AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Business Management, Economics and Banking
ISSN (E): 2832-8078 Volume 41, October - 2025

ASSESSING THE IMPACT OF JUST-IN-TIME LOGISTICS ON EFFECTIVE INVENTORY MANAGEMENT IN CONSTRUCTION PROJECTS IN THE SOUTH-SOUTH REGION OF NIGERIA

1 Glory Williams Archibong;
2 Kelechi Enyinna Ugwu;
3 Erasmus Ejike Duru
1Department of Procurement Management, Federal University of Technology Centre of Excellence in Sustainable Procurement, Environmental and Social Standards (FUTO-sPESS), Imo State, Nigeria
2Department of Management Technology,
Federal University of Technology, Owerri, Imo State, Nigeria
3Department of Financial Management,
Federal University of Technology, Owerri, Imo State, Nigeria
Corresponding Author: Email: geenelly76@gmail.com Tel: +2348034092108

ABSTRACT

The construction industry in Nigeria's South-South region faces significant challenges in material management, leading to inefficiencies, cost overruns, and delays in project delivery. This study investigates the impact of Just-in-Time (JIT) logistics on effective inventory management in selected construction projects within this region, focusing on the interplay between inventory control and JIT implementation. Utilizing a correlational research design, data were collected from 208 respondents across top, middle, and lower management levels using a validated questionnaire based on a five-point Likert scale. Statistical analysis, including regression and ANOVA, revealed a strong negative correlation (R = 0.751, R Square = 0.564) between JIT logistics and inventory levels, rejecting the null hypothesis that JIT does not affect inventory levels (p = 0.000). Survey results indicated high agreement (88.94%–98.08%) on the importance of inventory management practices, such as real-time tracking and optimal inventory levels, in supporting JIT's goals of waste reduction and timely material delivery. Major challenges identified include complex return processes (93.27% agreement) and lack of coordination (97.60% agreement), which hinder JIT effectiveness. Proposed strategies to optimize construction efficiency include adopting advanced tracking systems, streamlining return processes, enhancing supplier coordination, implementing lean principles, and providing staff training. These findings

KEYWORDS

Construction Efficiency, Just-in-Time (JIT) Logistics, Lean Construction, Inventory Management, Material Management

underscore the critical role of robust inventory control in successful JIT logistics implementation and offer actionable insights for improving project efficiency in Nigeria's South-South region.

Introduction

The construction industry is a critical driver of socio-economic development, providing essential infrastructure and contributing significantly to employment in many countries, including Nigeria. In recent years, the industry has faced increasing pressure to improve productivity, reduce costs, and deliver projects on time, especially within developing economies where inefficiencies are more pronounced (Ameh & Osegbo, 2011). These inefficiencies are often linked to poor material management, logistical delays, and waste, which not only increase project costs but also compromise project quality and delivery schedules. As construction projects become more complex, particularly in fast-growing regions such as the South-South geopolitical zone of Nigeria, the need for more streamlined and responsive supply chain systems becomes increasingly urgent.

Inventory control and logistics are central components of the construction supply chain. Effective inventory control involves the systematic planning, ordering, storage, and usage of materials in a manner that minimizes cost while ensuring materials are available when needed (Kumar & Suresh, 2009). In construction, inventory costs can represent a significant portion—often over 60%—of total project expenditures (Mahamid, 2013). Poor inventory practices, such as overstocking, stockouts, and mismanagement, lead to material wastage, site congestion, and scheduling disruptions. These issues can be particularly acute in the South-South region of Nigeria, where infrastructural and logistic challenges are common due to terrain, weather, and transportation constraints.

In response to these challenges, the adoption of lean construction principles—particularly Just-in-Time (JIT) logistics—has gained attention as a strategic solution. Originally developed in the Japanese manufacturing sector, JIT emphasizes the timely delivery of materials in exact quantities as they are needed in the production process, thereby reducing inventory holding costs, space requirements, and waste (Vrijhoef & Koskela, 2000). When adapted to construction, JIT logistics aims to synchronize material deliveries with project schedules, improve workflow continuity, and enhance overall efficiency. However, the success of JIT implementation is closely tied to how well inventory is managed (Oyedele et al., 2012). Without reliable inventory data, coordination with suppliers, and contingency planning, JIT can fail, leading to costly delays and underperformance.

Several empirical studies underscore the importance of inventory control in the successful implementation of Just-in-Time (JIT) logistics within construction. Ogunbiyi et al. (2014) found that Nigerian firms with structured inventory systems experienced greater success with JIT due to improved supplier coordination. Similarly, Alinaitwe (2009) identified poor material tracking as a major barrier to JIT adoption in Uganda, a challenge echoed in Nigeria's context. Eshofonie (2008), focusing on the Niger Delta, revealed that inconsistent procurement and inaccurate forecasting led to material delays that hindered JIT effectiveness. Olanipekun et al. (2011) further noted that complex projects with weak inventory oversight suffered delays and resource inefficiencies, making JIT unfeasible. Even in more advanced economies, Salem et al. (2005) concluded that JIT logistics only improved site performance when supported by robust inventory control and delivery scheduling. Collectively, these studies highlight a recurring theme: JIT logistics cannot function in isolation. It requires precise inventory

management, strong supplier collaboration, and reliable forecasting to succeed. These insights are particularly relevant to the South-South region of Nigeria, where logistical constraints and infrastructural limitations make effective inventory control a critical factor in construction project efficiency.

Despite growing interest in JIT principles among construction professionals in Nigeria, there is limited empirical research examining the interrelationship between inventory control practices and JIT logistics performance, particularly in the context of the South-South Nigeria. This region, which includes states such as Rivers, Delta, Akwa Ibom, and Bayelsa, is undergoing rapid urbanization and hosts a variety of large-scale residential, commercial, and industrial construction projects. However, it is also characterized by logistical difficulties, including poor transportation networks, supply chain fragmentation, and inconsistent material deliveries (Oke et al., 2017). These conditions make it a valuable case for studying how inventory practices affect JIT effectiveness. This study therefore seeks to investigate the relationship between inventory control and Just-in-Time logistics in selected construction projects within the South-South region of Nigeria.

The objectives of the study is to:

1. Determine the extent to which inventory control influences the successful implementation of JIT logistics.
2. Determine the major challenges encountered in integrating JIT logistics into projects.
3. Determine the strategies to be adopted to optimize construction efficiency through better material management.

To better guide the study, a null hypothesis which states that: Just-in-time logistics does not affect inventory levels in selected construction projects within the South-South region of Nigeria will be tested.

By achieving these objectives, the research hopes to contribute to the growing body of knowledge on construction supply chain management in emerging economies and provide actionable insights for practitioners, policymakers, and researchers seeking to improve project delivery and efficiency.

Methodology

The study adopted a correlational research design with a population comprising of employees of construction projects in selected cities across South-South Nigeria. Employees of construction projects within the cadre of top, middle, and lower management were considered for the study. From this population, a stratified random sampling was used to select 208 respondents to participate in the study. A questionnaire tagged ‘investigative questions on supplier diversity and delivery time’ was used to collect data for the study after proper validation. Participants were asked to respond to the items by ticking on a five-point likert scale of strongly agree, agree, undecided, disagree and strongly disagree.

Results and Discussion of findings

Table 1: Investigative Questions on Just-in-time Logistics

Question	SA (%)	AG (%)	UN (%)	DA (%)	SD (%)	Total (%)
Our company manages returns more effectively...	52.88	42.79	1.92	0.96	1.44	100
Implementing a robust just-in-time logistics system...	48.56	44.71	2.88	2.40	1.44	100
Properly managed just-in-time logistics can provide...	47.60	46.63	4.33	0.48	0.96	100
Just-in-Time logistics contributes to sustainability...	46.15	50.96	0.48	0.48	1.92	100
Poorly managed just-in-time logistics can result...	44.71	51.92	0.96	1.44	0.96	100
Complex return processes can frustrate customers...	43.75	49.52	5.77	0.96	0.00	100
Lack of coordination in just-in-time logistics...	45.19	52.40	0.48	0.96	1.92	100

Table 2: Investigative Questions on Inventory Level.

Question	SA (%)	AG (%)	UN (%)	DA (%)	SD (%)	Total (%)
My firm has developed an effective inventory...	48.56	49.52	0.48	0.96	0.48	100
Maintaining optimal inventory levels ensures...	47.60	48.56	0.48	0.48	2.88	100
Advanced inventory tracking systems can provide...	44.71	45.67	6.25	2.40	0.96	100
Keeping an adequate inventory level can prevent...	44.23	47.60	5.77	0.96	1.44	100
Excessive inventory levels can lead to high...	43.75	47.12	3.37	5.29	0.48	100
Insufficient inventory can result in stockouts...	46.15	43.27	6.73	0.96	2.88	100
Poor inventory management can cause inaccuracies...	42.79	46.15	8.65	0.48	1.92	100

Discussion

Extent to Which Inventory Control Influences the Successful Implementation of JIT Logistics

The high agreement rates in Tables 1 and 2 suggest a strong correlation between effective inventory control and successful JIT logistics implementation. Inventory management practices, such as real-time tracking and maintaining optimal inventory levels, directly support JIT's goal of delivering materials exactly when needed, reducing waste and costs (Chopra & Meindl, 2016). The data indicates that firms with robust inventory control systems are better equipped to implement JIT logistics, as evidenced by the high agreement on operational efficiency and sustainability. Conversely, poor inventory management can lead to inaccuracies and stockouts, which undermine JIT logistics by causing delays and inefficiencies. Thus, inventory control is a cornerstone of JIT logistics, enabling firms to meet customer demands efficiently while minimizing costs and waste (Slack et al., 2019).

Major Challenges Encountered in Integrating JIT Logistics into Projects

The challenges identified align with existing literature on JIT logistics. For instance, Waters (2009) notes that JIT systems require precise coordination among supply chain partners, and any misalignment can lead to delays and cost overruns, as supported by the response of the respondents. Complex return processes are particularly problematic in construction, where material returns are common due to project variability, and inefficient processes can disrupt JIT schedules (Hopp & Spearman, 2011). Additionally, the high costs associated with poorly managed JIT logistics reflect the need for robust

systems to manage inventory and logistics, as errors in these areas can significantly impact project budgets (Chopra & Meindl, 2016). These challenges underscore the importance of addressing coordination, process efficiency, and stakeholder alignment to successfully integrate JIT logistics into construction projects.

Strategies to Optimize Construction Efficiency through Better Material Management

These strategies address the challenges identified in the survey while leveraging the strengths of effective inventory control and JIT logistics. Advanced tracking systems and streamlined return processes directly tackle coordination and efficiency issues, while lean principles and supplier collaboration align with JIT's focus on waste reduction. Staff training ensures that these systems are effectively implemented, reducing errors and enhancing overall project efficiency. By adopting these strategies, construction firms can optimize material management, ensuring timely deliveries, cost savings, and improved customer satisfaction (Hopp & Spearman, 2011).

Test of Research Hypothesis

H_O: Just-in-time logistics does not affect inventory levels in selected construction projects within the South-South region of Nigeria.

Table 3: Model Summary for the Hypothesis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.751[a]	.564	.550	30.49173	.425

Source: (SPSS Version 25)

a. Predictors: (Constant), JIT = Just-in-time logistics

b. Dependent Variable: IL = Inventory level

Table 4: Analysis of Variance (ANOVA) for the Hypothesis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	38459.201	1	38459.201	41.365	.000[b]
	Residual	29751.858	32	929.746		
	Total	68211.059	33			

Source: (SPSS Version 25)

a. Dependent Variable: IL

b. Predictors: (Constant), JIT

Table 5: Ordinary Least Square Method (Coefficients) for the Hypothesis

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	73.072	7.045		10.372	.000
	RL	-.709	.110	-.751	-6.432	.000

Source: (SPSS Version 25)

a. Dependent Variable: IL

The analysis of Tables 3, 4, and 5 tests the null hypothesis (Ho) that Just-in-Time (JIT) logistics does not affect inventory levels in selected construction projects within Nigeria's South-South region. The Model Summary (Table 3) shows a strong correlation (R = 0.751) between JIT logistics and inventory levels, with 56.4% of the variance in inventory levels explained by JIT logistics (R Square = 0.564) and an Adjusted R Square of 0.550, indicating a robust model fit. The standard error of the estimate is 30.49173, and the Durbin-Watson statistic of 0.425 suggests positive autocorrelation. Also, the ANOVA results (Table 4) demonstrate that the regression model is statistically significant (F = 41.365, p = 0.000), with a regression sum of squares (38,459.201) indicating that JIT logistics accounts for a significant portion of inventory level variability, supporting the rejection of the null hypothesis. The OLS coefficients (Table 5) reveal that JIT logistics has a significant negative effect on inventory levels (B = -0.709, Beta = -0.751, t = -6.432, p = 0.000), suggesting that increased JIT implementation reduces inventory holdings, with a constant term of 73.072 (t = 10.372, p = 0.000) establishing a baseline inventory level.

The data strongly rejects the null hypothesis, confirming that JIT logistics significantly influences inventory levels in construction projects in Nigeria's South-South region. The strong correlation (R = 0.751) and explanatory power (R Square = 0.564) indicate that JIT logistics enables leaner inventories by ensuring timely material deliveries, aligning with its goal of minimizing holding costs (Chopra & Meindl, 2016). The negative coefficient (-0.709) suggests that enhanced JIT implementation reduces inventory levels, improving efficiency in construction projects (Slack et al., 2019). The significant ANOVA results (p = 0.000) reinforce that this relationship is robust, though the low Durbin-Watson statistic (0.425) suggests potential autocorrelation, possibly due to omitted variables like supply chain variability (Gujarati & Porter, 2009). These findings highlight JIT's role in optimizing inventory management, offering practical implications for construction efficiency.

Conclusion

Effective inventory control is critical to the successful implementation of JIT logistics, as it enables precise material management, reduces waste, and enhances customer satisfaction. However, challenges such as complex return processes, lack of coordination, and potential inefficiencies must be addressed to fully realize JIT benefits in construction projects. By implementing strategies such as advanced tracking systems, streamlined returns, supplier coordination, lean principles, and staff training, construction firms can optimize material management and improve project efficiency.

References

1. Alinaitwe, H. M. (2009). Prioritizing lean construction barriers in developing countries: A case study of the Ugandan construction industry. *Journal of Construction in Developing Countries*, 14(1), 15–30.
2. Ameh, O. J., & Osegbo, E. E. (2011). Study of relationship between time overrun and productivity on construction sites. *International Journal of Construction Supply Chain Management*, 1(1), 56–67.
3. Chopra, S., & Meindl, P. (2016). *Supply Chain Management: Strategy, Planning, and Operation* (6th ed.). Pearson.
4. Eshofonie, F. (2008). Factors affecting material procurement in Nigerian construction sites. *Journal of Engineering and Applied Sciences*, 3(2), 189–193.

5. Gujarati, D. N., & Porter, D. C. (2009). *Basic Econometrics* (5th ed.). McGraw-Hill.
6. Hopp, W. J., & Spearman, M. L. (2011). *Factory Physics* (3rd ed.). Waveland Press.
7. Kumar, S., & Suresh, N. (2009). *Production and Operations Management* (2nd ed.). New Age International.
8. Mahamid, I. (2013). Contractors' perception of risk factors affecting cost overrun in building construction projects. *Emirates Journal for Engineering Research*, 18(1), 57–64.
9. Ogunbiyi, M., Goulding, J., & Oloke, D. (2014). An empirical study of the impact of lean construction techniques on Nigerian construction projects. *Construction Innovation*, 14(3), 301–320.
10. Oke, A. E., Ogunsemi, D. R., & Adeyemi, A. Y. (2017). Evaluating key risk factors in public construction projects in Nigeria. *Journal of Engineering, Project, and Production Management*, 7(1), 21–29.
11. Olanipekun, E. A., Aje, I. O., & Abiola-Falemu, J. O. (2011). Effects of project complexity on construction project delivery in Nigeria. *Journal of Facilities Management*, 9(2), 135–146.
12. Oyedele, L. O., Jaiyeoba, B. E., & Kadiri, K. O. (2012). Critical success factors in construction stakeholder management: A case study of Nigeria. *Journal of Facilities Management*, 10(2), 123–142.
13. Salem, O., Solomon, J., Genaidy, A., & Luegring, M. (2005). Site implementation and assessment of lean construction techniques. *Lean Construction Journal*, 2(1), 1–21.
14. Slack, N., Brandon-Jones, A., & Johnston, R. (2019). *Operations Management* (9th ed.). Pearson.
15. Vrijhoef, R., & Koskela, L. (2000). The four roles of supply chain management in construction. *European Journal of Purchasing & Supply Management*, 6(3–4), 169–178.
16. Waters, D. (2009). *Supply Chain Management: An Introduction to Logistics* (2nd ed.). Palgrave Macmillan.