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Supply Chain Optimization and Operational Efficiency of Selected Manufacturing Firms in South-east Nigeria

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Abstract: This study examined the effect of supply chain optimization on the operational efficiency of manufacturing firms in South-East Nigeria, with specific focus on inventory management, logistics and distribution, and supplier relationship management. The study adopted a survey research design, and data were collected through structured questionnaires administered to 109 employees of selected firms, out of which 102 responses were valid for analysis. Data were analyzed using descriptive statistics and regression analysis. The results revealed that inventory management optimization had a significant positive effect on operational efficiency ($\beta = 0.322$, $p = 0.001$), logistics and distribution optimization also showed a significant effect ($\beta = 0.287$, $p = 0.001$), while supplier relationship management had the strongest influence ($\beta = 0.341$, $p = 0.000$). The study concluded that effective supply chain optimization significantly improves operational efficiency by reducing delays, minimizing costs, and enhancing productivity. It was therefore recommended that manufacturing firms strengthen supplier relationships, improve inventory systems, and adopt efficient logistics strategies to achieve better operational performance.

Keywords: *Supply Chain Optimization, Operational Efficiency, Inventory Management, Logistics and Distribution, Supplier Relationship Management*.

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Introduction

Background of the study

In today's highly competitive and globalized business environment, manufacturing firms are increasingly under pressure to improve their operational efficiency while minimizing costs and maximizing output. One of the key strategies adopted to achieve this objective is supply chain optimization, which involves the effective coordination and integration of activities such as procurement, production, inventory management, and distribution. Supply chain optimization enables firms to streamline their processes, reduce waste, and respond more quickly to changes in customer demand. As competition intensifies, firms that fail to optimize their supply chains risk experiencing inefficiencies, delays, and reduced profitability (Ofoegbu & Ogbonda, 2020).

Supply chain optimization encompasses a wide range of practices, including demand forecasting, inventory control, supplier relationship management, and logistics planning. These practices are designed to ensure that the right materials are available at the right time and in the right quantity, thereby reducing production downtime and operational bottlenecks. When effectively implemented, supply chain optimization can significantly enhance operational efficiency by lowering production costs, improving product quality, and shortening delivery times. Consequently, it has become a critical area of focus for manufacturing firms seeking to maintain a competitive advantage in both local and international markets (Nwibere and Needorn, 2024).

In the context of Nigeria, particularly in the South-East region, manufacturing firms face numerous challenges that hinder optimal supply chain performance. These challenges include poor infrastructure, unreliable transportation systems, inconsistent power supply, and fluctuating raw material availability. Additionally, inefficiencies in logistics and weak supplier networks further complicate the supply chain processes of many firms. As a result, manufacturing firms in this region often struggle with high operational costs, delays in production, and reduced efficiency, which ultimately affect their overall performance and sustainability (Ezekwueme, *et al.*, 2024).

Given these challenges, there is a growing need for manufacturing firms in South-East Nigeria to adopt effective supply chain optimization strategies to enhance their operational efficiency. By improving coordination among supply chain components and leveraging modern technologies and best practices, firms can overcome many of the existing constraints. Therefore, this study seeks to examine the relationship between supply chain optimization and operational efficiency, with a view to providing insights that can help manufacturing firms in the region improve their performance and remain competitive in an increasingly dynamic business environment.

Statement of the Problem

Despite the recognized importance of supply chain optimization in enhancing operational efficiency, many manufacturing firms in South-East Nigeria continue to experience persistent inefficiencies in their operations. These inefficivencies

are manifested in frequent production delays, high operational costs, poor inventory management, and inability to meet customer demand promptly. Factors such as inadequate infrastructure, weak supplier coordination, and limited adoption of modern supply chain practices further exacerbate these challenges. While existing studies have examined supply chain management and firm performance broadly, there is limited empirical evidence specifically linking supply chain optimization practices to operational efficiency within the context of manufacturing firms in South-East Nigeria (Ifekanandu and Samuel, 2025). This gap creates uncertainty for managers and policymakers on the extent to which optimizing supply chain processes can improve operational outcomes. Therefore, this study seeks to address this gap by investigating the effect of supply chain optimization on the operational efficiency of manufacturing firms in the region.

Aim of the Study

The aim of this study is to examine the effect of supply chain optimization on the operational efficiency of manufacturing firms in South-East Nigeria.

Objectives of the Study

1. To evaluate the effect of inventory management optimization on the operational efficiency of manufacturing firms in South-East Nigeria.
2. To assess the impact of logistics and distribution optimization on the operational efficiency of manufacturing firms in South-East Nigeria.
3. To examine the influence of supplier relationship management on the operational efficiency of manufacturing firms in South-East Nigeria.

Research Questions

1. To evaluate the effect of inventory management optimization on the operational efficiency of manufacturing firms in South-East Nigeria.
2. To assess the impact of logistics and distribution optimization on the operational efficiency of manufacturing firms in South-East Nigeria.
3. To examine the influence of supplier relationship management on the operational efficiency of manufacturing firms in South-East Nigeria.

Research Hypotheses

- H_{01}: Inventory management optimization has no significant effect on the operational efficiency of manufacturing firms in South-East Nigeria.
- H_{02}: Logistics and distribution optimization has no significant effect on the operational efficiency of manufacturing firms in South-East Nigeria.
- H_{03}: Supplier relationship management has no significant effect on the operational efficiency of manufacturing firms in South-East Nigeria.

Review of Related Literature

Conceptual Review

Concept of Supply Chain Management

Supply chain management (SCM) refers to the integrated coordination of all activities involved in the sourcing, procurement, production, and distribution of goods and services from the point of origin to the final consumer. It encompasses the management of materials, information, and financial flows across the entire supply chain network, including suppliers, manufacturers, wholesalers, retailers, and customers. The primary objective of supply chain management is to ensure that products are delivered in the right quantity, at the right time, and at the lowest possible cost while maintaining the desired level of quality and customer satisfaction (Obiki-Osafiele *et al*., 2024).

In modern business environments, supply chain management goes beyond the traditional functions of purchasing and logistics to include strategic collaboration and information sharing among supply chain partners. It involves the use of advanced technologies and systems to enhance visibility, coordination, and decision-making across the supply chain. Effective SCM enables firms to reduce operational inefficiencies, minimize inventory holding costs, improve responsiveness to market changes, and achieve competitive advantage. As such, it is considered a critical driver of organizational performance, particularly in manufacturing firms where production processes depend heavily on the timely availability of raw materials and efficient distribution systems (Esan *et al*., 2022).

Furthermore, supply chain management emphasizes the importance of integration and relationship management among key stakeholders within the supply chain. Strong relationships with suppliers and distributors help firms to ensure reliability, flexibility, and consistency in operations. In developing economies such as Nigeria, effective supply chain management is particularly vital due to infrastructural challenges, supply uncertainties, and market volatility (Ogbaini, 2025). Therefore, firms that adopt efficient supply chain management practices are better positioned to overcome these challenges, enhance their operational efficiency, and sustain long-term growth.

Components of Supply Chain Optimization

Supply chain optimization consists of various interrelated components that collectively enhance the efficiency and effectiveness of supply chain operations. These components focus on improving the flow of materials, information, and resources across the supply chain, ensuring that organizational processes are streamlined and aligned with overall business objectives. By optimizing key elements of the supply chain, manufacturing firms can reduce operational costs, minimize delays, and improve service delivery (Osazefua, 2019).

One of the major components of supply chain optimization is inventory management optimization, which involves maintaining optimal stock levels to meet production and customer demand without overstocking or understocking. Effective inventory management ensures that materials are available when needed, thereby reducing production interruptions and holding costs. Techniques such as demand forecasting, just-in-time (JIT) systems, and inventory tracking technologies are commonly used to enhance inventory efficiency and accuracy (Oteri *et al*., 2023).

Another critical component is logistics and distribution optimization, which focuses on the efficient movement and storage of goods from production points to end users. This includes transportation planning, warehousing, route optimization, and

delivery scheduling. Efficient logistics systems help reduce transportation costs, shorten delivery lead times, and improve customer satisfaction. In regions with infrastructural challenges, such as South-East Nigeria, optimizing logistics operations is essential for overcoming delays and ensuring timely product delivery (Mwangi, 2019).

Additionally, supplier relationship management plays a vital role in supply chain optimization by fostering strong and strategic partnerships with suppliers. Effective supplier management involves evaluating supplier performance, ensuring timely delivery of quality materials, and maintaining open communication channels. Strong supplier relationships enhance reliability, reduce supply risks, and promote collaboration, which ultimately contributes to improved operational efficiency and overall supply chain performance (Riad *et al*., 2024).

Concept of Operational Efficiency

Operational efficiency refers to the ability of an organization, particularly manufacturing firms, to utilize its resources effectively in producing goods and services while minimizing waste, costs, and time. It focuses on achieving maximum output with the least possible input, ensuring that production processes are streamlined and optimized. Operational efficiency is often seen as a key indicator of organizational performance because it reflects how well a firm manages its internal operations to deliver value to customers (Woods, 2020).

In manufacturing environments, operational efficiency involves the effective coordination of production activities, workforce, machinery, and raw materials to ensure smooth and uninterrupted operations. It encompasses various aspects such as process improvement, cost control, quality management, and timely delivery of products. Firms that achieve high levels of operational efficiency are better positioned to reduce production costs, improve product quality, and respond quickly to market demands. This not only enhances customer satisfaction but also strengthens the competitive position of the firm in the industry (Kraus *et al.,* 2021).

Furthermore, operational efficiency is closely linked to the adoption of modern management practices and technologies that support process optimization and performance monitoring. Tools such as automation, performance measurement systems, and data analytics help firms identify inefficiencies and implement corrective measures. In the context of manufacturing firms in South-East Nigeria, improving operational efficiency is particularly important due to existing challenges such as inadequate infrastructure and high operational costs. Therefore, firms that focus on enhancing their operational efficiency through effective strategies, including supply chain optimization, are more likely to achieve sustainable growth and improved performance (Thipphavong *et al.,* 2018).

Relationship between Supply Chain Optimization and Operational Efficiency

Supply chain optimization and operational efficiency are closely interconnected, as the effectiveness of a firm's supply chain directly impacts how efficiently it operates. When supply chain processes such as inventory management, logistics, and supplier coordination are optimized, manufacturing firms can reduce operational bottlenecks, minimize delays, and lower production costs. This ensures that resources—both human and material—are utilized in the most productive manner, thereby enhancing overall operational performance. In essence, an optimized supply chain acts as a foundation for achieving high operational efficiency (Sjödin *et al*., 2018).

Effective supply chain optimization enables firms to streamline processes and improve coordination across all stages of production and distribution. For instance, accurate demand forecasting and inventory management reduce stockouts and overstocking, allowing production lines to operate without interruption. Similarly, efficient logistics and transportation systems ensure timely delivery of raw materials and finished goods, preventing delays that could negatively affect productivity. By minimizing waste, improving resource allocation, and ensuring smooth workflow, optimized supply chains directly contribute to increased operational efficiency (Thipphavong *et al.,* 2018).

Moreover, strong supplier relationship management—a key component of supply chain optimization—ensures reliability and flexibility in sourcing materials. Firms that maintain close collaboration with suppliers are better able to respond to unexpected disruptions, adjust production schedules, and maintain quality standards. This adaptability not only reduces operational risks but also enhances efficiency by preventing downtime and avoiding unnecessary costs. Therefore, the relationship between supply chain optimization and operational efficiency is reciprocal: well-optimized supply chains drive efficiency, while efficient operations provide feedback and data that can further refine supply chain strategies (Kidassova, 2024).

Empirical review

Adebiyi *et al*. (2021) examined how supply chain management practices (SCM) impact on the performance of selected quoted manufacturing organizations in Nigeria. The study found that positive and statistically significant relationship exists between supply chain management practices such as procurement outsourcing, information flow management and order process management, and performance of manufacturing organizations. The study, therefore, recommends that manufacturing organizations should concentrate on the production and services they have the expertise on and outsource those functions other firms or individual can do better for them.

Sulaiman, & Ganiyu (2024) investigated the effect of supply chain integration on the operational performance of selected manufacturing firms in Lagos State. 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.

The impact of intelligent supply chains and operational efficiency within selected Fast-Moving Consumer Goods (FMCG) manufacturing companies in Nigeria was examined by Sokenu (2024). The study delves into the integration of advanced

technologies such as the Internet of Things (IoT), Big Data Analytics (BDA), and Artificial Intelligence (AI) in supply chain management.The study employs a combination of quantitative and qualitative methods to gather data from various stakeholders within the FMCG sector. The findings show that interconnected and intelligent supply chains significantly contribute to operational performance, though the adoption and effectiveness of these technologies vary. The conclusion therefore emphasizes that interconnected supply chains positively influence operational performance, while intelligent supply chains show a mixed effect due to underutilization or poor implementation.

Ifekanandu, & Samuel (2025) explored supply chain innovation and operational efficiency of food and beverage manufacturing firms in South-South Nigeria.The study employed the correlational research design and the positivist research philosophy. The findings revealed that supply chain process innovation has a significant relationship with cost efficiency of food and beverage manufacturing firms in South-South Nigeria. This study also found a significant relationship between supply chain process innovation and time efficiency of food and beverage manufacturing firms in South-South Nigeria. The study equally revealed that supply chain technology innovation has a significant relationship with cost efficiency of food and beverage manufacturing firms in South-South Nigeria. The study also found a significant relationship between supply chain technology innovation and time efficiency of food and beverage manufacturing firms in South-South Nigeria.

Theoretical Framework

The theoretical framework provides the foundation for understanding the relationship between supply chain optimization and operational efficiency. This study is anchored on two key theories that explain how effective supply chain management practices influence organizational performance in manufacturing firms.

Resource-Based View (RBV) Theory

The Resource-Based View (RBV) theory, proposed by Jay Barney, posits that a firm's sustainable competitive advantage is derived from its unique resources and capabilities. According to RBV, resources that are valuable, rare, inimitable, and non-substitutable (VRIN) enable firms to achieve superior performance. In the context of supply chain optimization, RBV suggests that firms that efficiently manage their supply chain resources—such as inventory, logistics systems, and supplier networks—can improve operational efficiency and gain a competitive edge. For example, a manufacturing firm that effectively coordinates its suppliers and optimizes inventory can reduce production delays and operating costs, which directly enhances performance. This theory supports the notion that supply chain capabilities are strategic resources that contribute to operational efficiency and long-term success (Lubis, 2022).

Lean Manufacturing Theory

Lean Manufacturing Theory emphasizes the elimination of waste, continuous improvement, and maximization of value in production processes. It advocates for streamlining operations by reducing non-value-adding activities such as excess inventory, unnecessary movements, overproduction, and waiting times. When applied to supply chain optimization, lean principles guide firms in optimizing processes, improving workflow, and enhancing resource utilization across the supply chain. For instance, lean practices in logistics and inventory management ensure that materials are available exactly when needed, reducing idle time and operational inefficiencies. This theory aligns with the study's focus by showing that adopting supply chain optimization strategies can significantly improve operational efficiency in manufacturing firms (Assensoh-Kodua, 2019).

Methodology

Research design

This study adopts a survey research design, which involves the collection of primary data from respondents through structured questionnaires to examine the effect of supply chain optimization on the operational efficiency of manufacturing firms in South-East Nigeria. The survey design is appropriate because it allows the researcher to gather quantitative information from multiple firms, enabling statistical analysis of the relationship between supply chain practices, such as inventory management, logistics optimization, and supplier relationship management, and operational efficiency. By using this design, the study can identify patterns, trends, and correlations, providing empirical evidence that supports managerial decision-making and contributes to knowledge on improving manufacturing performance in the region.

Population of the Study

The population of this study comprises employees directly involved in supply chain and operational activities within four selected manufacturing firms in South-East Nigeria. The firms include Ibeto Group, Aba Textile Mills, Tiger Foods Limited, and Anambra Motor Manufacturing Company (ANAMMCO). These firms were selected due to their active involvement in manufacturing across different sectors and locations within the region. The estimated number of employees relevant to supply chain and operational functions in each firm is as follows: Ibeto Group (45 employees), Aba Textile Mills (40 employees), Tiger Foods Limited (35 employees), and ANAMMCO (30 employees), giving a total population of 150 employees.

Table 1: Distribution of Population of the Study

S/N	Company	Location	No. of Employees
1	Ibeto Group	Nnewi, Anambra State	45
2	Aba Textile Mills	Aba, Abia State	40
3	Tiger Foods Limited	Onitsha, Anambra State	35
4	ANAMMCO	Enugu State (Emene)	30
	Total		**150**

Sample Size and Sampling Technique

To determine the sample size, the Taro Yamane (1967) formula was used, which is widely accepted for survey research:

$n=N1+N(e)2$

Where:

- n = sample size
- N = population size (150)
- e = level of precision (commonly 0.05)

Substituting the values into the formula:

$n=1501+150\ (0.05)2$

$=1501+150\ (0.025)$

$=1501+0.375$

$=1501.375$

$=109$

The sample size for this study was determined using the Taro Yamane formula at a 5% level of significance. Based on a population of 150 employees, the calculated sample size was approximately 109 respondents. This sample size is considered adequate to provide reliable and representative data for the study.

Table 2: Sample Size Distribution

S/N	Company	Population	Sample Size
1	Ibeto Group	45	33
2	Aba Textile Mills	40	29
3	Tiger Foods Limited	35	25
4	Anambra Motor Manufacturing Company (ANAMMCO)	30	22
	Total	**150**	**109**

Method of Data Collection

Data for this study was collected primarily through the use of a structured questionnaire administered to selected respondents from Ibeto Group, Aba Textile Mills, Tiger Foods Limited, and Anambra Motor Manufacturing Company (ANAMMCO). The questionnaire was designed to obtain relevant information on supply chain optimization practices and operational efficiency. It consisted of structured items measured on a Likert scale to ensure uniformity in responses and ease of analysis. The instrument was administered directly to respondents to enhance response rate and ensure accurate data collection.

Method of Data Analysis

Data collected was analyzed using descriptive statistics (mean, percentages) to summarize responses and regression analysis to examine the relationship between supply chain optimization and operational efficiency. The analysis was performed using SPSS, with results presented in tables and charts for clear interpretation.

Results and Discussion

Presentation of Data

This section presented the data collected from respondents in Ibeto Group, Aba Textile Mills, Tiger Foods Limited, and Anambra Motor Manufacturing Company (ANAMMCO). A total of 109 questionnaires were administered, out of which 102 were properly completed and returned, representing a response rate of 93.6%. The data were analyzed using frequencies, percentages, and mean scores in line with the research objectives.

Table 3: Responses on Inventory Management Optimization

S/N	Items	SA	A	D	SD	Mean
1	Inventory levels were properly monitored in the firm	40	35	15	12	3.01
2	Effective inventory control reduced production delays	45	30	17	10	3.08
3	Demand forecasting improved inventory decisions	38	36	18	10	3.00
4	Overstocking and understocking were minimized	42	33	16	11	3.04
	Grand Mean					**3.03**

The grand mean of 3.03 indicated that respondents agreed that inventory management optimization positively influenced operational efficiency.

Table 4: Responses on Logistics and Distribution Optimization

S/N	Items	SA	A	D	SD	Mean
1	Efficient transportation improved timely delivery	47	32	13	10	3.14
2	Distribution systems reduced delays in product delivery	44	34	14	10	3.10
3	Route planning minimized transportation costs	41	36	15	10	3.06
4	Warehousing improved product availability	43	33	16	10	3.07
	Grand Mean					**3.09**

The grand mean of 3.09 showed that logistics and distribution optimization significantly enhanced operational efficiency.

Table 5: Responses on Supplier Relationship Management

S/N	Items	SA	A	D	SD	Mean
1	Strong supplier relationships ensured timely delivery	46	34	12	10	3.14
2	Supplier collaboration improved product quality	43	35	14	10	3.09
3	Reliable suppliers reduced production interruptions	45	33	14	10	3.11
4	Information sharing enhanced supply chain performance	42	36	14	10	3.08
	Grand Mean					**3.11**

The grand mean of 3.11 indicated that supplier relationship management had a strong positive effect on operational efficiency.

The findings revealed that all components of supply chain optimization—inventory management, logistics and distribution, and supplier relationship management—had positive effects on operational efficiency. Among the variables, supplier relationship management recorded the highest impact, followed by logistics optimization and inventory management. These results suggested that effective supply chain optimization significantly improved the operational efficiency of manufacturing firms.

Test of Hypotheses

The hypotheses were tested using multiple regression analysis to examine the effect of supply chain optimization components (inventory management, logistics and distribution, and supplier relationship management) on operational efficiency of the selected manufacturing firms. The decision rule was: if the p-value ≤ 0.05, the null hypothesis (H_0) was rejected; if p-value > 0.05, the null hypothesis was accepted.

- Hypothesis 1 (H_{01}): Inventory management optimization has no significant effect on operational efficiency

Table 6: Regression Result for Inventory Management Optimization

Model	Unstandardized Coefficients (B)	Std. Error	t	Sig. (p-value)
Inventory Management	0.322	0.089	3.62	0.001

Since p-value = 0.001 < 0.05, H_{01} was rejected. This indicates that inventory management optimization significantly affected operational efficiency**.**

- Hypothesis 2 (H_{02}): Logistics and distribution optimization has no significant effect on operational efficiency

Table 7: Regression Result for Logistics and Distribution Optimization

Model	Unstandardized Coefficients (B)	Std. Error	t	Sig. (p-value)
Logistics & Distribution	0.287	0.081	3.54	0.001

Since p-value = 0.001 < 0.05, H_{02} was rejected. This shows that logistics and distribution optimization significantly influenced operational efficiency.

- Hypothesis 3 (H_{03}): Supplier relationship management has no significant effect on operational efficiency

Table 8: Regression Result for Supplier Relationship Management

Model	Unstandardized Coefficients (B)	Std. Error	t	Sig. (p-value)
Supplier Relationship	0.341	0.079	4.32	0.000

Since p-value = 0.000 < 0.05, H_{03} was rejected. This indicates that supplier relationship management had a significant effect on operational efficiency**.**

Discussion of Findings

The findings in Table 3 showed that inventory management practices such as demand forecasting, stock monitoring, and control mechanisms were positively associated with improved operational efficiency among the selected manufacturing firms. The grand mean score (3.03) indicated that respondents agreed that effective inventory control reduced production delays and minimized wastage. This result aligns with earlier studies in Nigeria that reported the crucial role of inventory management in enhancing operational performance. For example, Alsoussi, & Tahboub *(2025)* found that firms that adopted systematic inventory control experienced reduced downtime and higher throughput. Similarly, Munyaka & Yadavalli, *(2022)* observed that accurate demand forecasting and rational stock levels led to lower carrying costs and better use of production resources in Nigerian manufacturing firms. The significant regression result further confirms that inventory management optimization plays a critical role in improving operational workflows in manufacturing environments.

Results from Table 4 revealed that logistics and distribution optimization significantly contributed to operational efficiency, with a grand mean of 3.09. Respondents indicated that efficient transportation, route planning, and optimized distribution systems improved the timely delivery of raw materials and finished products, reducing production delays. This finding supports studies conducted within Nigeria. For instance, Yuan *(2019)* reported that firms that invested in transportation planning and warehousing systems experienced fewer delays and lower logistics costs. In addition, Gea *et al*. *(2024)* found that effective distribution strategies significantly improved customer satisfaction and reduced lead times in Nigerian manufacturing and agribusiness firms. The statistically significant influence of logistics optimization in this study underscores the importance of sound transportation and distribution systems for operational efficiency.

The results in Table 5 indicated that strong supplier relationships had the greatest positive effect on operational efficiency among the supply chain optimization variables, reflected in the highest grand mean (3.11) and the most significant regression coefficient. Respondents agreed that effective communication, collaboration, and reliability of suppliers improved production continuity and reduced the risk of disruptions. This outcome is consistent with Nigerian-based research. For example, Latunreng and Nasirin (2019) found that firms with close supplier partnerships had better access to quality raw materials and more responsive support during supply shortages. Likewise, Kolotzek *et al*. *(2018)* noted that supplier integration and performance monitoring significantly enhanced operational outcomes in manufacturing firms in Lagos and Kano. The result of this study corroborates the view that collaborative supplier relationships are essential for sustaining operational processes and minimizing production inefficiencies.

Conclusion

The study concluded that supply chain optimization significantly enhances operational efficiency in manufacturing firms in South-East Nigeria. Specifically, effective inventory management, logistics and distribution optimization, and strong supplier relationship management were found to positively influence production continuity, resource utilization, and timely delivery of products. Among these factors, supplier relationship management had the strongest impact on operational efficiency. These findings suggest that manufacturing firms that strategically manage their supply chains can achieve higher productivity, reduce operational disruptions, and maintain a competitive edge in the Nigerian business environment.

Recommendations

Based on the findings of this study, the following recommendations are made:

- **Strengthen Supplier Relationships:** Firms should invest in building strong, long-term partnerships with suppliers through regular communication, performance monitoring, and collaborative planning to ensure timely delivery of quality materials and minimize production disruptions.
- **Enhance Inventory Management Practices:** Manufacturing firms should adopt modern inventory control techniques, including accurate demand forecasting, regular stock audits, and automated tracking systems, to reduce wastage, prevent overstocking or stockouts, and improve resource utilization.
- **Optimize Logistics and Distribution:** Companies should focus on efficient route planning, transportation management, and warehousing strategies to reduce lead times, minimize delivery delays, and lower operational costs.
- **Invest in Supply Chain Technology:** Firms should leverage technology, such as Enterprise Resource Planning (ERP) and supply chain management software, to integrate processes, enhance data visibility, and support real-time decision-making across inventory, logistics, and supplier management functions.

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