϵi \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_eqi

Where:

OEi​ = Operating Efficiency of the i-th manufacturing firm

CEi​ = Control Environment of the i-th manufacturing firm

ICi​ = Information and Communication of the i-th manufacturing firm

β0​ = Intercept term

β1​,β2​ = Coefficients for the independent variables

ϵi​ = Error term

The decision rule for hypothesis testing is based on a significance level of 5%. If the p-value for a test is less than 0.05, the null hypothesis is rejected, and the alternative hypothesis is accepted. Conversely, if the p-value is greater than 0.05, the null hypothesis is not rejected.

# 4.0 Result and Discussion

# 4.1 Analysis of Research Questions

The whole of the expected responses was 246. However, the actual responses realised was 192 (78%). The response rate to the research instrument is quite large enough for inferential analysis, and so the study was continued based on the response rate of 78%.

**Table 1 Analysis of Researcher Questions**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S/N | **Operating Efficiency** | **Strongly****Agree** | **Agree** | **Disagree** | **Strongly****Disagree** | **Mean** |
| 1 | Our organization makes the best use of available resources to reduce waste. | 104 | 19 | 53 | 16 | 3.10 |
| 2 | Tasks and operations are completed within reasonable time and cost. | 100 | 12 | 40 | 40 | 2.90 |
| 3 | Internal controls help reduce delays and improve production speed. | 66 | 9 | 86 | 31 | 2.57 |
| 4. | Employees are able to meet their targets due to efficient systems and procedures. | 40 | 16 | 77 | 59 | 2.19 |
|  | **Control Environment** | **Strongly****Agree** | **Agree** | **Disagree** | **Strongly****Disagree** | **Mean** |
| 5 | My organization has clear policies and procedures that guide employees’ behavior. | 94 | 31 | 27 | 40 | 2.93 |
| 6 | Management demonstrates strong commitment to ethical values and integrity. | 77 | 6 | 76 | 33 | 2.66 |
| 7 | Roles and responsibilities of staff are clearly defined and regularly reviewed. | 46 | 17 | 81 | 48 | 2.32 |
| 8 | There is a strong tone at the top that promotes accountability and good conduct. | 91 | 23 | 48 | 30 | 2.91 |
|  | **Information and Communication** | **Strongly****Agree** | **Agree** | **Disagree** | **Strongly****Disagree** | **Mean** |
| 9 | Financial and operational information is shared in a timely and accurate manner. | 156 | 9 | 3 | 24 | 3.55 |
| 10 | Employees are informed about internal control processes relevant to their duties. | 149 | 15 | 16 | 12 | 3.57 |
| 11 | There is open communication between departments to enhance efficiency. | 149 | 21 | 1 | 21 | 3.55 |
| 12 | Management regularly communicates expectations regarding performance and compliance. | 111 | 5 | 14 | 62 | 2.86 |

Source: Field Survey (2025)

In Table 1, the frequency table illustrates the responses to various research questions concerning operating efficiency, control environment, and information and communication within organizations. Each question is followed by the distribution of responses on a 5-point Likert scale and their respective means, providing insight into how respondents perceive each statement.

Starting with the "Operating Efficiency" section, question 1 asked whether the organization makes the best use of available resources to reduce waste. A significant 104 respondents strongly agreed with this statement, while 19 agreed. On the other hand, 53 disagreed and 16 strongly disagreed. This indicates a favorable response towards efficient resource usage, with a mean score of 3.10, suggesting a moderate agreement among respondents.

For question 2, which explored whether tasks and operations are completed within reasonable time and cost, 100 respondents strongly agreed, while 12 agreed, and a notable 40 both disagreed and strongly disagreed. The mean score of 2.90 reflects a somewhat neutral to slightly favorable perception, indicating that respondents see some inefficiencies in the time and cost aspects of operations.

In question 3, which focused on whether internal controls help reduce delays and improve production speed, the responses were more varied. Only 66 respondents strongly agreed, with 9 agreeing, while 86 disagreed and 31 strongly disagreed. The mean score of 2.57 suggests a more negative outlook on the effectiveness of internal controls in improving production speed, indicating room for improvement in this area.

Question 4 assessed whether employees are able to meet their targets due to efficient systems and procedures. A relatively low 40 respondents strongly agreed, with 16 agreeing, while 77 disagreed and 59 strongly disagreed. With a mean score of 2.19, this indicates a negative perception of the organization's efficiency in enabling employees to meet their targets, pointing to significant areas where internal processes may be lacking.

Moving to the "Control Environment" section, question 5 inquired whether the organization has clear policies and procedures that guide employee behavior. A strong 94 respondents strongly agreed, and 31 agreed, while 27 disagreed and 40 strongly disagreed. The mean score of 2.93 suggests a moderate level of agreement that the organization has clear policies, though there is still a considerable portion of respondents who disagree or strongly disagree, pointing to potential gaps in policy clarity.

For question 6, which asked whether management demonstrates strong commitment to ethical values and integrity, 77 respondents strongly agreed, while 6 agreed, and 76 disagreed. With a mean score of 2.66, the response indicates a less favorable perception, with many respondents feeling that the commitment to ethics and integrity might not be as strong as expected in the organization.

In question 7, focusing on the clarity and regular review of roles and responsibilities, 46 respondents strongly agreed, while 17 agreed. However, 81 disagreed and 48 strongly disagreed, indicating significant concerns regarding the clarity and regular review of roles. The mean score of 2.32 shows that respondents do not generally perceive roles and responsibilities as being well-defined or updated regularly.

Question 8 assessed whether there is a strong tone at the top that promotes accountability and good conduct. A significant 91 respondents strongly agreed, and 23 agreed, with 48 disagreeing and 30 strongly disagreeing. The mean score of 2.91 reflects a generally favorable response, though there is still a considerable number of respondents who feel that the tone at the top may not be strong enough to foster accountability.

In the "Information and Communication" section, question 9 asked whether financial and operational information is shared in a timely and accurate manner. A strong 156 respondents strongly agreed, with 9 agreeing, and only 3 disagreed and 24 strongly disagreed. The mean score of 3.55 suggests a very positive perception of the organization's communication practices, with most respondents agreeing that information is shared effectively.

Question 10, concerning whether employees are informed about internal control processes relevant to their duties, received positive responses. 149 respondents strongly agreed, with 15 agreeing, and 16 disagreed and 12 strongly disagreed. The mean score of 3.57 indicates strong agreement, signaling that the communication regarding internal controls is generally effective within the organization.

For question 11, which explored whether there is open communication between departments to enhance efficiency, 149 respondents strongly agreed, with 21 agreeing, and only 1 disagreed and 21 strongly disagreed. The mean score of 3.55 reflects a very positive response, suggesting that most respondents feel communication between departments is open and contributes to efficiency.

Lastly, question 12, which inquired whether management regularly communicates expectations regarding performance and compliance, received 111 respondents who strongly agreed, while 5 agreed, and 14 disagreed, with 62 strongly disagreeing. The mean score of 2.86 reflects a relatively neutral response, with a larger proportion of respondents indicating that management communication regarding expectations may not be as frequent or clear as desired.

# 4.2 Test of Hypotheses

Table 2 below shows the output of the regression analysis used in testing the hypotheses.

**Table 2 Test of Hypotheses**

|  |
| --- |
| **Model Summary** |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .368a | .135 | .126 | 2.01444 |
| a. Predictors: (Constant), Information and Communication, Control Environment |
| **ANOVAa** |
| Model | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 120.023 | 2 | 60.012 | 14.789 | .000b |
| Residual | 766.956 | 189 | 4.058 |  |  |
| Total | 886.979 | 191 |  |  |  |
| a. Dependent Variable: Operating Efficiency |
| b. Predictors: (Constant), Information and Communication, Control Environment |
| **Coefficientsa** |
| Model | Unstandardized Coefficients | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | 5.485 | 1.030 |  | 5.325 | .000 |
| Control Environment | .273 | .058 | .322 | 4.738 | .000 |
| Information and Communication | .171 | .056 | .209 | 3.076 | .002 |
| a. Dependent Variable: Operating Efficiency |

Source: SPSS V. 26 Output (2025)

Table 2 presents the results from the hypothesis testing for the effect of internal control mechanisms—specifically control environment and information and communication—on the operating efficiency of manufacturing firms in Nigeria. The model summary, ANOVA statistics, and the regression coefficients provide valuable insights into how each of the independent variables influences operating efficiency. The Adjusted R Square value is 0.126, indicating that the model explains 12.6% of the variation in operating efficiency. This suggests that while the model captures some of the factors affecting operating efficiency, there are likely other variables outside of the control environment and information and communication that also contribute to its variability. In practical terms, this means the explanatory power of the model is moderate, but not overwhelming, pointing to the complexity of factors influencing operating efficiency in manufacturing firms.

The p-value for the F-statistic in the ANOVA table is 0.000, which is highly significant at the 5% level (p < 0.05). This indicates that the model as a whole is statistically significant and that the independent variables—control environment and information and communication—collectively have a significant effect on operating efficiency. Thus, we can reject the null hypothesis that the model as a whole does not significantly affect operating efficiency.

The constant term is 5.485, which represents the expected operating efficiency when both control environment and information and communication are held constant. This value is significant at p = 0.000, indicating that it is reliably different from zero.

# 4.2.1 Test of Hypothesis I

H01. Control environment has no significant effect on the operating efficiency of manufacturing firms in Nigeria.

The coefficient for the control environment variable is 0.273, with a p-value of 0.000. This means that for every one-unit increase in the control environment (assuming all other variables are held constant), the operating efficiency increases by 0.273 units. Since the p-value is less than 0.05, the effect of the control environment on operating efficiency is statistically significant. The positive sign indicates a positiveeffect, meaning that a better control environment leads to an increase in operating efficiency. Since the p-value is less than 0.05, we accept the alternate hypothesis that Control environment has a positive and significant effect on operating efficiency of manufacturing firms in Nigeria (β = 0.273, p = 0.000).

# 4.2.2 Test of Hypothesis II

H02. Information and communication do not significantly affect operating efficiency of manufacturing firms in Nigeria.

The coefficient for information and communication is 0.171, with a p-value of 0.002. This suggests that for each one-unit increase in information and communication practices (holding other variables constant), the operating efficiency increases by 0.171 units. The p-value is also below the 0.05 threshold, indicating that this effect is statistically significant. Similarly to control environment, the positive sign of the coefficient suggests that improved information and communication practices lead to better operating efficiency. Since the p-value is less than 0.05, we accept the alternate hypothesis that Information and communication positively and significantly affect the operating efficiency of manufacturing firms in Nigeria (β = 0.171, p = 0.002).

# 4.3 Discussion of Findings

The finding that control environment has a positive and significant effect on operating efficiency in Nigerian manufacturing firms suggests that a well-structured control environment leads to better operational outcomes. The positive coefficient of 0.273 indicates that improvements in the control environment, such as the establishment of clear policies, ethical standards, and accountability measures, enhance operational efficiency. This can be attributed to the fact that a strong control environment fosters a sense of responsibility among employees, reduces operational risks, and creates an atmosphere where processes are more predictable and transparent. When employees understand their roles and the organizational values, they are likely to perform more effectively, adhering to established procedures that optimize resource usage and minimize inefficiencies. The significance of this result further indicates that control environment improvements are crucial in enhancing manufacturing performance, as they have a direct, measurable effect on reducing waste and improving operational timelines. Similarly, Okafor et al. (2025) found that environmental controls significantly contribute to the operational performance of agricultural cooperatives, emphasizing the role of clear policies and compliance. Similarly, Onwuchekwa et al. (2024) showed that the control environment's clarity in roles and responsibilities improves operational outcomes in supermarkets in Nigeria. Ogunwale and Isibor (2024) also identified that internal control structures, including a well-managed control environment, positively affect firm performance, particularly in manufacturing. In contrast, Adegboyegun et al. (2020) noted that while the control environment's impact on SME performance is modest, it still exerts a positive influence on business profitability. These studies collectively affirm that a strong control environment is integral to operational efficiency.

The finding that information and communication positively influence operating efficiency suggests that clear, timely, and accurate information is vital for effective decision-making and the smooth operation of manufacturing firms. The coefficient of 0.171 indicates that better communication practices, such as regular updates on operational procedures and financial data, are associated with improved operational outcomes. This is because efficient communication ensures that all employees are aligned with organizational goals, aware of their responsibilities, and informed about changes or expectations. Furthermore, well-structured communication systems can enhance coordination across departments, reduce delays, and improve responsiveness, all of which contribute to greater operating efficiency. The significance of this effect (p = 0.002) highlights the crucial role of communication in facilitating the efficient functioning of manufacturing firms. In the same vein, Okafor et al. (2025) found that communication mechanisms, such as clear and accurate information sharing, play a key role in operational performance, especially in cooperative settings. Onwuchekwa et al. (2024) similarly highlighted the importance of internal communication in supermarkets, where clear communication contributed to enhanced operational outcomes. Teshome (2021) also noted that while communication is crucial in private commercial banks, its positive impact on operational performance was less pronounced compared to other internal control components. However, Ajala et al. (2023) found that information and communication significantly improved the operational effectiveness of SMEs in Nigeria, reinforcing the positive relationship between communication practices and firm performance.

# 5.0 Conclusion and Recommendation

Manufacturing firms operate efficiently through streamlined processes, optimized resource allocation, and effective management practices. Internal control mechanisms, which include policies, procedures, and oversight activities, are crucial for ensuring that these processes run smoothly, safeguard assets, and enhance the firm’s overall performance. Effective internal controls ought to minimize errors, reduce the risk of fraud, optimize operational activities, and ensure compliance with relevant regulations. In such an environment, manufacturing firms are able to maintain consistent productivity, manage costs effectively, and sustain competitive advantages in the market. Ultimately, the effectiveness of internal control mechanisms in enhancing operating efficiency depends on how well they are integrated into the company’s culture and day-to-day activities. Manufacturing firms that view internal controls not merely as a compliance requirement but as a strategic tool for improving efficiency are likely to benefit from more streamlined processes, reduced operational costs, and improved product quality. By embedding internal controls into the fabric of their operations, manufacturing firms can create a sustainable competitive advantage, improve their profitability, and position themselves for long-term success in the increasingly complex and competitive market environment. Thus, the implementation of effective internal controls is the key to unlocking greater operational performance and ensuring that manufacturing firms are well-positioned to thrive in a changing global marketplace.

Hence, the study recommends that:

1. Management teams in manufacturing firms should prioritize the development and implementation of clear organizational policies, ethical guidelines, and accountability structures in order to enhance operational efficiency by fostering a conducive work environment that promotes responsibility and compliance among employees.

2. Management and communication departments in manufacturing firms should establish more robust information-sharing mechanisms using ERP systems, regular audits, timely updates, clear communication channels, and regular training for employees on internal control processes, ensuring that all staff members are consistently informed and aligned with organizational goals.

# 5.1 Limitations of the study and Suggestion for Further Studies

One limitation of this study is that it used a cross-sectional survey design, meaning the data was collected at just one point in time. This limits the ability to see how internal control mechanisms and operating efficiency might change over time. Additionally, the study only focused on employees in the internal control units of manufacturing firms in Nigeria, which might not fully represent the views of all staff members in the organization, potentially limiting the generalizability of the findings. The data collected was affected by non-response bias since the actual responses realised was 192 (78%) out of the expected responses was 246.

For further studies, it would be useful to explore how internal control mechanisms impact operating efficiency over a longer period, using a longitudinal study to track changes over time. Additionally, future research could include a broader range of employees from different departments within manufacturing firms to get a more comprehensive understanding of the effects of internal controls on operating efficiency. It would also be interesting to compare how these mechanisms influence efficiency in manufacturing firms across different countries or industries.

Disclaimer (Artificial intelligence)

The author hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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