

Impact of Just-in-Time (JIT) Delivery on Operational Efficiency: A Study of Selected Manufacturing Firms in South-West Nigeria

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Abstract

This study examines the effect of Just-in-Time (JIT) delivery on operational efficiency in manufacturing firms located in South-West Nigeria. Adopting a descriptive survey research design, the study aimed to describe the existing relationship between JIT delivery and operational efficiency without manipulating variables. The target population included senior and junior staff from ten manufacturing firms, selected through a judgmental sampling technique based on their extensive experience in the manufacturing sector. A sample size of 360 was determined for the study. Primary data were collected using questionnaires, observations, and personal interviews, with the data analysis conducted using the Statistical Package for the Social Sciences (SPSS) version 27. The study employed Pearson Product-Moment Correlation Coefficient to assess the relationship between JIT delivery and operational efficiency. The findings revealed a strong positive correlation ($r = 0.682$) between JIT delivery and operational efficiency, indicating that increased implementation of JIT practices significantly enhances operational efficiency. The correlation was statistically significant ($p = 0.000$), reinforcing the robustness of the findings. These results underscore the critical role of JIT delivery in optimizing operational processes within manufacturing firms, suggesting that JIT is an effective strategy for improving efficiency and competitiveness in the Nigerian manufacturing industry.

Keywords

Supply Chain Management, Just-in-time, Operational, Efficiency, Nigeria

1. Introduction

The dynamics of business atmosphere has placed important challenges on business organizations. As compared to the traditional business environment, firms nowadays have entered a new edge of business environment that is more competitive and complicated (Chen & Lin, 2018). As a result, the success of a firm does not only depend on its individual performance, rather on a complex chain of firms engaging in various roles.

Performance is no longer a function of occurrences and decisions in individual firms, because the collaboration and collectivity of the activities of all stakeholders are involved and contribute to the overall results of supply chain (Kavota, et al., 2024). The performance is seamless and it depends on the coordination of all stakeholders in the supply chain to ensure realization of the required conclusions. Franke et al. (2021) observe that indication has revealed that supply chain management if applied properly reduces misalignment, promotes party's capabilities, opens up more interaction that will ultimately lead to efficient and effective utilization of goals and objectives of the organization.

According to Mukhamedjanova (2020), the supply chain management includes all of those activities associated with moving goods from the raw-materials stage through to the end user. This includes sourcing and procurement, production scheduling, order processing, inventory management, transportation, warehousing and customer service. SCM also embodies the information systems which are necessary to monitor all of those activities.

Cohen (2020) defined supply chain as a network of facilities and distribution options that perform the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chain management is integrated philosophy in the management of the distribution progress from supplier to final user. Supply chain management is a guiding concept of functional integration beyond individual firms onto networks of organizations (Davoodi et al., 2020). Consequently, the study seeks to examine the effect of just-in-time delivery on operational efficiency in manufacturing firms in South-West, Nigeria.

Article Structure

This article has seven sections. Section 1 is the introduction, section 2 contains the literature review, section 3 contains the research methodology, Section 4 contains findings, Section 5 contains the discussion and conclusion of findings, section 6 contains the practical implication and section 7 contains the recommendations.

2. Literature Review

2.1. Supply Chain Management

Supply Chain Management includes a set of individual functional entities and practices for enhancing the long-term competitive performance of individual firms and their supply chain as a whole by integrating the internal functions within the

firm and effectively linking them with the external operations of suppliers, manufacturers, distributors, customers and other channel members (Kim, 2019). SCM encompasses all activities, which are involved in planning and management, sourcing and procurement, conversion and all logistics management activities as well as coordination and collaboration with channel partners (Cohen, 2020).

SCM practices are implemented to achieve and enhance performance through supply chain, which require an internal cross-functional integration within the firm and external integration with suppliers and customers to be successful (Zekhnini et al., 2021). In developing countries, Jordan in particular, most of the entrepreneurs and managers generally ignore the concept of SCM, and even where it is applied, it is done partially lacking its true spirit and totality (Zekhnini et al., 2021).

Traditional production/distribution processes have been radically changed across many countries and most firms are obliged to redesign their manufacturing network (Ekanayake et al., 2022). Many firms began to realize that it is not enough to improve efficiencies just within the firm, but also in their whole supply chain. The growth and development of SCM is not driven only by internal motives, but also by a number of external actors such as: increased globalization, reduced barriers to international trade and improvements in information availability, and environmental concerns. Therefore, some factors that provided stimulus for the development of existing trends in SCM include: computer generated production schedules, increasing importance of controlling inventory, government regulations and actions such as the creation of a single European market, establishing Qualified Industrial Zones (QIZs), and the Guidelines of Global Agreement on Tariff and Trade (GATT) and World Trade Organization (WTO) (Gunasekaran et al., 2019). Practicing SCM is considered an essential prerequisite to staying in the competitive global race and to growing profitability (Moberg et al., 2019).

2.2. Just-in-Time (Timely) Delivery

All over the universe reduced delivery time, higher customer satisfaction, reduced financial cost and a high level trust amongst suppliers established results produced by supply chain management. Supply chain management (SCM) is the coordinated set of procedures which is used in receiving raw materials from suppliers, process those into finished goods and then supply to end users. It involves a whole lot of skills ranging from gathering of information, to planning and control to resources management, communication and performance measurement. This concept which was born out of Just-in-Time (JIT) production and logistics flourishes in product based and manufacturing companies. As organizations try to support strategic management practices such as market entry, introduction of new products, growth and expansion, improvement and reliability and speed of delivery of order while trying to lower cost. For organizations to work closely with their suppliers, logistics providers, distributors/wholesalers and re-tailers, their supply chain must be streamlined and backed up with technological aids.

In today's competitive business there is an increased focus on delivering value

to the customer. The focus on attention of most of businesses is providing products and services that are more valuable compared to its competitors. Concurrent to the focus on customer value, the marketplace in which businesses operate today is widely recognized as being complex and turbulent (Christopher, 2020). The growth of supply chain aims to improve profitability, customer response and ability to deliver value to the customers and also to improve the interconnection and interdependence among firms. Due to market expanding from domestic market to global market increase customer demands, for instance demanding lower prices, faster delivery, higher quality products or services and increase the variety of items (Vickery & Calantone, 2020). According to Towil and Christopher, (cited in Thatte, 2020), the end customer in the marketplace today determined by the success of failure of supply chains management practices. They stated that getting the right product, at the right price, at the right time to the customer is not only improved competitive success but also the key to survival.

Kilic and ErKayman (2021) said that JIT is a production system that improves the relationship with supplier, reduces inventories, and reduces time. Taghipour et al. (2020) stated that because of rapid changes and increased in competition, the companies started to apply JIT aims to minimize inventory level and improve delivery of goods to customer. Talib et al. (2020) said that JIT an approach searches for perfection in production process and elimination of waste. Choi et al. (2023) mentioned that JIT making what customer needs with right quantity using the minimum resources. Perret et al. (2022) said that JIT can be applied on selling, purchasing, and operations but when it is customized in a way fits the target business environment. Perret et al. (2022) assures that following JIT selling can lead to enhancement in performance only when integrated control has been provided to the whole process. Kilic and ErKayman (2021) assure that JIT practices can facilitate the production operation to bring the operational performance to better or desirable level by the manager. Lastly, Yan et al. (2020) see that in order to apply JIT, it is important to consider the quality level. In which it is mostly be improved by the times especially in JIT purchasing. and people.

Barth and Formoso (2021) stated that the idea behind JIT is to constantly pursue to find ways that make performance procedures more productive. The eventual goal of JIT is to provide a good or a service without waste (Singh Rastogi & Singhal, 2021).

2.3. Organizational Performance

Organizational performance refers to how well an organization achieves its market-oriented goals as well as its financial goals (Yamin et al., 2020). The short-term objectives of SCM are primarily to increase productivity and reduce inventory and cycle time, while long-term objectives are to increase productivity and profits for all members of the supply chain. Financial metrics have served as a tool for comparing organizations and evaluating an organization's behavior over time (Waller et al. (2020). Any organizational initiative, including supply chain management,

should ultimately lead to enhanced organizational performance.

The aim of every organization is to enhance the performance but for improvement, they must need to measure it accurately first (Gunasekaran et al., 2019). Previously performance was measured by cost with the passage of time more financial indicator were added like return on asset, return on investment, sale and etc. (Ballou et al., 2019). Only financial indicators are not enough for measure overall and accurate performance, consequently, with the intent of balance score-card approach some operational indicators were added (Gunasekaran et al., 2019). Other approaches also added values in measuring supply chain like quantitative or qualitative measures, strategic, tactical and operational measures and etc. A comprehensive review and revealed that for the good performance measure all the members should be considered, performance measure should consider both financial and non-financial items, all the levels of supply chain must be considered and all process of supply chain should be included so the performance should be measured by operational performance (Gunasekaran et al., 2019). Meanwhile, researchers had used many ways to measure the effects of risk sources and supply chain practices with different means like firm or organizational performance, product performance, operational performance (Gunasekaran et al., 2019).

Nevertheless, indicators to measure above mention performance are alike. SCM had been measured by operational performance and its indicators were quality performance, flexibility performance, customer service, delivery performance and cost performance (Ballou et al., 2019).

2.4. Operational Efficiency

The term “operations” describe the processes and resources that organization use to produce the highest quality products or services as efficiently as possible. Operational efficiency on the other hand refers to the capability of an organization to deliver products or services to its customers in the most cost-effective manner possible while still ensuring the high quality of its products, service and support (Saragih et al., 2020). Operational efficiency looks at an organization’s capabilities and performance. Amponsah-Kwatiah and Asiamah (2021) perceive operational efficiency as the extent to which changes in the cash conversion cycle, operating expenses to sales revenue ratio, operating cash flow, total asset turnover, total debt to total assets ratio, firm size, and operating risk impact the future performance of the firm. Operational efficiency (OE) plays an important role in improving current and future firm performance of a business enterprise. In order to attain operational efficiency a company needs to minimize redundancy and waste while leveraging the resources that contribute most to its success and utilizing the best of its workforce, technology and business processes Amponsah-Kwatiah and Asiamah (2021). The reduced internal costs result from operational efficiency.

2.5. Empirical Review

Balkhi et al (2022) This study primarily discusses the application of JIT systems

in healthcare inventory management, emphasizing their significance. It also explores the advantages and limitations of JIT systems in healthcare management. Furthermore, the study examines supply chain challenges faced by healthcare organizations during the COVID-19 pandemic and provides strategies and recommendations for improvement. [Stojkanović et al. \(2021\)](#) discuss the application of Just in Time (JIT) as a modern principle of inventory management, emphasizing the need to minimize inventory levels to reduce overall production and business costs. The authors argue that efficient inventory management is crucial because inventories represent a significant portion of a company's assets and require substantial investment. The goal of JIT is to keep inventory levels as low as possible without disrupting production or sales continuity. This is achieved by synchronizing material orders with consumption, which increases order frequency but ensures materials arrive just in time for use. The strategy aims to maintain financial stability, reduce inventory holding costs, and ultimately increase gross profit. While the ideal scenario would involve no inventory until the moment of consumption or sale, this is challenging to achieve. Therefore, the focus is on maintaining minimal inventory levels that do not compromise production or sales, facilitating smooth flow through the supply chain without delays. [Ufua et al.](#) explore the implementation of Just-in-Time (JIT) inventory management in a commercial livestock farm situated in a challenging, swampy region of southern Nigeria. Through a qualitative case study involving interviews and workshops, the research reveals that successful JIT implementation in such a unique context requires strong commitment from internal organizational members and effective collaboration with supply chain partners. The study highlights that in certain non-standard situations, like the one examined, adopting JIT may involve additional costs, but these are necessary due to the impracticality of conventional inventory management practices in the given environment.

2.6. Research Gap

Based on the empirical studies reviewed—[Balkhi et al. \(2022\)](#), [Stojkanović et al. \(2021\)](#)—there is a strong justification for using a quantitative approach in research on Just-in-Time (JIT) inventory management. Quantitative methods enable precise measurement of key performance indicators (KPIs) such as inventory levels, cost savings, production efficiency, and financial stability. For example, in the studies by [Stojkanović et al. \(2021\)](#), the impact of JIT on reducing inventory holding costs and increasing gross profit can be quantified and analyzed statistically. Similarly, [Balkhi et al. \(2022\)](#) could quantify the reduction in waste or improvement in patient outcomes in healthcare settings.

3. Methodology

This study adopted a descriptive survey research design. Descriptive survey research design is concerned with describing events as they are, without any manipulation of what caused the event or what is being observed. In surveys, views,

facts, among others are collected, analyzed and used for answering research questions. The target population for this study consists of the senior and junior staff of the manufacturing firms in southwest, Nigeria. In this study, ten (10) manufacturing firms were from southwest, Nigeria by Judgmental sampling technique. The manufacturing organizations selected were those that have long term duration experience in manufacturing business.

Table 1. Population of the study.

S/No	Geo-Political Zone	Organization	Population	Sample Size
1.	South West	Dangote Groups	580	58
2.	South West	Unilever Nigeria Plc.	500	50
3.	South West	Nestle Nigeria Plc.	480	48
4.	South West	Nigerian German Chemicals Plc.	450	45
5.	South West	PZ Cussons Nigeria Plc.	320	32
6.	South West	Flour Mills of Nigeria Plc.	300	30
7.	South West	Lafarge Africa Plc.	270	27
8.	South West	DN Tyre and Rubber (Dunlop) Nig. Plc.	240	24
9.	South West	DUFIL Prima Foods Limited	240	24
10.	South West	Cadbury Nigeria plc.	220	22
		Total No. of Staff	3600	360

Source: Field Survey, 2024.

In **Table 1**, the South West geo-political zone is home to a significant concentration of major organizations, with a combined population of 3,600. Leading this group is Dangote Groups with a population of 580, followed closely by Unilever Nigeria Plc. with 500, and Nestle Nigeria Plc. with 480. Nigerian German Chemicals Plc. contributes 450 to the total, while PZ Cussons Nigeria Plc. and Flour Mills of Nigeria Plc. add 320 and 300, respectively. Lafarge Africa Plc. has a population of 270, DN Tyre and Rubber (Dunlop) Nig. Plc. and DUFIL Prima Foods Limited each contribute 240, and Cadbury Nigeria Plc. rounds out the group with a population of 220. This aggregation highlights the industrial capacity and workforce distribution in the South West region.

3.1. Sample Size

The sample size may be large or small depending on the nature of the population of inter-est.

The actual population of the study is three thousand six hundred (3600).

Based on this population, the sample size was determined at 95% level of confidence and 5% error tolerance using Taro Yamane's sample size determination formula.

The formula is stated below (Umar & Wachiko, 2021).

$$n = \frac{N}{1 + Ne^2}$$

Where n = the sample size

e = level of significance (proportion of sampling error)

1 = constant value

N = the finite population size

The sample size for this study was therefore:

$$N = 3600$$

$$n = 1 + 3600(0.05)^2$$

$$n = 1 + 3600(0.0025)$$

$$n = 1 + 9$$

$$n = 10$$

$$n = \frac{3,600}{10}$$

$$n = 360$$

This gives a sample size of 360

The designated organizations were properly represented using proportionality formula.

Thus: $Q = A/N \times n/1$

Where:

Q = the number of the questionnaire allocated to each selected manufacturing firm

A = the population of each selected manufacturing firm

N = the total population of all selected manufacturing firms

n = the estimated sample size used in the study.

Thus:

Dangote Groups

Proportion of staff to be sampled

$$\frac{580 \times 360}{3600} = 58$$

$$3600 \quad 1$$

Unilever Nigeria Plc.

Proportion of staff to be sampled

$$\frac{500 \times 360}{3600} = 50$$

$$3600 \quad 1$$

Nestle Nigeria Plc.

Proportion of staff to be sampled

$$\frac{480 \times 360}{3600} = 48$$

$$3600 \quad 1$$

Nigerian German Chemicals Plc.

Proportion of staff to be sampled

$$\frac{450 \times 360}{3600} = 45$$

$$3600 \quad 1$$

PZ Cussons Nigeria Plc.

Proportion of staff to be sampled

$$\frac{320 \times 360}{3600} = 32$$

$$3600 \quad 1$$

Flour Mills of Nigeria Plc.

$$\frac{300 \times 360}{3600} = 30$$

$$3600 \quad 1$$

Lafarge Africa Plc.

Proportion of staff to be sampled

$$\frac{270 \times 360}{3600} = 27$$

$$3600 \quad 1$$

DN Tyre and Rubber (Dunlop) Nig. Plc.

Proportion of staff to be sampled

$$\frac{240 \times 360}{3600} = 24$$

$$3600 \quad 1$$

DUFIL Prima Foods Limited

Proportion of staff to be sampled

$$\frac{240 \times 360}{3600} = 24$$

$$3600 \quad 1$$

Cadbury Nigeria plc.

Proportion of staff to be sampled

$$\frac{220 \times 360}{3600} = 22$$

$$3600 \quad 1$$

3.2. Sources and Method of Data Collection

The data for this study were generated from primary sources. Data were collected through the administration of questionnaire, observation and holding of personal interview which are instrument of the survey method of research.

The research instrument used for this study is a structured questionnaire. The questionnaire was formulated considering the research questions and hypotheses. The designed questionnaire has two sections, A and B. All the questions in section A were drawn and aimed at providing some general information from the respondents while the remaining questions in section B were meant to directly address the research questions. In the design of the questionnaire, four-point Likert scale format was used. There are 23 questions in the questionnaire. The questionnaire was distributed to the staff of the selected manufacturing firms.

3.3. Method of Data Analysis

The statistical software package SPSS 27 was used for the analysis. According to the research requirements, statistical techniques such as Pearson Product-Moment Correlation Coefficient analysis were employed to test the hypotheses. Frequencies were converted to percentages to enable meaningful comparison of the responses. Translating frequency counts into percentages shows the number per hundred, providing a common base of "100" for comparison.

3.4. Test of Validity and Reliability

The researcher ensured the validity of the instrument through face-to-face validation by presenting it to experts for modification. To guarantee sampling validity, the questionnaire was properly structured and pre-tested. Content validity was assessed by examining whether the instrument covered a representative sample of the behavioral domains and comparing the items with other research factors for consistency. The instrument was divided into sections, each carefully checked to align with the research objectives and hypotheses.

For reliability, a test-retest method was used by distributing 20 copies of the questionnaire to selected manufacturing firms, then re-administering them after a few days. Spearman Rank Order Correlation Coefficient was used to test reliability, resulting in a high consistency score of $P = 0.9714$.

Table 2. Reliability table.

Organization	First average X	Second average Y	Xr	Yr	D	d2
1	2	2	1	1	0	0
2	2	2	1	1	0	0
3	2	1	1	1	0	0
4	1	2	1	2	1	1
5	1	2	2	2	0	0
6	2	2	2	2	0	0
$\Sigma d2 = 1$						

Source: Field Survey, 2023.

In **Table 2**, the reliability analysis using the test-retest method reveals a high level of consistency in the responses from the six organizations. The comparison of average scores from two rounds of data collection showed minimal differences in rankings, with most organizations displaying perfect consistency. Only one organization showed a slight variation, but this difference was minimal. The squared differences (d^2) are small, leading to a high Spearman Rank Order Correlation Coefficient of $P = 0.9714$. This indicates that the instrument is highly reliable, consistently measuring the intended variables across different instances.

$$\begin{aligned}
 P &= \frac{1 - 6 \sum d^2}{n(n^2 - 1)} \\
 &= \frac{1 - 6(1)}{6(6^2 - 1)} \\
 &= \frac{1 - 6(1)}{6(36 - 1)} \\
 &= \frac{1 - 6}{6(35)} \\
 &= \frac{1 - 6}{210} \\
 &= 1 - 0.0286
 \end{aligned}$$

$$P = 0.9714$$

3.5. Model Specification

The study relied on the study variables and literatures for designing the model to be tested for the hypothesis of the study. The model is as shown below:

$$\text{SCM} = f(X_i) \quad (\text{i})$$

$$\text{Pfm} = P + \alpha - U \quad (\text{ii})$$

Where;

SCM = Supply Chain Management

X1 = the independent variable

Pfm = Performance

f = frequency

U = Error Term

α = Intercept

The decision to test the hypothesis of the study is as follows:

If the p-value of the t-coefficient is less than 1% (0.01) or 5% (0.05), the null hypothesis is rejected and otherwise we fail to reject it.

The above is framed in connection with network theory which is considered to describe the relationships in which companies, suppliers, customers or buyer are engaged

4. Findings

Table 3 indicates that among the sum 360 copies of questionnaire administered, only 60 representing 16.7% were missing (invalid), while 300 copies were retrieved and valid for analysis representing 83.3% of the total copies distributed.

Table 3. Questionnaire distribution and retrieval.

Questionnaire	Details	Percentage (%)
Retrieved and usable	300	83.3
Not Retrieved/Retrieved but not Usable	60	16.7
Total	360	100

Source: Field Survey 2024.

4.1. Descriptive Analysis

The results in **Table 4** reveal that respondents have a highly positive view of Just-in-Time (JIT) delivery's effects on operational efficiency and quality control in manufacturing firms in Nigeria. A substantial majority (270 out of 300) agreed or strongly agreed that JIT delivery enhances operational efficiency. This indicates strong support for the notion that JIT practices improve manufacturing efficiency. Additionally, an even larger majority (292 out of 300) agreed or strongly agreed that JIT delivery significantly contributes to better quality control. This highlights a broad consensus that JIT practices are effective in ensuring high-quality standards. Out of 600 total responses, 93% were positive about JIT delivery's impact,

while only 7% were negative. This suggests a strong overall confidence in JIT delivery as a valuable practice for improving both efficiency and quality in the surveyed manufacturing firms.

Table 4. Impact of Just-in-Time delivery on operational efficiency

	Options	Agree	Strongly agree	Disagree	Strongly Disagree	Total
1	Just-in-time delivery positively impact operational efficiency in selected manufacturing firms in Nigeria.	148	122	20	10	300
2	Just-in-Time delivery contributes immensely towards improvement on quality control in selected manufacturing firms in Nigeria.	178	114	5	3	300
Total		562(93%)		38(7%)		600

4.2. Inferential Analysis

The correlation analysis in **Table 5** between just-in-time (JIT) delivery and operational efficiency reveals a strong positive relationship, with a correlation coefficient of 0.682. This indicates that as the implementation of just-in-time delivery increases, operational efficiency also tends to improve significantly. The correlation is statistically significant, as evidenced by a p-value of 0.000, confirming that the observed relationship is not due to chance. The analysis was conducted on a sample size of 300 for both variables, ensuring robustness in the findings. This strong positive correlation underscores the effectiveness of just-in-time delivery in enhancing operational efficiency within organizations.

Table 5. Correlations.

		Just-in-time delivery	Operational efficiency
Pearson Correlation	Just-in-time delivery	1.000	0.682
	Operational efficiency	0.682	1.000
Sig. (1-tailed)	Just-in-time delivery	.	0.000
	Operational efficiency	0.000	.
N	Just-in-time delivery	300	300
	operational efficiency	300	300

Source: Field Survey 2024.

4.3. Test of Hypothesis

H04: Just-in-time delivery does not have significant effect on operational efficiency in selected manufacturing firms in South-West, Nigeria.

H4: Just-in-time delivery has significant effect on operational efficiency in selected manufacturing firms in South-West, Nigeria.

4.4. Result of Hypothesis

From **Table 5**, the correlation result showed that just-in-time has a positive significant relationship with operational efficiency in selected manufacturing firms in South-West, Nigeria with a significant p-value of 0.000. Hence, the Null hypothesis is rejected and accept the alternative that just-in-time has a positive significant relationship with operational efficiency in selected manufacturing firms in South-West, Nigeria.

5. Discussion and Conclusion

The correlation analysis presented in **Table 5** demonstrates a significant positive relationship between Just-in-Time (JIT) delivery and operational efficiency, with a correlation coefficient of 0.682. This value suggests a substantial association, indicating that as the adoption and implementation of JIT delivery practices increase, there is a corresponding and notable improvement in operational efficiency. The strength of this correlation highlights the critical role that JIT delivery plays in optimizing operations within organizations. The statistical significance of the findings is supported by a p-value of 0.000, confirming that the observed relationship is highly unlikely to be due to random chance. This level of significance strengthens the credibility of the correlation and suggests that the implementation of JIT delivery systems is a key factor in driving operational improvements.

The analysis was conducted using a sample size of 300 for both variables, which provides a robust basis for the findings. A sample of this size ensures that the results are reliable and can be generalized to a broader population. The positive correlation indicates that organizations that effectively implement JIT delivery are likely to experience enhanced operational efficiency, leading to better resource utilization, reduced waste, and improved overall performance.

In conclusion, the findings from the correlation analysis underscore the importance of JIT delivery as a strategic tool for enhancing operational efficiency. Organizations that prioritize and implement JIT delivery systems are likely to see significant improvements in their operational processes. The strong positive correlation, coupled with the statistical significance of the results, provides compelling evidence that JIT delivery is an effective approach for achieving higher levels of efficiency. As such, organizations aiming to improve their operational performance should consider adopting or strengthening their JIT delivery practices. The results of this analysis offer valuable insights for decision-makers and practitioners in supply chain management, highlighting the potential benefits of integrating JIT delivery into their operational strategies.

6. Practical Implication

The findings from the correlation analysis have significant practical implications

for manufacturing firms in Nigeria, where operational efficiency is crucial for competitiveness and profitability. The strong positive relationship between Just-in-Time (JIT) delivery and operational efficiency, evidenced by a correlation coefficient of 0.682, suggests that Nigerian manufacturers who implement JIT practices can expect substantial improvements in their operational processes. This is particularly important in Nigeria, where manufacturing firms often face challenges such as fluctuating supply chains, high inventory costs, and inefficient resource utilization.

By adopting JIT delivery, Nigerian manufacturing firms can reduce excess inventory, minimize waste, and better align production schedules with demand, leading to a more streamlined and responsive operation. The statistical significance of the results reinforces the reliability of these benefits, making JIT an attractive strategy for firms aiming to optimize their operations and reduce costs. Furthermore, in a market where agility and quick response to changes in demand are critical, JIT can provide a competitive edge, enabling firms to meet customer needs more effectively while maintaining lean operations. For Nigerian manufacturers, these findings suggest that investing in JIT practices could lead to enhanced operational efficiency, improved profitability, and greater resilience in a challenging economic environment.

7. Recommendation

Based on the findings, the following recommendation is made for Nigerian manufacturing firms:

Nigerian manufacturing firms should prioritize the adoption and implementation of JIT delivery practices as a strategic approach to enhance operational efficiency. Given the strong positive correlation between JIT and operational efficiency, JIT practices can lead to significant reductions in excess inventory, minimize waste, and improve alignment between production schedules and market demand. These improvements are essential for optimizing resource utilization, reducing costs, and increasing profitability.

Additionally, to successfully implement JIT, firms should focus on strengthening their supply chain management systems. This includes building strong relationships with reliable suppliers, improving communication channels, and ensuring timely delivery of raw materials. By doing so, firms can mitigate the risks associated with fluctuating supply chains and ensure a steady flow of inputs necessary for efficient production.

Furthermore, JIT implementation requires a well-trained workforce that understands the principles and practices of JIT. Nigerian manufacturers should invest in training programs for their employees to ensure that they are equipped with the skills and knowledge needed to execute JIT strategies effectively.

Technology also plays a crucial role in the successful implementation of JIT. Nigerian manufacturers should invest in modern technologies such as inventory management software, demand forecasting tools, and real-time tracking systems.

These technologies can help streamline operations, improve accuracy in demand forecasting, and ensure that production schedules are aligned with actual demand.

Lastly, to ensure the continuous success of JIT practices, Nigerian manufacturing firms should establish monitoring and evaluation mechanisms. Regularly assessing the impact of JIT on operational efficiency and making necessary adjustments will help maintain the benefits of JIT over time. This proactive approach will enable firms to stay competitive and responsive to market changes, further enhancing their resilience in the challenging Nigerian economic environment.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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