The Effect of Supply Chain Integration on the Operational Performance of Selected Manufacturing Firms in Lagos State, Nigeria

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Abstract- ***This study investigated the effect of supply chain integration on the operational performance of selected manufacturing firms in Lagos State. The study adopted an exploratory cross-sectional survey research design. Dangote Flour Mills Plc, and Nestle Foods Nigeria Plc, Lagos State were purposively selected for the study, and the study's population includes 4,007 employees of the studied firms. Three hundred and sixty-four (364) employees were selected using a simple random sampling technique. Primary data was employed and a primary instrument (self-administered questionnaire) was designed to collect the data from the respondents. The survey data collected were analysed using descriptive statistics to achieve the mean, frequency distribution, and percentage of data collected, and inferential statistical tool (linear regression analysis) was used to test the study hypotheses with the aid of SPSS version 26. The findings of the study revealed that internal integration has a positive and a significant effect on productivity in selected food and beverages firms, supplier integration has a positive and a significant effect on quick delivery in selected food and beverages firms, and customer integration has a positive and a significant effect on customer satisfaction in selected food and beverages firms. It is therefore, concluded that supply chain integration strategies are effectively implemented to facilitate operational performance. The study recommends that the managers of manufacturing firms should ensure that information flows between production, inventory, purchasing, marketing, and distribution units to achieve effective and efficient production and meet customer demand. Also, a high degree of reactivity and adaptability should be fostered to satisfy the demands of internal customers and optimize productivity in every department within the firm.***

Indexed Terms- ***Customer Integration, Manufacturing Firms, Internal Integration, Operational Performance, Supply Chain Integration.***

I. INTRODUCTION

1.1 Background to the Study

Operational performance is critical for a company's competitiveness in the supply chain. Improving this performance requires all supply chain participants to enhance their overall efficiency (Santoso et al., 2022). Operational performance includes optimizing resource use, reducing costs, and maximizing profit potential (Usman et al., 2020). Effective operational performance management involves ensuring timely deliveries, minimizing lead times, and maintaining optimal machine levels (Yego&Namusonge, 2021).

Global political and economic factors complicate traditional supply chain management, especially in a globalized market where partners and suppliers are across borders (Phan et al., 2020). Businesses now operate in a dynamic environment, facing increased competition, customer expectations, and the need to maintain high performance (Kumara & Rahman, 2015). To sustain competitiveness, manufacturing organizations must develop operational strategies that support effective implementation of their corporate competitive strategy, requiring strong cooperation and continuous adherence within the supply chain (Khan et al., 2022).

Manufacturing companies face challenges such as cost reduction and enhanced customer service, pushing them to seek sustainable competitive advantages (Lassnig et al., 2022). To address these challenges, companies need robust supply chain strategies and technology to optimize internal and external processes, improve performance, reduce costs, and respond swiftly to customer needs (Palazzo &Vollero, 2022).

Supply Chain Integration (SCI) has become increasingly important for organizational success.

Companies must closely collaborate with customers and suppliers to enhance performance, meet consumer demand, and increase profitability (Kumar et al., 2017). SCI significantly improves a company's financial and operational performance, shifting tasks like inventory control and raw material acquisition to the supply chain level (Mohammadi et al., 2014). Effective SCI fosters cooperation and integration across supply chain businesses, enhancing performance and reducing costs (Cheng et al., 2016; Tseng & Liao, 2015).

SCI impacts operational success directly by fostering strong collaboration among supply chain participants and indirectly by helping businesses eliminate non-value-adding operations (Hedijani&Saei, 2020). The intimate connection between SCI and operational effectiveness has been emphasized globally, with scholars advocating for a systematic approach to SCI in response to global competition (Uwamahoro, 2018)

1.Statement of the Problem Summary:

Manufacturing organizations in dynamic and competitive sectors must continuously improve operations to maintain sustainability and high performance. However, this can be challenging, particularly for firms in developing countries like Nigeria. Effective Supply Chain Integration (SCI) is essential for improving operational performance, yet many Nigerian manufacturing companies have not fully adopted SCI practices. Issues such as poor raw material quality, delayed deliveries, and noncompliance with environmental regulations hinder these companies' performance.

Research shows that SCI positively impacts operational efficiency, but many Nigerian firms, especially in Lagos State, continue to manage supply chain activities discretely rather than integrating them. The focus of most existing research has been on developed countries, with limited studies in Nigeria, particularly in the food and beverage subsector of the manufacturing industry. This study aims to investigate the effect of SCI on the operational performance of selected food and beverage firms in Lagos State, specifically Dangote Flour Mills Plc and Nestle Foods Nigeria Plc, focusing on the indicators of internal, supplier, and customer integration.

1.3 Aim and Objectives of the Study

The study aims to investigate the effect of supply chain integration on the operational performance of selected food and beverages firms in Lagos State. Specifically, the study seeks to:

i. examine the effect of internal integration on the productivity of selected food and beverages firms in Lagos State.
ii. assess the effect of supplier integration on quick delivery of selected food and beverages firms in Lagos State.
iii. determine the effect of customer integration on customer satisfaction of selected food and beverages firms in Lagos State.

1.4. Research Questions

Based on the objectives of the study, the following research questions were put forward and answered:

i. What is the effect of internal integration on the productivity of selected food and beverages firms in Lagos State?
ii. To what extent is the effect of supplier integration on quick delivery of selected food and beverages firms in Lagos State?
iii. What is the effect of customer integration on customer satisfaction of selected food and beverages firms in Lagos State?

1.5. Hypotheses of the Study

To achieve the study objectives, the following null hypotheses were tested in the study:

i. Internal integration has no significant effect on the productivity of selected food and beverages firms in Lagos State.
ii. Supplier integration has no significant effect on quick delivery of selected food and beverages firms in Lagos State.
iii. Customer integration has no significant effect on customer satisfaction of selected food and beverages firms in Lagos State.

1.6 Significance of the Study

The study highlights the importance of Supply Chain Integration (SCI) indicators—such as internal integration, supplier integration, and customer integration—in improving operational efficiency and business competitiveness. These insights are valuable for both manufacturing and service industries, helping

them implement appropriate SCI strategies to ensure successful production and marketing activities in a volatile business environment.

The findings are particularly useful for food and beverage supply chain partners, including consumers, retailers, wholesalers, distributors, and producers. The study suggests that supply chain managers should enhance their firms' ability to adapt to disruptions and maintain a sustained competitive advantage by proactively designing and configuring their supply chain systems.

For managers in manufacturing companies, the study offers guidance in finding innovative solutions to supply chain challenges and identifying new opportunities for dynamic adaptation to changing environmental conditions. It also benefits other organizations by demonstrating the relevance of SCI strategies in mitigating risks, particularly those related to cost reduction and improved performance.

The study's findings are valuable to the government for developing policies and initiatives that support the growth and sustainability of the industrial sector. By understanding the challenges manufacturing firms face in implementing SCI, the government can improve access to funding, offer guidance, streamline regulations, and ultimately help businesses adopt SCI initiatives more effectively.

Industry policymakers can use the study's insights to develop and implement measures that reduce supply chain disruptions, making it easier for businesses to operate within the supply chain. The study also contributes to the theoretical literature on the relationship between SCI indicators and operational performance, particularly within the Nigerian manufacturing context. It serves as a foundation for future research on SCI and provides a valuable resource for scholars, enriching the overall body of knowledge.

1.7 Scope of the Study

This study analysed the effect of Supply Chain Integration (SCI) on the operational performance of listed firms in the food and beverages sub-sector of the manufacturing industry in Lagos State. The research focused specifically on two companies: Dangote Flour Mills Plc and Nestle Foods Nigeria Plc. The study examined three key SCI strategies—internal integration, supplier integration, and customer integration—to assess their impact on operational performance, measured by productivity, quick delivery, and customer satisfaction. Data was collected from senior and managerial staff of the selected firms and analysed using linear regression analysis.

II. LITERATURE REVIEW

The study is grounded in three key theories: Strategic Choice Theory, Resource-Based View (RBV) Theory, and Systems Theory, each offering a framework to understand supply chain integration (SCI) and operational performance.

Strategic Choice Theory emphasizes the impact of senior management decisions on organizational performance and the relationships between internal and external entities. It highlights the importance of well-informed decisions in inventory management and other areas to enhance efficiency and sustain high performance levels. This theory is relevant as it underscores the role of managerial decisions in integrating supply chains and improving competitiveness.

Resource-Based View (RBV) Theory posits that a firm's unique, valuable, and hard-to-replicate resources are crucial for maintaining competitive advantage and achieving superior performance. The theory suggests that strategic management and SCI are intertwined, with effective use of resources leading to enhanced operational flexibility and efficiency. This perspective is particularly pertinent for organizations aiming to leverage their resources to improve SCI and overall business performance.

Systems Theory focuses on the interconnections among various components of an organization, viewing them as part of a larger, integrated system. It highlights the importance of understanding these relationships to manage complexity and optimize processes. In the context of supply chain management, this theory underscores the need for internal integration and coordination of subsystems to ensure efficient processing and delivery of customer orders.

Together, these theories provide a comprehensive framework for examining how strategic decisions, resource management, and system integration contribute to effective SCI and operational success.

This section provides a conceptual review of the variables explored in the study, focusing on Supply Chain Integration (SCI) and its dimensions, as well as operational performance.

III. SUPPLY CHAIN INTEGRATION (SCI)

SCI refers to the extent of integration between an organization's internal operations and those of its suppliers, customers, and other supply chain (SC) participants. It is divided into internal and external integration:

- Internal Integration: Focuses on coordinating and collaborating within an organization's departments to meet customer and supplier demands.
- External Integration: Emphasizes collaboration with suppliers and customers to streamline inter-organizational processes.

SCI offers several advantages, including improved market share, financial performance, and customer satisfaction.

Dimensions of SCI

The SCI is measured through three primary dimensions:

- Internal Integration: Involves connecting different departments within an organization to work as a cohesive unit, improving information flow, reducing errors, and enhancing operational success.
- Supplier Integration (SI): Refers to the long-term, cooperative relationships between a company and its suppliers, involving shared strategic and operational practices to ensure a smooth supply chain.
- Customer Integration (CI): Focuses on collaborating with customers to understand their needs and improve product quality, responsiveness, and overall customer satisfaction.

Operational Performance

Operational performance is assessed in terms of cost, quality, delivery, and flexibility, with key metrics including fulfilment, inventory performance, and responsiveness. It is crucial for achieving customer satisfaction, which is essential for organizational success. Meeting customer demands and maintaining satisfaction are top priorities for organizations in today's competitive environment.

2.3.4.2 Quick Delivery

Quick delivery is a crucial service element for transactions involving physical products, especially for online merchants. Companies have implemented strategies to enhance delivery speed without extra cost to customers. Quick delivery can be categorized into two types:

- Speedy Delivery: Rapid shipment after an order is placed, often influencing purchase decisions.
- Immediate Delivery: Same-day delivery, typically available at a higher cost, with less precise time frames.

2.3.4.3 Productivity

Productivity is a key issue in both industrialized and developing nations. It measures how effectively financial and human capital are utilized by dividing production output by one of the production variables. Productivity reflects the efficiency of resource use and conversion into tangible outcomes, influencing organizational performance.

2.4 Empirical Review

The empirical review examines various studies on the impact of Supply Chain Integration (SCI) on operational performance. Key findings include:

- Setyadi (2023): SCI positively impacts product quality and operational performance.
- Masa'deh et al. (2022): SCI and technology management significantly influence operational performance.
- Oliveira and Gonzalez (2022): SCI, a multidimensional construct, greatly affects operational performance.
- Atnafu and Hussen (2017): SCI significantly improves businesses' operational performance.

- Yuen and Thai (2017): The impact of internal and external integration on operational performance varies between product and service supply chains.
- Pasupuleti, V.(2024); :Enhancing Supply Chain Agility and Sustainability through Machine Learning: Optimization Techniques for Logistics and Inventory Management

2.5 Conceptual Framework

The study's conceptual framework includes three SCI constructs: internal integration, supplier integration, and customer integration. Operational performance is represented by productivity, customer satisfaction, and quick delivery. The framework is based on the formulated hypotheses.

IV. METHODOLOGY

The study used an exploratory cross-sectional survey design to examine the impact of supply chain resilience (SCR) on the operational performance of selected manufacturing firms in Lagos. This design was chosen because it allows for the analysis of data from a population at a single point in time, facilitating the identification of variables and their relationships. The study targeted employees within the food and beverage sub-sector, specifically from Dangote Flour Mills Plc and Nestle Foods Nigeria Plc, which together have a total workforce of 4,007 employees. These firms were selected due to their significant role in the industry and their active participation in the stock market, with operations based in Lagos State, Nigeria's commercial hub. A simple random sampling technique was employed to select respondents from key departments, such as production, procurement/logistics, management, HR, and sales/marketing, ensuring an unbiased collection of relevant data. The sample size was to be determined using Taro's (1967) formula.

$$n = \frac{N}{1 + N(e)^2}$$

Where;

n = Sample size

N = Population size = 4,007.

e = Margin of errors = 5% = 0.05

Hence;

$$n = \frac{4{,}007}{1 + 4{,}007(0.05)^2}$$

$$n = \frac{4{,}007}{1 + 4{,}007(0.0025)}$$

$$n = 364$$

The study determined a sample size of 364 respondents, considered a true representation of the study population. This sample was distributed proportionally between the two companies using Bryman's (2011) formula. Specifically, 203 questionnaires were administered to respondents at Nestle Foods Nigeria Plc, which has 2,239 staff, and 161 questionnaires were distributed to respondents at Dangote Flour Mills Plc, with 1,768 staff. This allocation ensures a balanced and representative data collection process across both companies.

Table 3.1 Allocation of Sample Size

S/N	Company's Name	Number of Staff	Stable 3.1ample Size
1	Nestle Foods Nigeria Plc.	2, 239	$\frac{2{,}239 \times 364}{4{,}007} = 203$
	Dangote Flour Mills Plc	1,768	$\frac{1{,}768 \times 364}{4{,}007} = 161$
	Total	4,007	364

Source: Computed by the researcher 2023

3.5 Data Collection Method

In the study, 203 questionnaires were distributed to respondents at Nestle Foods Nigeria Plc, and 161 to those at Dangote Flour Mills Plc. Data collection was conducted using a well-structured questionnaire, designed based on research questions and divided into seven sections. These sections addressed respondent profiles, internal integration, supplier integration, customer integration, and operational performance, with questions largely adapted from existing studies

and structured on a five-point Likert scale.The study's validity and reliability were ensured through a pilot study involving 30 participants, employing face and content validity. Management experts reviewed the questionnaire to ensure its relevance and appropriateness, leading to adjustments where necessary. Reliability was tested using Cronbach's alpha, with a minimum threshold of 0.7 considered acceptable for internal consistency.

Table 3.2 Cronbach's Alpha Test for Reliability

S/N	Variable	Number of Items	Cronbach's Alpha
1	Internal Integration	5	0.704
2	Supplier Integration	5	0.820
3	Customer Integration	5	0.933
4	Productivity	3	0.801
5	Quick Delivery	2	0.703
6	Customer satisfaction	3	0.790

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

This chapter focused on the analysis of data. The chapter deals with the editing and presentation of data collected; the distribution of demographic data; the analysis of research question, the test of hypotheses; and the discussion of findings. The data analysis was done with the aid of SPSS version 26.

4.2 Presentation and Analysis of Demographic Data

Table 4.1: Distribution of the Questionnaire

Questionnaire	Total
Copies of Questionnaire administered	364
Copies of questionnaire Retrieved	323
Response Rate	88.7%

Source: Field Survey, 2024

From the table 4.1, 364 copies of the questionnaire were administered on the respondents 323 copies were dully filled and collect. This gives an approximate response rate of 88.7% For a study of this nature, such a percentage is very high thereby indicating the willingness of the respondents to co-operate. The distribution of demographic data of respondents is presented in Table 4.2 below:

Table 4.2 Distribution of Demographic Data of Respondents

Responses	Frequency	Percent (%)
Gender		
Male	197	61.0
Female	126	39.0
Total	323	100.0
Age		
22-31yrs	79	24.5
32-41yrs	138	42.7
42-51yrs	83	25.7
52yrs and above	23	7.1
Total	323	100.0
Qualification		
ND/Equivalent	56	17.3
HMD/B.Sc	189	58.5
MBA/M.Sc	78	24.1
Total	323	100.0
Years of Service		
3 - 6yrs	82	25.4
7 -10yrs	186	57.6
11yrs and above	55	17.0
Total	323	100.0
Position		
Top-level Manager	48	14.9
Middle-level Manager	169	52.3
Lower-level Manager	106	32.8
Total	323	100.0
Department		
Production	74	22.9
Procurement/Logistics	81	25.1
Stock/Warehouse	97	30.0
Sales/Marketing	51	15.8
HR	20	6.2

Total	323	100.0

Source: Field Survey, 2024

Table 4.2 provides a demographic breakdown of the study's respondents. The majority (61.0%) were male, while 39.0% were female, indicating gender diversity. In terms of age, most respondents (42.7%) were between 32-41 years, reflecting an active workforce. Educationally, 58.5% held HND/B.Sc. degrees, showing a high level of education among respondents. Regarding years of service, 57.6% had 7-10 years of experience, indicating a knowledgeable and experienced group. In terms of job roles, 52.3% were middle-level managers, ensuring representation across all managerial levels. Finally, the respondents came from key departments: production (22.9%), procurement/logistics (25.1%), stock/warehouse (30.0%), sales/marketing (15.8%), and HR (15.8%), ensuring relevant departmental input for the study.
Data was presented and analysed in relation to research questions using a frequency distribution table.

Research Question I

Where 5= Strongly Agree, 4=Agree, 3 = Undecided, 2 = Disagree, 1 = Strongly Disagree

Table 4.3 What is the effect of internal integration on the productivity of selected manufacturing firms in Lagos State?

Statements		5	4	3	2	1	Total	Mean
In the manufacturing, my firm is very responsive to the demands of many departments.	N	150	111	38	8	16	323	4.15
	(%)	46.4	34.4	11.8	2.5	5.0	100.0	
My company's departments work together to create manufacturing scheduling, supply initiatives, and sales forecasts.	N	158	114	20	15	16	323	4.42
	(%)	48.9	35.3	6.2	4.6	5.0	100.0	
Information flows between inventory, purchasing, marketing, and distribution divisions are emphasized in my firm.	N	187	112	5	12	7	323	4.42
	(%)	57.9	34.7	1.5	3.7	2.2	100.0	
In my firm, there is a high degree of reactivity and adaptability to satisfy the demands of internal customers.	N	141	111	18	22	31	323	3.97
	(%)	43.7	34.4	5.6	6.8	9.6	100.0	
In my firm, we have an integrated inventory management system.	N	173	120	12	7	11	323	4.35
	(%)	53.6	37.2	3.7	2.2	3.4	100.0	

Source: Field Survey, 2024

Table 4.3 presents the mean values of responses, indicating general agreement among the respondents on various aspects of their firms' operations. The first row, with a mean of 4.15, shows that most respondents believe their firms are highly receptive to departmental demands. The second and third rows, both with a mean of 4.42, suggest strong agreement that departments collaborate effectively on manufacturing schedules, supply initiatives, and sales forecasts, and that there is a good flow of information between inventory, purchasing, marketing, and distribution divisions. The fourth row, with a mean of 3.97, indicates that respondents believe their firms are reactive and adaptable to internal customer demands. Lastly, the fifth row, with a mean of 4.35, reflects agreement that their firms have an integrated inventory management system.

Research Question II

Table 4.4 To what extent is the effect of supplier integration on quick delivery of selected manufacturing firms in Lagos State?

Statements		5	4	3	2	1	Total	Mean

For quick response ordering procedures, firm engages in extensive collaborative planning with suppliers.	N	187	120	8	5	3	323	4.50
	(%)	57.9	37.2	2.5	1.5	0.9	100.0	
firm Mcollaborates strategically with its suppliers on a high level.	N	203	98	14	4	4	323	4.52
	(%)	62.8	30.3	4.3	1.2	1.2	100.0	
To increase the accuracy, timeliness, and accessibility of information, my make firm's investment inter-ents in firm information systems.	N	202	98	15	6	2	323	4.52
	(%)	62.5	30.3	4.6	1.9	0.6	100.0	
Key suppliers are part of my firm's continual quality improvement initiatives.	N	163	85	30	18	27	323	4.05
	(%)	50.5	26.3	9.3	5.6	8.4	100.0	
Using information technology, my firm exchanges data with its main suppliers.	N	125	124	27	16	31	323	3.92
	(%)	38.7	38.4	8.4	5.0	9.6	100.0	

Source: Field Survey, 2024

Table 4.4 presents mean values that reflect strong agreement among respondents regarding their firms' collaboration with suppliers. The first row, with a mean of 4.50, indicates that most respondents strongly agree that their firms engage in extensive collaborative planning with suppliers for quick response ordering procedures. The second and third rows, both with a mean of 4.52, suggest that respondents strongly agree that their firms collaborate strategically with suppliers and invest in inter-firm information systems to enhance information accuracy, timeliness, and accessibility. The fourth row, with a mean of 4.05, shows that respondents agree that key suppliers are involved in their firms' continuous quality improvement initiatives. Finally, the fifth row, with a mean of 3.92, indicates agreement that their firms use information technology to exchange data with main suppliers.

Research Question III

Table 4.5: What is the effect of customer integration on customer satisfaction of selected manufacturing firms in Lagos State?

Statements		5	4	3	2	1	Total	Mean
My firm shares information on stock availability with its main customers.	N	159	109	23	14	19	323	4.15
	(%)	48.9	33.7	7.1	4.3	5.9	100.0	
My firm measures customer satisfaction in an appropriate and efficient manner.	N	136	106	21	24	36	323	3.87
	(%)	42.1	32.8	6.5	7.4	11.1	100.0	
Customers of my firm receive a great deal of information sharing concerning market data.	N	130	128	37	12	16	323	4.07
	(%)	40.2	39.6	11.5	3.7	5.0	100.0	
To predict demand visibility, my firm works closely with its customers on demand forecasting and market planning.	N	113	138	25	19	28	323	3.89
	(%)	35.0	42.7	7.7	5.9	8.7	100.0	

My firm involves customers in the Processofdevelopingnew products.	N	144	111	23	24	21	323	4.03
	(%)	44.6	34.4	7.1	7.4	6.5	100.0	

Source: Field Survey, 2024

4.3 Test of Hypotheses

The hypotheses developed in the study were tested using linear regression analysis. The condition for testing each of the hypothesis is that when P value is less than 0.05 ($p<0.05$) level of significance, the null hypothesis is rejected and when P value is greater than 0.05 ($p>0.05$) level of significance, the null hypothesis is accepted.

Hypothesis One

H_0: Internal integration has no significant effect on the productivity of selected food and beverages firms in Lagos State.

Table 4.6a Model Summary

Model	R	R^2	Adjusted R^2	Std. Error (SE)
1	0.768[a]	0.590	0.588	0.40484

a. Predictors: (Constant), Internal Integration

Table 4.6b ANOVAa

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	75.613	1	75.613	461.345	0.000[b]
Residual	52.611	321	0.164		
Total	128.223	322			

a. Dependent Variable: Productivity.

b. Predictors: (Constant), Internal Integration

Table 4.6b ANOVAa

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta	4.189	0.000
(Constant)	0.675	0.161		21.479	0.000
Internal Integration	0.817	0.038	0.768		

a Dependent Variable: Productivity

The analysis of Table 4.6a reveals a strong positive and significant relationship between internal integration and productivity, with a correlation coefficient (r) of 0.768 and p-value < 0.05. The coefficient of determination (R^2) is 0.590, indicating that 59.0% of the variability in productivity is explained by internal integration, while the remaining 41.0% is due to other factors not included in the model. The Standard Error of the Estimate (0.404) suggests strong accuracy in predicting productivity.

Table 4.6b shows that the overall model is statistically significant ($F = 461.345$; Sig. = 0.001, $p < 0.05$), confirming that internal integration significantly affects productivity.

Table 4.6c indicates that the coefficient for internal integration (0.817) has a strong positive effect on productivity. The probability value (0.000) and t-statistics (21.479) further support the significance of this effect (p-value < 0.05). Thus, the null hypothesis is rejected, and the alternate hypothesis, which states that internal integration positively and significantly affects productivity, is accepted.

Hypothesis Two:

H_0: Supplier integration has no significant effect on the quick delivery of selected food and beverage firms in Lagos State.

Table 4.7a Model Summary

Model	R	R^2	Adjusted R^2	Std. Error (SE)
1	0.698[a]	0.488	0.486	0.45244

a. Predictors: (Constant), Supplier Integration

Table 4.7b ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	62.513	1	62.513	305.384	0.000[b]
Residual	65.710	321	0.205		
Total	128.223	322			

a. Dependent Variable: Quick Delivery.
b. Predictors: (Constant), Supplier Integration

Table 4.7c Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	1.179	0.169		6.962	0.000
Supplier Integration	0.698	0.040	0.698	17.475	0.000

a Dependent Variable: Quick Delivery

The analysis of Table 4.7a reveals a strong positive and significant relationship between supply integration and quick delivery, with a correlation coefficient (r) of 0.698 and a p-value < 0.05. The coefficient of determination (R^2) is 0.488, indicating that 48.8% of the variability in quick delivery is explained by supply integration, while the remaining 51.2% is due to other factors not included in the model. The Standard Error of the Estimate (0.452) suggests strong accuracy in predicting quick delivery.

Table 4.7b shows that the overall model is statistically significant (F = 305.384; Sig. = 0.001, p < 0.05), confirming that supply integration significantly affects quick delivery.

Table 4.7c indicates that the coefficient for supply integration (0.698) has a strong positive effect on quick delivery. The probability value (0.000) and t-statistics (17.475) further support the significance of this effect (p-value < 0.05). Thus, the null hypothesis is rejected, and the alternate hypothesis, which states that supply integration positively and significantly affects quick delivery, is accepted.

Hypothesis Three

H_0: Customer integration has no significant effect on customer satisfaction of selected food and beverages firms in Lagos State.

Table 4.8a Model Summary

Model	R	R^2	Adjusted R^2	Std. Error (SE)
1	0.782[a]	0.611	0.610	0.39403

a. Predictors: (Constant), Customer Integration

Table 4.8b ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	78.386	1	78.386	504.875	0.000[b]
Residual	49.838	321	0.155		
Total	128.223	322			

a. Dependent Variable: Customer Satisfaction.
b. Predictors: (Constant), Customer Integration

Table 4.8c Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	T	Sig.

	B	Std. Error	Beta		
(Constant)	1.311	0.126		10.381	0.000
Supplier Integration	0.686	0.031	0.782	22.469	0.000

a Dependent Variable: Quick Delivery

A close examination of table 4.8a above indicates that $r = 0.782$, $p < 0.05$. This is an indication that there is a strong positive and significant relationship between the customer integration and customer satisfaction. The R2 value of 0.611 indicates that about 61.1% of the variations in customer satisfaction were due to the variations in the customer integration. This implies that 61.1% of the variations that occur in customer satisfaction can be explained by the customer integration. The balance of 38.9% could be explained by other variables not included in the model.

Summary

Table 4.8a

- Standard Error of the Estimate: 0.394, indicating strong accuracy in predicting the output.

Table 4.8b

- Significance of Overall Model: F = 504.875, Sig. = 0.001 ($p < 0.05$), indicating the model is statistically significant.
- Conclusion: Customer integration has a significant effect on customer satisfaction.

Table 4.8c

- Coefficient of Customer Integration: 0.686, suggesting a strong positive effect on customer satisfaction.
- Probability Value: 0.000 and t-statistics of 22.469, indicating the effect is significant ($p < 0.05$).
- Conclusion: The null hypothesis is rejected; the alternate hypothesis stating customer integration positively and significantly affects customer satisfaction is accepted.

Discussion of Findings

- Internal Integration and Productivity: Positive and significant effect in selected food and beverages firms in Lagos State. This integration facilitates effective information flow and enhances productivity. Supported by Masa'deh et al. (2022), Oliveira and Gonzalez (2022), Birhanu et al. (2022), and Johono and Siagian (2022).
- Supplier Integration and Quick Delivery: Positive and significant effect. Firms collaborate extensively with suppliers, improving response time, accuracy, and profitability. Supported by Simbarashe et al. (2022), Basel et al. (2022), Zaid et al. (2021), and Latuconsina (2021).
- Customer Integration and Customer Satisfaction: Positive and significant effect. Firms work closely with customers on demand forecasting and market planning, leading to improved satisfaction and profitability. Supported by Sutanto and Japutra (2021), Abdusalam (2021), Uwamahoro (2018), and Gollo and Paul (2018).

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

The summary of findings is as follow:

The study's findings reveal that internal integration has a positive and a significant effect on productivity in selected food and beverages firms in Lagos State. This is indicated in hypothesis one with a coefficient of 0.817 and p-value < 0.05

The study's findings reveal that supplier integration has a positive and a significant effect on quick delivery in selected food and beverages firms in Lagos State. This is indicated in in hypothesis two with a coefficient of 0.698 and p-value < 0.05

The study's findings reveal that customer integration has a positive and a significant effect on customer satisfaction in selected food and beverages firms in Lagos State. This is indicated in hypothesis three with a coefficient of 0.686 and p-value < 0.05

Conclusion

The study examined the effect of supply chain integration on the operational performance of selected food and beverages firms in Lagos State. It is evident from the findings that internal integration, supplier integration, and customer integration are effectively implemented to facilitate operational performance.

The study concludes that internal integration has a positive and a significant effect on productivity in selected food and beverages firms. The application of internal integration enhances information flows between inventory, purchasing, marketing, and distribution units to achieve effective and efficient production and meet customer demand.

The study concludes that supplier integration has a positive and a significant effect on quick delivery in selected food and beverages firms. The application of supplier integration strategy enables the firms to engage in extensive collaborative planning with suppliers for quick response ordering procedures. This facilitates quick delivery of raw materials for production and quick delivery of finished products to the customers.

The study concludes that customer integration has a positive and a significant effect on customer satisfaction in selected food and beverages firms. By adopting customer integration in the supply chain, the firms were able to work closely with their customers on demand forecasting and market planning to predict demand visibility. This facilitates customer satisfaction, which invariably optimise the sale volume and profitability of the firms in a highly competitive market.

Recommendations

Based on the findings of the study and the conclusions drawn, it is sacrosanct for firms in the manufacturing sector to give hid to the following relevant recommendations:

i. The managers of food and beverage firms should ensure that information flows between production, inventory, purchasing, marketing, and distribution units to achieve effective and efficient production and meet customer demand. Also, a high degree of reactivity and adaptability is should be fostered to satisfy the demands of internal customers and optimise productivity in every department within the firm.

ii. The managers of food and beverage firms should engage in extensive collaborative planning with suppliers for quick response ordering procedures. This would facilitate quick delivery of raw materials for production and quick delivery of finished products to the customers.

iii. It is expedient for the management of manufacturing firms to build a substantial inter-firm information system to increase the accuracy, timeliness, and accessibility of information in the supply chain. Also, they should collaborate strategically with key suppliers and engage them in continual quality improvement initiatives. This would enhance quick delivery of quality raw materials for production and quick delivery of quality products to the customers.

iv. The managers of food and beverage firms should work closely with their customers on demand forecasting and market planning to predict demand visibility. Also, information on available stock should be shared with major customers aimed at satisfying customer demands. This would invariably optimise the sale volume and profitability of the firms in a highly competitive market.

v. It is expedient for the managers of manufacturing firms to apply supply chain integration strategies in their production and marketing operation to facilitate operational performance in the market.

Contributions to Knowledge

In addition to providing literature on SCI practices for would be researchers, the study contributes to knowledge in the following areas:

i. The study provides a perceptive of the dimensions (internal, supplier, and customer integration) that manufacturing firms use to facilitate operational performance and this could provide a framework of reference for other manufacturing organisations

to assess their operational performance in the market.

ii. This study proposed and tested a SCI practices model for the Nigerian manufacturing sector that can mitigate the negative impact of their production process on the operating environment and satisfy the demand of the customers.

iii. The study also contributes and enriches the current studies in the existing body of knowledge on the application of SCI practices by identifying the critical activities (internal, supplier, and customer integration) that are relevant to the food and beverage firms for optimising product quality and enhance customer satisfaction.

Suggestions for Further Study

The study put forward the following suggestions for further study:

i. The study focused on two purposively selected firms in the food and beverages sub-sector of the Nigerian manufacturing sector. Further studies on SCI practices should look at the entire firms in the sub-sector to have a general view of the effect of SCI practices on operational performance in the sector.
ii. Further researches should investigate SCI practices in other sub-sectors of the Nigerian manufacturing sector or probably the entire manufacturing sector, so that effect of SCI practices on operational performance could be examined.

iii. This study was conducted in Lagos State; therefore, further studies could be conducted in other industrial clusters in Nigeria.

iv. Three dimensions of SCI practices (internal, supplier, and customer integration practices) were explored in the study, further studies could explore other dimensions of SCI practices not captured in the study.

Limitations of the Study

The study was confronted with a number of constraints which are stated below:

i. Getting the respondents to agree to fill the questionnaire was a bit difficult. Some respondents were reluctant to fill the questionnaire due to their indifference to the items contained in the questionnaire.

ii. It may not be possible to generalise the findings of the study to other industries or sectors because the study focused on the food and beverages sub-sector of the Nigerian manufacturing sector.

iii. Another limitation was the limited time frame in which this study had to be completed owing to a combination of official and academic commitments throughout the study.

Despite these limitations, the findings of this study do provide valuable insights into a number of pertinent issues in value-chain management. it also provides a platform for future investigation.

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