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Information and Communications Technology, Supply Chain Management Practices, and Performance of Food and Beverage Industry

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ABSTRACT

The study evaluated the relationship between information and communications technology (ICT) and performance, as well as assessed the relationship between supply chain management practices (SCMPs) and performance among businesses in the Foods and Beverages industry in Oyo State, Nigeria. It scrutinized the influence of ICT and SCMPs on the performance of businesses in the Foods and Beverages Industry. The study employed a descriptive survey research design. Data for the study were obtained from primary sources via the administration of a structured questionnaire. The population comprised all the firms in the Foods and Beverages sector of the Nigerian economy located in Oyo state. Additionally, the study had a sample size of 100, randomly selected from all the firms in the Foods and Beverages industry in Oyo State. Data collected were analyzed using standard deviation, mean, percentages, and regression analysis. The outcomes of the study showed a positive and substantial influence of ICT ($p < 0.05$, $\beta = 0.626$, $t = 6.862$) on performance. It also showed that SCMPs have a positive and substantial influence ($p < 0.05$, $\beta = 0.786$, $t = 10.854$) on performance. The results also showed that ICT and SCMPs have a positive and substantial impact on the performance ($p < 0.05$; $R^2 = 0.636$; $F = 62.965$) of businesses in the Foods and Beverages Industry in Nigeria. The findings suggest that efficient and effective adoption and application of SCMPs and ICT by businesses in the Nigerian Foods and Beverages sector can enhance their performance.

Keywords- Information and Communications Technology, Performance, Supply Chain Management

1. Introduction

Competing favorably in the global and national spaces requires an appropriate combination of both supply chain management practices (SCMPs) and information and communications technology (ICT) tools due to recent technological advancements. This strategic combination can significantly improve a firm's performance, including metrics such as return on assets, return on equity, increased customer satisfaction, and sales volume, among others (Moazzam et al., 2018). In Nigeria, this view is particularly relevant, given the growing importance of technology

adoption and efficient supply chain management practices in enhancing business performance. Research by Moazzam et al. (2018) supports the notion that the application and adoption of SCMPs and ICT can lead to improvements in financial performance, market dominance, customer service, and sales growth. Moreover, ICT solutions in supply chain management are increasingly recognized for their impact on effectiveness, customer value, and cost reduction (Owuru et al., 2021). For instance, the study conducted by Owuru et al. (2021) highlights the expanding popularity of ICT options in the supply chain, including the utilization of rules to extend product shelf life and optimize warehouse space through warehouse management systems (WMS). These technologies, commonly used in majority stores, facilitate efficient goods management through handheld devices and wireless networks, enabling faster and more accurate order fulfillment. In the context of Nigeria, where the food and beverages industry faces various challenges related to supply chain management and technological adoption, the findings of studies like these underscore the potential benefits of integrating SCMPs and ICT tools.

Erick and Surjandy (2018) provided a comprehensive overview of ICT, emphasizing its broad scope encompassing various communication applications and devices. They highlighted ICT's role in storing, retrieving, manipulating, transmitting, and receiving digital information, facilitated by advancements in networking, microsystems, and electronics. The authors delineated ICT into conventional computer-based technologies and emerging digital communication technologies, underscoring their significance across industries. Furthermore, they noted the advantages of ICT and e-business applications, such as enhancing knowledge administration, facilitating information sharing, and improving transaction efficiency and reliability. Alshurideh et al. (2020) echoed the importance of ICT in maintaining competitive positions in the market, particularly in meeting evolving consumer demands and technological advancements.

The Foods and Beverages industry significantly contributes to employment and consumer spending in the global economy. This sector encompasses activities such as production, processing, packaging, distribution, and retailing of food and beverage items, ranging from fresh produce to processed and packaged goods. According to the World Bank (2019), the Foods and Beverages industry accounts for approximately 10% of the global gross domestic product (GDP) and employs about 40% of the world's workforce. This sector plays a crucial role in economic growth and development, particularly in developing nations, where it contributes significantly to exports and foreign currency earnings. In Nigeria, data from the Nigeria Bureau of Statistics (2019) indicates that the Foods and Beverages sector constitutes about 22.5% of all organizations in the manufacturing sector. Moreover, it generates approximately 1.5 million jobs and contributes 4.6% to the country’s GDP. Therefore, investigating how SCMPs contribute to the success or failure of firms in this sector is essential for enhancing performance and maintaining competitiveness in the global market landscape.

1.1 Problem Statement

In a rapidly evolving global market, where competition is fierce and consumer demands are continuously changing, firms in the Foods and Beverages industry face the pressing challenge of optimizing their organizational performance to maintain relevance and competitiveness. Despite the sector's significant contribution to the economy, evidenced by its substantial share in global GDP and employment rates (World Bank, 2019), companies in this industry, particularly in Nigeria, grapple with various obstacles hindering their efficiency and effectiveness. For instance, while the Nigeria Bureau of Statistics (2019) highlights the sector's substantial presence within the country's manufacturing landscape, concerns persist regarding its overall contribution to GDP and job creation. Moreover, the dynamic nature of consumer preferences, coupled with technological advancements, underscores the urgency for companies to adopt innovative strategies. Therefore, understanding the impact of Information and Communications Technology (ICT) and Supply Chain Management Practices (SCMPs) on organizational performance within the Foods and Beverages industry in Nigeria emerges as a critical imperative.

1.2 Research Objectives

The objective of the study is to determine the effect of ICT and SCMPs on the Organisational performance of companies in the Foods and Beverages industry in Nigeria. The specific objectives are to:

i. examine the effect of ICT on the organisational performance of firms in the Foods and Beverages industry in Nigeria;
ii. assess the influence of SCMPs on the organisational performance of firms in the Foods and Beverages industry; and
iii. examine the impact of ICT and SCMPs on the organisational performance of firms in the Foods and Beverages industry in Nigeria.

2.0 Review of Literature

2.1 Information and Communications Technology

Information and communications technology (ICT) has evolved significantly since its inception, tracing back to the development of electronic computers in the 1930s. Catherine (2019) outlines the historical progression, highlighting milestones such as the creation of integrated circuits in the 1960s and the advent of personal computers in the 1970s and 1980s. The emergence of the World Wide Web in the 1990s revolutionized communication and accessibility to information, paving the way for advancements in e-commerce, online banking, and social media. Erick and Surjandy (2018) provide a comprehensive definition of ICT, encompassing various communication applications and devices, including television, computer hardware and software, satellite systems, cellular phones, and radio. They emphasize ICT's role in storing, retrieving, manipulating, transmitting, and receiving digital information, categorizing it into conventional computer-based technologies and emerging digital communication technologies. Furthermore, Osamwonyi (2020) underscores the significance of the communication component in ICT,

leading to the shift from information technology (IT) to information and communications technology. The types and extents of ICT required by organizations vary, with different systems tailored to meet specific needs (Amos, 2023). This interconnectedness facilitated by advancements in technology has ushered in a new era of digitization, characterized by widespread connectivity across domestic and international boundaries. These developments underscore the integral role of ICT in modern society and business operations, shaping the way information is produced, transmitted, and utilized in various contexts.

2.2 Supply Chain Management Practices

The concept of supply chain management (SCM) traces its roots back to the mid-20th century, with a significant shift occurring in the 1980s and 1990s due to intensified global competition. During this period, U.S. manufacturers began embracing SCM alongside practices such as total quality management (TQM), just-in-time (JIT), and business process reengineering (BPR) to enhance productivity and competitiveness (Adam, 2022). The development of computer technologies in the 1960s and 1970s facilitated the emergence of materials requirements planning (MRP), a precursor to modern SCM systems. This period marked the initial steps towards managing inventory and coordinating supply chain activities. A supply chain can be conceptualized as a complex network involving resources, people, activities, and organizations engaged in the design, production, and delivery of goods or services (Adam, 2022). It encompasses every stage of the process, from sourcing raw materials to delivering the final product to customers. Supply chain managers play a crucial role in overseeing the flow of goods and services, ensuring smooth coordination across all stages to optimize customer satisfaction.

Supply chain management practices (SCMPs) encompass a range of strategies aimed at effectively integrating and coordinating all activities within the supply chain (Muthoni & Mose, 2020). This includes procurement of raw materials, transformation into final products, and distribution to end consumers. Al-Kamel et al. (2021) note that SCMPs gained traction in the early 1990s as organizations sought ways to deliver goods and services at the lowest possible cost amidst fierce competition. The channel of distribution within the supply chain is responsible for the movement of finished goods from manufacturers to end customers, highlighting the interconnectedness of various entities involved in the process. These practices involve integration among suppliers, businesses, and customers, both upstream and downstream in the supply chain, as well as internal integration within organizations. SCMPs focus on resource coordination, knowledge sharing, planning, and performance evaluation to optimize supply chain efficiency and effectiveness.

2.2.1 Components of Supply Chain Management Practices

Supply chain management practices (SCMPs) encompass various components crucial for optimizing the efficiency and effectiveness of supply chains in the Foods and Beverages industry. One fundamental component is supplier selection and management, which involves identifying and collaborating with reliable suppliers to ensure a steady flow of high-quality raw

materials (Johan & Lydia, 2020). However, issues such as inconsistent product quality and delivery delays can arise if suppliers fail to meet expectations, impacting production schedules and customer satisfaction (Al-Kamel et al., 2021). For example, in Nigeria's Foods and Beverages sector, challenges with supplier reliability and quality control have been reported, leading to disruptions in production and distribution networks (Odesola & Akinola, 2018).

Another critical component is inventory management, which entails maintaining optimal inventory levels to meet demand while minimizing holding costs and stockouts (Muthoni & Mose, 2020). Inefficient inventory management can result in excess inventory tying up capital or shortages that lead to lost sales opportunities (Moazzam et al., 2018). In the context of the global Foods and Beverages industry, inadequate inventory management practices have been observed in some countries, leading to wastage of perishable goods and increased operational costs (Abu & Famakin, 2022).

Furthermore, logistics and distribution management play a pivotal role in ensuring timely delivery of products to customers while minimizing transportation costs (Moses & Richard, 2017). Issues such as inefficient routing, inadequate warehousing facilities, and transportation bottlenecks can impede the smooth flow of goods through the supply chain (Kechil et al., 2022). For instance, in the Foods and Beverages sector in Kenya, challenges with transportation infrastructure have been cited as a barrier to efficient distribution, affecting the accessibility of products in remote areas (Bor, 2021).

Information and communication technology (ICT) integration is another vital component that enhances coordination and communication across the supply chain (Sharma et al., 2020). By leveraging technologies such as enterprise resource planning (ERP) systems and electronic data interchange (EDI), firms can streamline information sharing and decision-making processes (Kumar et al., 2020). However, challenges such as limited ICT infrastructure and cybersecurity threats can hinder the effective implementation of ICT solutions (Owuru et al., 2021). In countries like Indonesia, disparities in ICT adoption among small and medium-sized enterprises (SMEs) in the Foods and Beverages industry have been observed, affecting their competitiveness and performance (Sinaga et al., 2021).

Specifically, effective supply chain management practices are essential for enhancing the competitiveness and performance of firms in the Foods and Beverages industry. However, challenges such as supplier reliability, inventory management inefficiencies, logistics bottlenecks, and ICT integration barriers can pose significant obstacles. Addressing these issues requires a holistic approach that involves collaboration among stakeholders, investment in infrastructure and technology, and continuous process improvement efforts.

2.3 Performance

Performance in business is a multifaceted concept encompassing both financial and non-financial dimensions, each playing a crucial role in evaluating the success and sustainability of an organization. Financial performance serves as a key benchmark for assessing how efficiently and effectively an organization is utilizing its resources to generate revenue and manage costs (Bloom et al., 2014). Metrics such as return on assets (ROA), return on equity (ROE), profit margins, return on investment (ROI), and cash flow provide valuable insights into the organization's financial health and profitability (Muthoni & Mose, 2020). However, issues such as fluctuating market conditions, economic instability, and unforeseen disruptions can pose challenges to maintaining consistent financial performance. For example, in the Foods and Beverages industry, volatile commodity prices, supply chain disruptions, and changing consumer preferences can impact revenue streams and profit margins, requiring organizations to adapt quickly to remain competitive (Mena et al., 2019).

In addition to financial metrics, non-financial indicators play a vital role in assessing the overall performance and competitiveness of an organization (Shahzad et al., 2020). These indicators, such as customer satisfaction and loyalty, market share, brand recognition and equity, and customer acquisition and retention, provide valuable insights into the organization's market position and reputation (Sukati et al., 2020). However, issues such as measuring intangible assets, interpreting qualitative data, and aligning non-financial goals with strategic objectives can present challenges in effectively assessing non-financial performance (Sundram et al., 2016). In the Foods and Beverages industry, non-financial indicators such as brand reputation and customer loyalty are crucial for maintaining market share and sustaining long-term growth. However, issues such as negative publicity, food safety incidents, and regulatory compliance failures can adversely affect brand reputation and erode customer trust, highlighting the importance of proactive risk management and crisis response strategies (Abu & Famakin, 2022).

2.4 Development of Research Hypotheses

2.4.1 Information and Communications Technology, Supply Chain Management Practices (SCMPs) and Firm Performance

The intricate relationship among ICT adoption, SCMPs, and firm performance is akin to a complex web of interconnected variables, where higher levels of adoption and sophistication of these practices tend to enhance firm performance, creating a virtuous cycle of improvement. This notion is supported by various scholars who have highlighted the positive impact of ICT and SCMPs on firm performance (Alshurideh et al., 2022; Abdel-Basset et al., 2018). For instance, Alshurideh et al. (2022) emphasize how supply chain integration positively influences organizational performance. Similarly, Abdel-Basset et al. (2018) discuss the transformative impact of IoT technologies on supply chain efficiency and effectiveness. However, the strength of this relationship is contingent upon contextual factors such as leadership, technology investments, organizational culture, employee skills, and regulatory policies (Bloom et al., 2014; Ganbold et al., 2021). Scholars like Bloom et al. (2014) highlight the distinct effects of

information and communication technology on firm organization, emphasizing the role of leadership and organizational culture in driving successful ICT adoption. Moreover, in emerging economies like Nigeria, where the Foods and Beverages industry plays a critical role in the economy (Muthoni & Mose, 2020), understanding this relationship is imperative for driving innovation and competitiveness. Therefore, exploring this relationship through empirical research is necessary to uncover insights that can inform strategic decision-making and drive industry-wide growth and development. Hence, the study hypothesizes that an in-depth investigation into the relationship among ICT adoption, SCMPs, and firm performance in the Foods and Beverages industry in Nigeria will yield valuable insights for enhancing competitiveness and driving economic growth in the sector. Consequently, the study hypothesizes that:

H_{01}: ICT and SCMPs have no substantial influence on the performance of firms in the Nigerian Foods and Beverages sector.

2.4.2 Information and Communications Technology (ICT) and Firm Performance

The adoption and implementation of ICT in supply chain management processes have been recognized as essential for enhancing efficiency, effectiveness, and overall firm performance (Kechil et al., 2022). Scholars like Bahago et al. (2022) emphasize the positive impact of appropriate ICT tools on organizational performance, highlighting improvements in service delivery, order tracking, safety, security, and customer service. Conversely, the absence of suitable ICT tools can lead to a decline in firm performance (Bahago et al., 2022). Despite the acknowledged benefits of ICT adoption, there is a recognized need for empirical investigations in diverse geographical contexts due to structural and cultural differences (Anning-Dorson, 2018). Therefore, conducting empirical research in an emerging economy like Nigeria is crucial to uncovering the specific dynamics of the ICT-firm performance relationship within the Foods and Beverages sector in Oyo State. Such research will provide valuable insights into the unique challenges and opportunities faced by firms in this region, enabling the development of tailored strategies to enhance competitiveness and drive economic growth. Thus, the hypothesis seeks to address these prevailing issues by investigating the ICT-firm performance relationship in a specific geographical context, contributing to both academic knowledge and practical industry insights. Subsequently, this research hypothesizes that:

H_{02}: ICT has no substantial influence on the performance of firms in the Nigerian Foods and Beverages sector.

2.4.3 Supply Chain Management Practices (SCMPs) and Firm Performance

The empirical studies conducted by Veera and Muhammad (2016), Charles (2021), Inda et al. (2020), and Moses and Richard (2017) have shed light on the intricate relationship between supply chain management practices (SCMPs) and firm performance across various industries and geographical contexts. These studies collectively highlight the positive and significant impact of SCMPs on organizational performance, emphasizing the crucial role of SCMPs in enhancing

competitiveness and driving success. However, as noted by Anning-Dorson (2018), there is a recognized need for further empirical investigations in diverse geographical frameworks to account for variations in structural and cultural factors. Therefore, conducting empirical research in an emerging economy like Nigeria, specifically within the Foods and Beverages sector in Oyo State, is essential to deepen our understanding of the SCMPs-firm performance relationship within this specific context. Such research will not only contribute to academic knowledge but also provide practical insights for firms operating in the region, enabling them to develop tailored strategies to optimize supply chain management practices and improve overall performance. Thus, the hypothesis seeks to address these prevailing issues by investigating the SCMPs-firm performance relationship in a specific geographical context, facilitating informed decision-making and enhancing competitiveness within the Foods and Beverages sector in Oyo State. Subsequently, this research hypothesizes that:

> **H_{03}: SCMPs have no substantial influence on the performance of firms in the Nigerian Foods and Beverages sector.**

2.5 Theoretical Justification

Two salient theories relevant to the topic of Information and Communications Technology (ICT), Supply Chain Management Practices (SCMPs), and the performance of the Food and Beverage Industry are the Resource-Based View (RBV) and the Technology-Organization-Environment (TOE) framework. The RBV, proposed by Wernerfelt (1984) and Barney (1991), asserts that a firm's competitive advantage and performance are determined by its unique resources and capabilities. In the context of the Food and Beverage Industry, this theory suggests that firms can achieve superior performance by effectively leveraging ICT and SCMPs as valuable strategic resources. For example, firms that invest in advanced ICT infrastructure and integrate SCMPs into their operations can enhance supply chain efficiency, reduce costs, and improve customer satisfaction, thereby gaining a competitive edge in the market (Kumar et al., 2020; Abdel-Basset et al., 2018). However, the RBV assumes homogeneity in resource availability and mobility, which may not always hold true in diverse contexts such as emerging economies like Nigeria, where firms face unique challenges related to infrastructure, skills, and regulatory environments (Odesola & Akinola, 2020).

On the other hand, the TOE framework, proposed by Tornatzky and Fleischer (1990), focuses on the interplay between technological factors, organizational characteristics, and environmental contexts in influencing firms' adoption and utilization of new technologies. In the Food and Beverage Industry, this framework suggests that the successful implementation of ICT and SCMPs depends not only on the technological capabilities but also on organizational readiness and external environmental factors. For instance, firms operating in highly competitive markets may be more inclined to adopt advanced ICT solutions and SCMPs to stay ahead of competitors (Alshurideh et al., 2022). Moreover, the TOE framework highlights the importance of supportive organizational cultures, leadership commitment, and regulatory frameworks in facilitating the

adoption and effective use of ICT and SCMPs (Shahzad et al., 2020; Ganbold et al., 2021). However, challenges such as limited access to technology infrastructure, resistance to change, and inadequate skills among employees can hinder the successful implementation of ICT and SCMPs in the Food and Beverage Industry, particularly in emerging economies like Nigeria (Odesola & Akinola, 2018; Owuru et al., 2021). Therefore, both the RBV and TOE framework provide valuable insights into the mechanisms through which ICT, SCMPs, and firm performance are interrelated, offering guidance for firms seeking to navigate the complexities of technological adoption and implementation in the Food and Beverage Industry.

3. Methodology

The choice of Oyo State as the study's location for investigating the relationship between ICT, SCMPs, and firm performance in the Foods and Beverages sector of the Nigerian economy is justified by several factors. Firstly, Oyo State is one of the major hubs for food and beverage production in Nigeria, hosting a significant number of firms operating in this sector (Odesola & Akinola, 2018). This concentration of food and beverage companies provides a rich and diverse sample population for the study, allowing for a comprehensive examination of the ICT and SCMPs practices prevalent in the industry. Additionally, Oyo State's strategic location in the southwestern region of Nigeria makes it accessible and representative of broader trends and dynamics within the Nigerian food and beverage market (Muthoni & Mose, 2020). Therefore, selecting Oyo State as the study area ensures that the findings are reflective of the broader context of the Foods and Beverages industry in Nigeria.

Furthermore, focusing on managers and supervisors within the firms in Oyo State's Foods and Beverages sector as the target population is justified by their pivotal roles in decision-making and operational management. Managers and supervisors possess valuable insights into the adoption and implementation of ICT and SCMPs within their respective organizations (Ganbold et al., 2021). As key stakeholders, their perspectives and experiences can provide nuanced understandings of how these technological practices influence organizational performance. By targeting this specific group, the study ensures that the data collected are from individuals directly involved in shaping the ICT and SCMPs strategies of their firms, thereby enhancing the relevance and validity of the research findings (Sharma et al., 2020).

Moreover, the utilization of a structured questionnaire divided into five parts aligns with established research practices and facilitates systematic data collection and analysis. The questionnaire's design, incorporating sections on demographic characteristics, ICT components, SCMPs, and their respective relationships with organizational performance, allows for a comprehensive exploration of the study variables (Kumar et al., 2020). By employing a 5-point Likert scale for measuring respondents' perceptions, the study ensures consistency and comparability in data interpretation. Additionally, the use of statistical techniques such as standard deviation, mean, percentages, and regression analysis enables rigorous data analysis, allowing for the identification of patterns, trends, and relationships among variables (Al-Kamel

et al., 2021). Overall, the methodological approach adopted in the study ensures the collection of robust and reliable data, facilitating meaningful insights into the ICT and SCMPs practices and their impact on firm performance in the Foods and Beverages sector of Oyo State, Nigeria.

4. Data Analysis

4.1 Response Rate

The response rate of 75% signifies a relatively high level of engagement among the managers and supervisors of the selected foods and beverages companies in Oyo State. While it is encouraging that a majority of the distributed questionnaires were completed and returned, the non-response from some participants raises concerns about potential bias in the data collected. The implications of this response rate could include the possibility of non-response bias, where those who chose not to participate may hold different perspectives or experiences compared to those who did. It is essential for researchers to acknowledge and address this potential bias when interpreting the study's findings to ensure the results accurately reflect the broader population of interest. Additionally, the response rate underscores the importance of ensuring clear communication, adequate follow-up, and perhaps incentives to encourage higher participation rates in future research endeavors.

4.2 Demographic Characteristics of Respondents (n= 75)

Among the 75 respondents, 55% were male, while 45% were female. This distribution suggests a slightly higher representation of male supervisors and managers within the selected foods and beverages companies in Oyo State. Regarding age demographics, the majority of respondents fell within the age range of 30-45 years, constituting 60% of the sample. This age group typically represents individuals with significant professional experience and may hold key managerial roles within their respective organizations. Moreover, 25% of the respondents were between the ages of 25-30, indicating a notable presence of younger professionals in managerial positions. This demographic trend reflects a diverse workforce composition within the foods and beverages industry, with implications for understanding the dynamics of ICT adoption and supply chain management practices among different age cohorts.

In terms of marital status, approximately 70% of the respondents were married, while 30% were single. This distribution suggests that a significant portion of supervisors and managers within the industry are likely to have familial responsibilities, which could influence their work priorities and decision-making processes regarding ICT adoption and supply chain management practices (Bhatia, 2018). Regarding educational qualifications, the majority of respondents held at least a bachelor's degree, comprising 80% of the sample, while 20% held postgraduate degrees. This suggests a relatively high level of educational attainment among managerial personnel in the foods and beverages sector, which could influence their understanding and utilization of ICT tools and supply chain management strategies. Additionally, the average years of experience among respondents were approximately 8-12 years, indicating a moderate level of professional expertise within the industry. This experience level could impact the perception and

implementation of ICT and supply chain management practices, with seasoned professionals likely to have valuable insights into industry-specific challenges and opportunities.

4.3 Measurement Model of Reliability Analysis

Cronbach's alpha coefficients were calculated for each dimension of the instruments to assess the internal consistency reliability. Nunnally et al. (1994) suggest that a minimum value of 0.60 is acceptable for Cronbach's alpha to indicate reliability. The Cronbach's alpha for the ICT constructs was 0.795, for SCMPs it was 0.821, for ICT-performance constructs it was 0.834, and for the SCMPs-Performance constructs, it was 0.784. These results indicate that all dimensions of the instruments demonstrated high internal consistency, surpassing the acceptable threshold of 0.60 (Nunnally et al., 1994). The robust reliability of the instruments suggests that the data collected are consistent and dependable, enhancing the validity of the study's findings. Additionally, these findings underscore the suitability of the chosen research instruments for measuring the variables under investigation, thereby strengthening the overall methodological rigor of the study.

4.4 Test of Research Hypotheses

Three hypotheses were formulated and tested in this study to examine the relationships between information and communications technology (ICT), supply chain management practices (SCMPs), and firm performance in the foods and beverages industry in Oyo State. Regression analysis was employed to analyze the data collected from the survey responses. The first hypothesis tested the relationship between ICT and firm performance, aiming to ascertain whether higher levels of ICT adoption and utilization positively influence organizational performance within the sector. The second hypothesis focused on the association between SCMPs and firm performance, seeking to determine whether effective supply chain management practices contribute significantly to enhanced organizational performance. Lastly, the third hypothesis examined the combined effect of ICT and SCMPs on firm performance. Regression analysis allowed for the assessment of the strength and directionality of these relationships, providing valuable insights into the drivers of firm performance within the foods and beverages industry (Wan et al., 2018).

4.4.1 Hypothesis One: ICT has no significant influence on Performance of Firms in the Foods and Beverages Industry in Oyo State

Table 1 presents the regression results on the ICT-firm performance relationship within the Foods and Beverages industry in Oyo State. The intercept value of 35.817 serves as the starting point for formulating the regression equation. The coefficient for ICT indicates that for every unit increase in ICT, there is a corresponding increase of 70.2% in firm performance. Additionally, the standardized coefficient of 0.626 suggests that for every one standard deviation change in ICT, there is a 62.6% improvement in performance. These findings indicate a significant and positive influence of ICT on firm performance, aligning with previous research in the field. For instance, Aslam et al. (2021) demonstrated that higher levels of ICT adoption

positively impact organizational performance, leading to increased efficiency and effectiveness in various industries. Similarly, Muthoni and Mose (2020) found that ICT adoption contributes to improved performance among manufacturing firms in Kenya, supporting the notion that investment in ICT infrastructure and capabilities can enhance overall firm performance. This result corroborates the works of Ganbold et al. (2021), who emphasized the importance of ICT-enabled supply chain integration in driving operational performance within organizations. Overall, these findings resonate with the submission of Abdel-Basset, Manogaran, and Mohamed (2018), who highlighted the transformative impact of ICT on supply chain operations and firm performance, underscoring the significance of ICT adoption for achieving competitive advantage and sustainable growth in the Foods and Beverages industry.

Table 1: Coefficients Table for ICT-Performance Relationship

Model	Unstandardized coefficients		Standardized coefficients	T	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Limit	Upper Limit
(Constant)	35.817	5.108	.626	7.012	.000	25.637	45.998
ICT	.702	.102		6.862	.000	.498	.906

Source: Field Survey, 2023
Dependent variable: Firm performance

Table 2 provides further insights into the relationship between ICT and firm performance, with the R-value indicating a linear relationship between the two variables. The correlation coefficient of .626a suggests a moderate to strong positive correlation between ICT and firm performance. Moreover, the R-squared value of 0.392 indicates that ICT explains approximately 39.2% of the variance in firm performance, implying that ICT serves as a significant predictor of performance within the Foods and Beverages industry. However, it is essential to acknowledge that other unmeasured factors may also influence firm performance, contributing to the remaining variance. Despite this, the findings support the rejection of the null hypothesis (H01), which posits that ICT has no substantial influence on firm performance, and the acceptance of the alternative hypothesis (H11), which asserts that ICT significantly impacts the performance of companies in the Foods and Beverages industry. These results align with the works of Kumar, Singh, and Modgil (2020), who emphasized the predictive power of ICT in enhancing organizational performance within the agri-food supply chain. Similarly, Alshurideh et al. (2022) highlighted the significant role of ICT-enabled supply chain integration in driving organizational performance, underscoring the importance of ICT adoption for achieving competitive advantage and operational excellence. This conclusion resonates with the submission of Bloom et al. (2014), who emphasized the distinct effects of ICT on firm organization and performance, highlighting the transformative potential of ICT for driving business success in the modern era.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.626[a]	.392	.384	5.19387	1.694

Source: Field Survey, 2023
Predictors: (Constant), ICT

Table 3 presents the ANOVA analysis of the ICT-firm performance relationship among firms in the Foods and Beverages industry in Oyo State. The calculated F-value of 47.089 is associated with a significant p-value of 0.000, which is less than the conventional significance level of 0.05. This indicates that ICT indeed has a substantial and positive influence on firm performance within the Foods and Beverages industry in Oyo State. Consequently, the null hypothesis (H_{01}) stating that ICT has no significant influence on firm performance is rejected, while the alternative hypothesis (H_1) proposing that ICT does have a significant influence on firm performance is accepted. These findings are consistent with the research of Muthoni and Mose (2020), who demonstrated the positive impact of ICT adoption on the performance of Foods and Beverages manufacturing firms in Kenya. Similarly, Abdel-Basset, Manogaran, and Mohamed (2018) highlighted the transformative effects of ICT on supply chain operations and firm performance, emphasizing the critical role of ICT in enhancing efficiency, productivity, and competitiveness. Moreover, the results align with the submission of Sharma et al. (2020), who emphasized the significant contribution of ICT applications to sustainable agriculture supply chain performance, underscoring the broader implications of ICT adoption for driving economic growth and sustainability within the Agri-food sector.

Table 3: ANOVA of ICT-Firm Performance Relationship

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1270.277	1	1270.277	47.089	.000[b]
Residual	1969.270	73	26.976		
Total	**3239.547**	**74**			

Source: Field Survey, 2023

4.4.2 Hypothesis Two: SCMPs does not have substantial influence on Performance of Firms in the Foods and Beverages Industry

Table 4 displays the regression results concerning the effect of SCMPs on the performance of firms within the Foods and Beverages industry in Oyo State. The intercept value of 15.029 serves as the starting point for formulating the regression equation, indicating the baseline performance level. The beta coefficient of 0.786 suggests a strong and positive influence of SCMPs on firm performance, signifying that as SCMPs increase, firm performance is expected to improve significantly. However, the standard error of 0.078 highlights the degree of uncertainty in the estimation of the beta coefficient, indicating potential variability in the

relationship. Overall, the findings indicate that SCMPs play a crucial role in enhancing the performance of firms operating in the Foods and Beverages industry in Oyo State. These results are consistent with the research of Alshurideh et al. (2022), who demonstrated the positive impact of supply chain integration on organizational performance, underscoring the importance of effective SCM practices for achieving competitive advantage. Similarly, Bor (2021) highlighted the significant contribution of green supply chain management practices to the performance of food and beverage processing firms in Kenya, emphasizing the broader implications of SCM for environmental sustainability and business success. Moreover, the findings resonate with the submission of Sukati, Sanyal, and Awaain (2020), who emphasized the positive association between SCM practices and organizational performance in the service industry, highlighting the critical role of SCM in driving operational excellence and business outcomes.

Table 4: Coefficients Table for SCMPs-Performance Relationship

Model	Unstandardized coefficients		Standardized coefficients	T	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	15.029	5.144	0.786	2.922	.005	4.777	25.282
Supply Chain Management Practices	0.848	0.078		10.854	.000	0.692	1.004

Source: Field Survey, 2023
Dependent variable: Firm performance

Table 5 provides insights into the linear relationship between SCMPs and firm performance, with an R-value of 0.786 indicating a strong correlation between these variables. The R2-value of 61.7% suggests that SCMPs explain a significant portion of the variance in firm performance within the Foods and Beverages industry in Oyo State. This finding implies that effective and efficient SCMPs have a substantial influence on the performance of companies in this sector. However, the remaining 38.3% of variance may be attributed to other factors not captured in the model, indicating the presence of additional variables that also impact firm performance. Building on these results, the study concludes that the adoption and application of SCMPs play a critical role in shaping the performance outcomes of firms in the Foods and Beverages industry. These findings align with previous research by Muthoni and Mose (2020), who emphasized the significant impact of SCM practices on the performance of manufacturing firms in Kenya, highlighting the importance of effective supply chain management for achieving organizational goals and competitive advantage. Additionally, the results corroborate the findings of Veera and Muhammad (2016), who demonstrated the positive relationship between SCMPs and supply chain performance in the Malaysian electronics sector, emphasizing the broader implications of SCM for enhancing operational efficiency and customer satisfaction.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.786[a]	.617	.612	4.12043	1.694

Source: Field Survey, 2023
a. Predictors: (Constant), SCMPs
Dependent Variable: firm performance

Table 6 presents the Anova results of the SCMPs-performance relationship among firms in the Foods and Beverages industry in Oyo State. The F Cal value of 117.809 with a significant value of 0.000 indicates that SCMPs have a substantial influence on the performance of firms in this sector ($p < 0.05$). Consequently, the null hypothesis (H02) proposing that SCMPs have no significant influence on performance is rejected, while the alternative hypothesis (H12) suggesting that SCMPs do have a significant influence on performance is accepted. These findings are consistent with previous research by Muthoni and Mose (2020), who demonstrated the positive impact of SCMPs on the performance of manufacturing firms in Kenya, underscoring the importance of effective supply chain management practices for enhancing operational efficiency and customer satisfaction. Additionally, the results align with the findings of Charles (2021), who highlighted the significant relationship between SCMPs and organizational performance in the dairy processing firms in Kenya, emphasizing the critical role of SCM practices in driving competitive advantage and business success within the food industry.

Table 6: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2000.158	1	2000.158	117.809	.000[b]
Residual	1239.389	73	16.978		
Total	**3239.547**	**74**			

Source: Field Survey, 2023
a. Dependent Variable: organisational performance
b. Predictors: (Constant), SCMPs

4.4.3 Hypothesis Three: ICT and SCMPs do not have substantial influence on Performance of Firms in the Foods and Beverages Industry

Table 7 presents the coefficient table of the regression results, indicating the combined effect of ICT and SCMPs on firm performance in the Foods and Beverages industry in Oyo State. The intercept value of 13.482 can be utilized to formulate the regression equation. The table reveals that for every unit increase in firm performance, ICT is predicted to increase by 20.6%, while SCMPs are predicted to increase by 71.5%. This suggests that both ICT and SCMPs play significant roles in influencing firm performance positively. These findings are consistent with previous research by Alshurideh et al. (2022), who demonstrated the complementary effect of ICT and SCM integration on organizational performance, emphasizing the importance of

leveraging technology and effective supply chain practices to enhance overall business outcomes. Additionally, the results resonate with the findings of Ganbold et al. (2021), who highlighted the synergistic relationship between information technology-enabled supply chain integration and operational performance, underscoring the critical role of integrated ICT and SCM strategies in driving business success and performance.

Table 7: Coefficient Table

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95% Confidence Interval	
	β	β				Lower Limit	Upper Limit
(Constant)	13.482	5.114		2.636	.010	3.287	23.677
Information and Communications Technology	0.206	.107	0.184	1.930	.058	-.007	.420
Supply Chain Management Practices	.715	.103	.663	6.951	.000	.510	.921

Source: Author's Computation, 2023.

a. Dependent Variable: performance

Table 8 provides insights into the linear relationship among ICT, SCMPs, and firm performance in the Foods and Beverages industry in Oyo State. The R-value of 0.798a indicates a strong correlation between these variables, implying that there is a significant association among ICT, SCMPs, and firm performance. The R2-value of 63.6% suggests that approximately two-thirds of the variance in firm performance can be explained by the combined influence of SCMPs and ICT. This underscores the importance of integrating both effective supply chain management practices and appropriate information and communication technologies to enhance business performance in the Foods and Beverages sector. These findings align with previous research by Kamble et al. (2023), who emphasized the synergistic effect of blockchain technology on supply chain integration and sustainable performance, highlighting the critical role of leveraging advanced technologies and efficient supply chain practices to drive organizational success. Additionally, the results resonate with the findings of Veera and Muhammad (2016), who demonstrated the interconnectedness of SCMPs, supply chain integration, and supply chain performance, underscoring the significance of integrating these elements to improve overall business outcomes.

Table 8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.798[a]	.636	.626	4.04563	1.465

Source: Author' Computation, 2023

a. Predictors: (Constant), SCMPs, ICT

Table 9 provides crucial insights into the influence of ICT and SCMPs on the performance of businesses in the Foods and Beverages industry in Oyo State. The ANOVA results reveal that both ICT and SCMPs have a significant impact on firm performance, as evidenced by the F Cal value of 62.965 and a significant p-value of 0.000, which is less than 0.05. This indicates that the model for the regression is statistically significant, further emphasizing the importance of integrating information and communication technologies with effective supply chain management practices to drive business performance. These findings corroborate the works of Muthoni and Mose (2020), who highlighted the positive relationship between SCMPs and organizational performance in the Foods and Beverages sector, underscoring the critical role of supply chain management practices in enhancing firm outcomes. Additionally, the results resonate with the submission of Ganbold et al. (2021), who emphasized the significant impact of information technology-enabled supply chain integration on operational performance, highlighting the need for businesses to leverage ICT and SCMPs to achieve competitive advantages and sustainable performance.

Table 9: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2061.115	2	1030.558	62.965	.000[b]
Residual	1178.431	72	16.367		
Total	**3239.546**	**74**			

Source: Field Survey, 2023
a. Dependent Variable: organisational performance
b. Predictors: (Constant), SCMPs, ICT

5. Discussions

For the first objective, the study examined the relationship between ICT and firm performance. It revealed a linear, positive, and statistically significant association between ICT and the performance of businesses in the Foods and Beverages industry ($p < 0.05$; $R^2=0.392$; $t= 6.862$). This suggests that firms in the Foods and Beverages industry in Nigeria that adopt and utilize appropriate ICT tools and personnel are likely to experience improved performance. As established earlier, this improved performance can manifest in both financial and non-financial aspects. It implies that the adoption and application of ICT by firms in the Foods and Beverages industry could result in enhanced market share, improved customer satisfaction, better quality of service, increased return on equity, and higher return on assets. This finding is consistent with the discoveries of Kechil et al. (2022), who conducted similar research and found that the adoption and application of ICT positively impacted the performance of selected logistics companies. Similarly, the findings of this study align with those of Bahago et al. (2022) and Nicholas (2009), whose empirical investigations also revealed that adopting and applying appropriate ICT tools and personnel to carry out organizational tasks improved operational efficiency and effectiveness, thereby enhancing firm performance.

For the second objective, the study assessed the relationship between SCMPs and the performance of businesses in the Foods and Beverages sector in Nigeria. It revealed that these two variables had a linear, positive, and statistically significant link ($p < 0.05$; $R^2=0.617$; $t=10.854$). This suggests that firms in the Foods and Beverages industry aiming to enhance their performance should closely attend to their SCMPs to ensure their effective and efficient implementation. As established earlier, this improved performance could manifest in both financial and non-financial aspects. It means that the adoption and application of effective and efficient SCMPs by firms in the Foods and Beverages industry could result in enhanced market share, improved customer satisfaction, better quality of service, increased return on equity, and higher return on assets. This finding is supported by previous studies conducted by Veera and Muhammad (2016) and Asha (2015), who found a similar linear, positive, and statistically significant relationship between SCMPs and firm performance in selected firms. Additionally, Charles (2021) also found that SCMPs significantly predicted both performance and competitive advantages of the firm, further validating the importance of SCMPs in driving firm performance.

Finally, the study examined the combined influence of ICT and SCMPs on the performance of firms in the Foods and Beverages industry in Nigeria. The results of the regression analysis revealed that both ICT and SCMPs had a positive and statistically significant impact on the performance of firms in the Foods and Beverages industry in Nigeria ($p < 0.05$; $R^2= 0.636$; $F=62.965$). This finding implies that adopting and implementing ICT alongside effective and efficient SCMPs by firms in the Foods and Beverages industry will lead to improved firm performance. As established earlier, this improved performance could manifest in both financial and non-financial aspects, such as enhanced market share, improved customer satisfaction, better quality of service, increased return on equity, and increased return on assets. This finding is consistent with previous empirical investigations conducted by Jumady et al. (2021), Johan and Lydia (2020), and Anil et al. (2019). These authors, through their empirical studies across various sectors and countries, found a positive, linear, and statistically significant influence of SCMPs and ICT on the performance of the businesses they examined.

6. Conclusion

This study delved into the intricate relationship between Information and Communications Technology (ICT), Supply Chain Management Practices (SCMPs), and the performance of firms in the Foods and Beverages industry in Nigeria, particularly in Oyo State. The findings underscored the significant positive impact of both ICT and SCMPs on firm performance, indicating that their adoption and effective implementation can lead to improved financial and non-financial outcomes for businesses in the sector. These outcomes include enhanced market share, increased customer satisfaction, better service quality, and improved financial metrics such as return on equity and return on assets. The implications of these findings are profound for the Foods and Beverages industry, as they highlight the importance of investing in and leveraging ICT and SCMPs to gain competitive advantages and ensure sustainable growth in a dynamic market environment. By embracing innovative technologies and optimizing supply

chain management practices, firms in this industry can position themselves for long-term success, adapt to changing consumer preferences, and thrive in an increasingly competitive landscape.

7. Recommendations and Policy Implications

Based on the findings of this study, several recommendations and policy implications emerge for stakeholders in the Foods and Beverages industry in Nigeria. Firstly, firms should prioritize investments in Information and Communications Technology (ICT) infrastructure and capabilities to enhance operational efficiency, customer service, and overall performance. This may involve adopting advanced digital tools, implementing robust data management systems, and providing adequate training for employees to effectively utilize ICT resources. Additionally, firms should focus on optimizing their Supply Chain Management Practices (SCMPs) to streamline processes, reduce costs, and improve responsiveness to market demands. This could entail implementing lean principles, adopting sustainable sourcing practices, and fostering closer collaboration with supply chain partners. Furthermore, policymakers and industry regulators should create an enabling environment that supports the adoption and integration of ICT and SCMPs in the Foods and Beverages sector. This may involve offering incentives for technology adoption, providing access to funding for digital transformation initiatives, and promoting knowledge sharing and best practices among industry players. Overall, embracing ICT and enhancing SCMPs can position firms in the Foods and Beverages industry for long-term competitiveness and sustainable growth in the Nigerian market.

8. Contributions to Knowledge and Suggestion for Further Studies

This study makes significant contributions to the body of knowledge by providing empirical evidence on the relationship between Information and Communications Technology (ICT), Supply Chain Management Practices (SCMPs), and firm performance in the Foods and Beverages industry in Nigeria. The findings underscore the importance of adopting and integrating ICT and SCMPs to enhance operational efficiency, customer service, and overall performance. Furthermore, the study highlights the need for policymakers, industry stakeholders, and managers to prioritize investments in technology and supply chain management to drive sustainable growth and competitiveness in the sector. For future research, it is recommended to explore the dynamics of ICT and SCMPs adoption across different industries and geographical regions in Nigeria, as well as investigate the impact of emerging technologies such as blockchain and artificial intelligence on supply chain performance in the Foods and Beverages industry. Additionally, longitudinal studies could be conducted to assess the long-term effects of ICT and SCMPs integration on firm performance and competitive advantage.

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