

Inventory management practices and perceived financial performance among managers in cement manufacturing firms in Tororo, Uganda

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Abstract

Firms in Tororo, Uganda. This study examined the influence of inventory management practices lean inventory systems, Economic Order Quantity (EOQ), and Just-in-Time (JIT) control on financial performance among cement manufacturers in Tororo, Uganda. Guided by Profit Maximization Theory and the EOQ model, the study adopted a pragmatic philosophy and a cross-sectional mixed-methods design. Data were collected from senior and middle-level managers using stratified random sampling, while key informants were purposively selected. Quantitative data were analyzed using descriptive statistics, correlation, and hierarchical regression analysis, while qualitative data were analyzed through thematic coding.

The findings revealed that inventory management practices significantly influence financial performance among cement manufacturers. EOQ emerged as the most dominant predictor, followed by lean inventory systems, while JIT showed a positive but comparatively weaker effect. Overall, the results indicate that effective inventory management improves financial performance by reducing costs, improving resource utilization, and enhancing operational efficiency. The study concludes that strengthening EOQ-based ordering systems, improving JIT implementation through reliable supplier coordination, and adopting lean inventory practices can enhance profitability, efficiency, and return on assets. Inventory management is therefore a critical strategic function for improving performance in the cement manufacturing sector.

Keywords: Inventory Management; Financial Performance; EOQ; Just-in-Time; Cement Manufacturing; Uganda

1. Introduction

Inventory management is critical to the success of manufacturing organizations because it ensures the availability of materials and products while minimizing operational costs and inefficiencies (Seniwoliba et al., 2017). It involves planning, ordering, storing, tracking, and controlling raw materials, work-in-progress, and finished goods to ensure products are available in the right quantities, at the right time, and in the right place (Wild, 2017). Effective inventory management therefore supports smooth production processes and improved organizational performance.

Inventory management practices are the strategies organizations use to maintain optimal inventory levels while avoiding excessive holding costs and stockouts that may disrupt operations. These practices contribute to operational efficiency, cost reduction, and improved financial outcomes (Heizer et al., 2020). This study focuses on three key practices: lean inventory systems, Economic Order Quantity (EOQ), and Just-in-Time (JIT).

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Lean inventory systems emphasize waste reduction and operational efficiency through maintaining minimum inventory levels without affecting production or customer satisfaction (Barigye et al., 2021). EOQ determines the optimal order quantity that minimizes ordering and holding costs (Upward, 1990), while JIT ensures materials are ordered or produced only when required, thereby reducing inventory waste and storage costs (Okello-Obura, 2015). These practices enhance supply chain efficiency and organizational competitiveness (Chopra & Meindl, 2019).

Perceived financial performance reflects managers' perceptions regarding profitability, cost efficiency, market performance, and overall financial sustainability (Forth & Bryson, 2019). Previous studies indicate that effective inventory management practices improve financial performance through cost reduction, efficient resource utilization, and enhanced productivity (Fullerton et al., 2014). Conversely, poor inventory management contributes to operational inefficiencies, increased costs, and reduced competitiveness (Reese, 2005; Luyombya, 2010).

In Uganda, cement manufacturers in Tororo have experienced operational inefficiencies, rising production costs, and unsatisfactory financial performance partly due to ineffective inventory management practices. Reports from Tororo Cement indicate that inadequate inventory controls contributed to operational and financial challenges (Tororo Cement Management Minutes, 2019; PILA Consultants, 2020). Although firms have introduced improved inventory systems and technological interventions, perceived financial performance among managers remains relatively unsatisfactory.

Despite growing scholarly interest in inventory management, limited empirical research has examined how lean inventory systems, EOQ, and JIT influence perceived financial performance among managers in cement manufacturing firms in Tororo, Uganda. This study therefore investigates the influence of inventory management practices on perceived financial performance among managers in cement manufacturers in Tororo, Uganda, guided by the EOQ model and Expectancy Theory.

General Objective

The main objective of this study was to examine the influence of inventory management practices on perceived financial performance among managers in cement manufacturing firms in Tororo, Uganda.

Specific Objectives

- To examine the effect of lean inventory systems on perceived financial performance among managers in cement manufacturing firms in Tororo, Uganda.
- To determine the influence of Economic Order Quantity (EOQ) on perceived financial performance among managers in cement manufacturing firms in Tororo, Uganda.
- To assess the effect of Just-in-Time (JIT) inventory systems on perceived financial performance among managers in cement manufacturing firms in Tororo, Uganda.

2. Theoretical Foundation

2.1. Profit Maximization Theory

Profit Maximization Theory posits that the primary objective of a firm is to maximize profits through efficient use of resources and effective operational strategies (Friedman, 1970). Firms achieve this by minimizing costs, improving productivity, and enhancing operational efficiency. In manufacturing firms, inventory management is central to profit maximization because it directly affects production continuity, cost control, and overall financial performance (Chopra & Meindl, 2019).

Inventory management involves the procurement, storage, and utilization of raw materials, spare parts, and finished goods. Effective management reduces input costs, prevents production disruptions, and minimizes expenses such as storage, spoilage, and obsolescence (Stevenson, 2020). Practices such as Just-in-Time (JIT) systems and automated tracking help firms maintain optimal inventory levels while reducing holding costs. This is particularly important in cement manufacturing, where downtime can lead to significant financial losses.

In the cement industry, maintaining adequate supplies of raw materials such as limestone, gypsum, and clinker ensures continuous production and efficient asset utilization. This leads to economies of scale, reduced unit costs, and improved financial outcomes. Consequently, effective inventory management improves key financial indicators such as profitability, return on assets (ROA), and cash flow (Pandey, 2021). The theory therefore supports the view that

inventory management practices influence perceived financial performance among managers in cement manufacturing firms.

2.2. Economic Order Quantity (EOQ) Theory

The Economic Order Quantity (EOQ) theory, developed by Ford W. Harris in 1913, is a foundational inventory management model that determines the optimal order quantity that minimizes total inventory costs by balancing ordering and holding costs (Harris, 1913; Silver, Pyke, & Thomas, 2017).

The model assumes constant demand, fixed lead times, and stable prices. Although these assumptions may not fully reflect real-world conditions, EOQ remains useful for guiding cost-efficient inventory decisions. It helps managers determine optimal order quantities and reorder points to avoid both overstocking and stock-outs.

In cement manufacturing, firms handle large volumes of raw materials such as limestone, gypsum, and clinker. Excess inventory increases storage costs, risk of spoilage, and capital tied up, while insufficient inventory can cause production delays and unmet demand (Chopra & Meindl, 2020). EOQ helps firms optimize inventory levels, reduce costs, and maintain uninterrupted production.

Effective use of EOQ improves financial performance through better cash flow management, efficient working capital utilization, and higher return on assets (ROA) (Capkun, Hameri, & Weiss, 2009). Therefore, EOQ provides a relevant framework for understanding how inventory management practices influence perceived financial performance among managers in cement manufacturing firms in Tororo, Uganda.

2.3. Lean Inventory System and Perceived Financial Performance

The relationship between inventory management practices and financial performance has attracted increasing scholarly attention; however, findings remain inconsistent and context-dependent. In particular, the extent to which specific inventory management dimensions; namely lean inventory systems, Economic Order Quantity (EOQ), and Just-in-Time (JIT) influence perceived financial performance has not been conclusively established in literature. Extant studies tend to emphasize operational performance, cost reduction, and efficiency gains, with limited focus on perceived financial outcomes, especially in heavy manufacturing sectors such as cement production. This gap necessitates further empirical investigation, particularly in developing economy contexts where supply chain constraints are more pronounced.

Lean inventory systems are grounded in the principle of eliminating waste while maintaining optimal production flow and customer satisfaction. Li, Wang, and Chen (2024) examined the impact of inventory leanness and operational leanness on financial performance among Chinese SMEs. Their findings revealed an inverted U-shaped relationship between lean practices and financial performance indicators such as Return on Assets (ROA) and Return on Sales (ROS). This suggests that moderate adoption of lean inventory practices enhances financial performance by reducing waste, improving efficiency, and lowering operational costs. However, beyond a certain threshold, excessive leanness negatively affects performance due to insufficient buffer stocks, increased vulnerability to supply disruptions, and reduced flexibility in responding to demand fluctuations.

While these findings are important, the study's focus on Chinese SMEs limits external validity, particularly for capital-intensive industries such as cement manufacturing, which operate under different production dynamics and supply chain complexities. Cement production involves high-volume raw material requirements, long production cycles, and heavy dependence on uninterrupted supply chains, making over-lean operations potentially risky. Therefore, findings from SME-based contexts may not directly translate to industrial manufacturing environments in developing economies.

Similarly, Saengchote and Wongkaew (2017) investigated lean inventory practices among firms listed on the Stock Exchange of Thailand and found that lean strategies significantly influenced accounting-based performance measures, including ROA and ROE. However, the strength of this relationship varied across industries, suggesting that sectoral differences play a critical role in determining the effectiveness of lean inventory systems. The study, however, did not isolate specific causal mechanisms through which lean practices influenced financial outcomes, limiting managerial interpretability.

In the African context, Achuora and Robert (2022) examined lean inventory practices among supermarkets in Nairobi County, Kenya. Their study revealed that practices such as Just-in-Time, cross-docking, drop-shipping, and backordering significantly improved cost efficiency and service quality. While these outcomes are positive, the study primarily

focused on operational performance indicators rather than broader financial outcomes such as profitability, return on investment (ROI), or perceived financial performance. This limitation reduces its applicability to financial decision-making contexts.

Further evidence is provided by Tanaka and Sato (2024), who investigated Japanese fashion retailers and found that lean inventory strategies alone did not significantly enhance profitability. However, when combined with high information technology (IT) intensity, lean systems had a significant positive effect on financial performance. This highlights the moderating role of technological infrastructure in determining the success of lean strategies. Nevertheless, the study relied exclusively on quantitative secondary data and did not explore organizational or managerial factors influencing lean implementation.

Despite these contributions, existing literature remains largely fragmented, sector-specific, and focused on operational outcomes. There is limited empirical evidence linking lean inventory systems to perceived financial performance in capital-intensive manufacturing industries such as cement production in developing countries like Uganda. Consequently, this study hypothesizes that:

H₁: Lean inventory systems are not significantly associated with perceived financial performance.

2.4. Economic Order Quantity and Perceived Financial Performance

The Economic Order Quantity (EOQ) model is one of the most widely applied quantitative inventory management techniques used to minimize total inventory costs by balancing ordering and holding costs. Although widely recognized in operations management theory, empirical evidence regarding its direct influence on financial performance remains mixed and context-dependent.

Ojwang and Author (2024) investigated EOQ implementation in Kenyan sugar manufacturing firms and found that EOQ significantly improved organizational performance by reducing ordering and holding costs while enhancing operational efficiency. Their regression analysis indicated a strong positive relationship between EOQ adoption and performance outcomes. However, the study largely emphasized cost efficiency and operational improvements rather than broader financial performance indicators such as Return on Assets (ROA), Return on Investment (ROI), or profitability perception.

Additionally, the study was limited to a single industry, which restricts generalizability. Sugar manufacturing shares some similarities with cement production in terms of raw material dependency, but differences in production processes and market dynamics limit direct transferability of findings.

Mensah and Co-author (2023) examined EOQ alongside Just-in-Time (JIT) and Strategic Supplier Partnerships (SSP) in Ghana's food and beverage sector. Their findings showed that EOQ had a positive but moderate effect on organizational performance compared to other inventory strategies. While EOQ contributed to cost reduction and inventory optimization, its standalone impact was relatively weaker. This suggests that EOQ is more effective when integrated with complementary supply chain strategies rather than used in isolation.

A systematic review by Alnahhal et al. (2024) confirmed that EOQ remains effective in reducing inventory costs and improving turnover in stable environments. However, the author's highlighted significant limitations, including EOQ's reliance on assumptions such as constant demand, stable pricing, and predictable lead times. In real-world environments characterized by demand volatility, supply chain disruptions, and inflationary pressures, these assumptions often do not hold.

In African manufacturing contexts, Okoro and Team (2016) found a positive relationship between inventory control systems, including EOQ principles, and profitability indicators such as ROA and Net Profit Margin (NPM). However, EOQ was not analyzed independently, making it difficult to isolate its specific contribution. Similarly, Kamara (2021) found that improved inventory turnover positively influenced ROA in a Sierra Leonean manufacturing firm, but EOQ was not explicitly examined.

Overall, while EOQ is widely recognized as a cost optimization tool, empirical evidence regarding its direct and isolated impact on perceived financial performance remains limited, particularly in cement manufacturing firms operating in volatile developing economies such as Uganda. Therefore:

H₂: Economic Order Quantity is not significantly related to perceived financial performance.

2.5. Just-in-Time Inventory Control and Financial Performance

Just-in-Time (JIT) inventory systems are designed to minimize inventory levels by ensuring materials are received only when needed in the production process. JIT aims to reduce waste, improve efficiency, and enhance responsiveness within supply chains. However, its financial implications remain debated in literature.

Claycomb, Germain, and Dröge (1999) found that integrated JIT systems significantly improved financial indicators such as Return on Investment (ROI), profits, and return on sales. However, their findings were based on perceptual survey data, which may introduce bias. Additionally, the study did not isolate the effects of JIT components such as purchasing, production, and selling, limiting its explanatory depth.

Ahmad, Mehra, and Pletcher (2004) found that JIT significantly improved operational performance by reducing lead times and inventory levels. However, its direct impact on financial performance was weak, suggesting that financial benefits may be mediated by operational efficiency improvements rather than direct effects.

More recent evidence by Urohman, Suryana, and Pandin (2023) confirmed that JIT reduces production and holding costs, thereby improving profitability. However, the study highlighted variations across industries and noted that most existing research is cross-sectional, limiting insights into long-term sustainability.

Abu Zaid et al. (2017) emphasized that coordination among JIT components enhances operational performance but did not assess financial outcomes. Similarly, Gbadamosi et al. (2024) found operational improvements in public sector institutions but did not evaluate financial performance indicators.

Overall, while JIT is consistently associated with operational efficiency, evidence on its relationship with perceived financial performance remains limited, especially in manufacturing sectors in developing economies. Therefore:

H₃: Just-in-Time inventory systems are not significantly related to perceived financial performance.

2.6. Inventory Management Practices and Perceived Financial Performance

Broader studies on inventory management practices also provide mixed but generally positive evidence regarding their influence on financial performance. Koumanakos (2008) found that lean inventory strategies significantly improve ROA, ROE, and profit margins, while excessive inventory reduces profitability due to increased holding costs and obsolescence risks. However, the study focused on European manufacturing firms and did not disaggregate specific inventory practices such as EOQ and JIT.

Naliaka and Namusonge (2015) found that JIT, EOQ, and ABC analysis improved cost efficiency, product quality, and competitiveness in Kenyan manufacturing firms. However, the study was limited to a single firm, reducing generalizability. Ogbo et al. (2014) and Anichebe and Agu (2013) similarly reported positive relationships between inventory control and profitability in Nigerian SMEs, but methodological limitations and small samples constrained their findings.

Overall, literature suggests that inventory management practices positively influence financial performance. However, gaps remain in: (i) disaggregating individual practices, (ii) focusing on perceived financial performance, and (iii) examining cement manufacturing firms in Uganda.

Therefore:

H₄: Inventory management practices are not significantly associated with perceived financial performance.

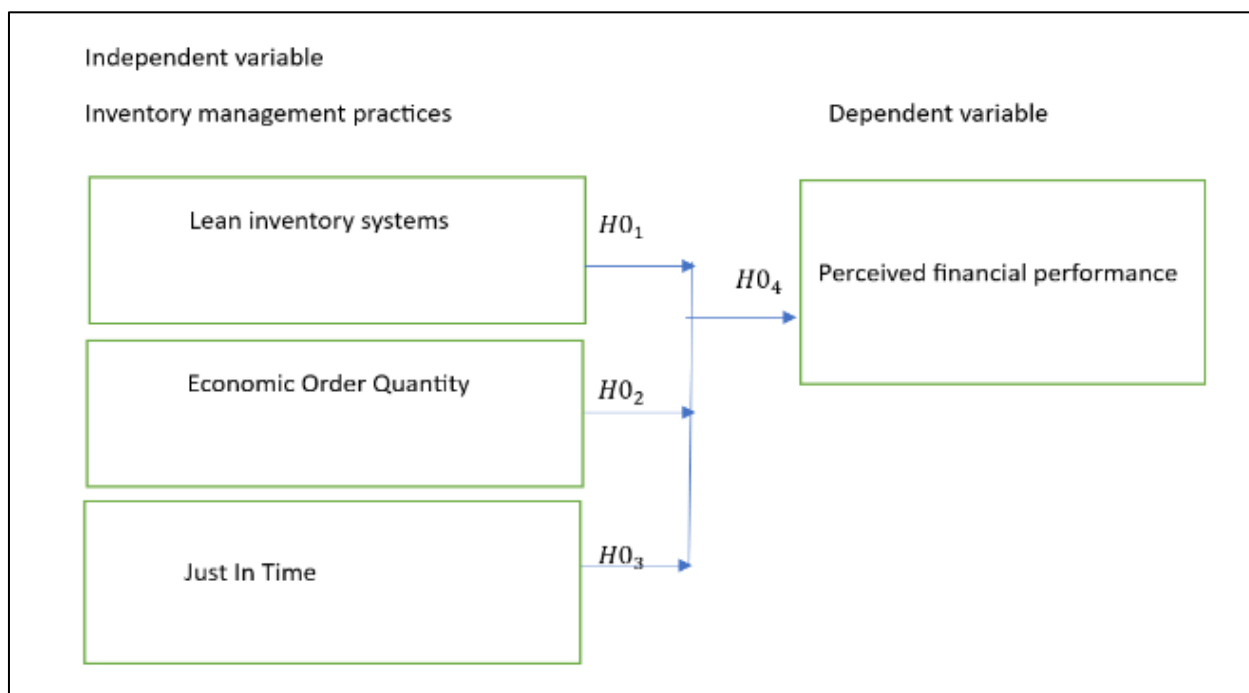


Figure 1 Hypothesized Model

3. Research Methodology

This study adopted a pragmatic research philosophy, integrating both quantitative and qualitative approaches to address complex organizational issues (Creswell & Plano Clark, 2018). A cross-sectional design was used to capture data at a single point in time and examine relationships among variables (Bryman, 2016).

The study targeted senior and middle-level managers in cement manufacturing firms in Tororo, Uganda. A sample of 140 managers was determined using Slovin's formula and selected through stratified sampling to ensure representation across managerial levels (Israel, 2013; Saunders, Lewis, & Thornhill, 2019). Additionally, 15 key informants, including senior managers and supply chain experts, were purposively selected to provide deeper insights (Patton, 2015).

Data were collected using structured questionnaires for quantitative data and semi-structured interviews for qualitative insights (Creswell, 2014). Quantitative data were analyzed using SPSS, applying descriptive statistics, correlation, and regression analysis to examine relationships among variables (Hair et al., 2019). Qualitative data were analyzed using thematic analysis to identify patterns and themes (Braun & Clarke, 2006). The qualitative findings were used to complement and triangulate quantitative results, enhancing the validity and depth of the study.

3.1. Findings of the Study

The study examined the impact of inventory management practices—Economic Order Quantity (EOQ), Just-in-Time (JIT), and Lean Information Systems (LIS)—on perceived financial performance (PFP) in cement manufacturing firms in Tororo, Uganda. Exploratory Factor Analysis (EFA) identified three key dimensions of inventory management: EOQ, which accounted for 26.01% of the variance; LIS, contributing 20.39%; and JIT, explaining 13.01%. Together, these factors explained 59.41% of the total variance, indicating that they adequately represent inventory management practices in the sector. Similarly, indicators of perceived financial performance explained 60.46% of the variance, confirming the reliability of the construct and consistency with prior studies on financial performance measurement.

Descriptive statistics revealed generally positive perceptions of inventory management practices and financial performance among respondents. EOQ recorded the highest mean score ($M = 3.51$), followed by JIT ($M = 3.43$) and LIS ($M = 3.36$), suggesting that EOQ is the most consistently applied practice within the firms. Overall, the results indicate that inventory management practices are moderately implemented and viewed positively in relation to financial outcomes.

Correlation analysis showed a strong positive relationship between overall inventory management and perceived financial performance ($r = 0.620$, $p < 0.01$), indicating that improved inventory practices are associated with better financial performance. At the dimensional level, EOQ exhibited the strongest relationship with PFP ($r = 0.629$), followed by LIS ($r = 0.340$) and JIT ($r = 0.205$). This suggests that EOQ plays the most dominant role in influencing financial performance perceptions, while LIS and JIT contribute to a lesser extent.

Regression analysis confirmed that inventory management significantly predicts perceived financial performance ($R^2 = 0.385$; $\beta = 0.620$, $p < 0.001$), explaining 38.5% of the variation in financial outcomes. The model was statistically significant, indicating that inventory management is a meaningful determinant of perceived financial performance in cement manufacturing firms.

A multiple regression analysis further showed that EOQ, JIT, and LIS jointly explain 40.8% of the variance in perceived financial performance ($R^2 = 0.408$, $p < 0.001$). Among these predictors, EOQ emerged as the only statistically significant factor ($\beta = 0.575$, $p < 0.001$), highlighting its strong influence on financial performance. In contrast, JIT and LIS showed positive but statistically insignificant effects, suggesting that their impact may be indirect or dependent on organizational and contextual conditions.

4. Conclusion

The study concludes that inventory management practices significantly influence perceived financial performance in cement manufacturing firms in Uganda. However, the strength of influence varies across practices, with EOQ emerging as the most critical determinant of financial performance.

The findings indicate that EOQ enhances financial performance by optimizing order quantities, reducing holding and ordering costs, and improving cash flow efficiency. JIT and LIS contribute positively but do not independently predict financial performance in the multivariate model, suggesting that their effectiveness may depend on integration with other operational systems and contextual firm conditions.

Overall, inventory management plays a significant role in shaping financial performance perceptions, confirming its importance as a strategic operational function in manufacturing firms.

Recommendations

Based on the findings, several recommendations are proposed to enhance financial performance through improved inventory management.

- First, firms should strengthen EOQ implementation by adopting data-driven inventory systems that optimize ordering decisions, reduce excess stock, and minimize holding costs.
- Second, organizations should improve JIT practices by enhancing supplier reliability, delivery coordination, and production scheduling to reduce delays and improve responsiveness to demand fluctuations.
- Third, companies should invest in Lean Information Systems through the adoption of digital inventory tracking, real-time data systems, and integrated enterprise resource planning tools to improve visibility and coordination across operations.
- Fourth, inventory management should be integrated as a strategic capability within organizational planning to improve efficiency, competitiveness, and long-term financial sustainability.

Finally, policymakers and industry regulators should support the adoption of modern inventory management systems by improving digital infrastructure, offering training programs, and promoting technology-driven supply chain practices within the manufacturing sector.

Compliance with ethical standards

Disclosure of conflict of interest

The researcher declares that this thesis is entirely original and has not been submitted to any other institution for the award of a degree or any other academic qualification.

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Statement of ethical approval

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Statement of informed consent

"Informed consent was obtained from all individual participants included in the study."

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