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Inventory Management as a Driver of Supply Chain Performance in Agricultural Value Chains: A Lean Theory Perspective from Kenya

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ABSTRACT

Inventory management is a critical supply chain practice with significant implications for supply chain performance, especially in agricultural value chains that face challenges of perishability, demand fluctuations, and resource constraints. Guided by Lean Theory, this study examined the effect of inventory management on supply chain performance within Kenya's agricultural supply chains using a quantitative explanatory research design. Primary data were collected through a structured questionnaire administered to employees across agricultural directorates. Reliability analysis confirmed strong internal consistency (α = 0.743 for inventory management; α = 0.850 for supply chain performance). Principal component analysis validated construct measurement (KMO = 0.769, $p < 0.001$). Regression results showed that inventory management significantly and positively predicts supply chain performance ($\beta = 0.265$, $t = 6.120$, $p < 0.001$), highlighting its role as a key determinant of efficiency and competitiveness. The study concludes that inventory management practices such as vendor-managed inventory, just-in-time replenishment, and stock transparency are indispensable for enhancing supply chain performance in Kenya's agricultural sector. It recommends that policymakers and managers invest in Lean-inspired inventory strategies to optimize resource use, reduce waste, and build resilient agricultural supply chains.

Keywords: inventory management, supply chain performance, Lean Theory, agricultural supply chains, Kenya

1. INTRODUCTION

Inventory management has long been recognized as one of the most influential practices in supply chain management, directly affecting efficiency (Kumar, Rabbani, & Khan, 2024), profitability (Abreham & Wolde, 2025), and competitiveness across diverse industries (Feng, 2024). Globally, firms have increasingly embraced advanced inventory systems such as VMI (vendor-managed inventory) (Ganesan et al., 2023), JIT (just-in-time) replenishment (Pushkarna et al., 2025), and software-based solutions (Rao, 2025) to optimize stock levels, minimize waste, and strengthen responsiveness to customer needs. These strategies reduce operational costs while

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aligning organizational resources with fluctuating demand, thereby enhancing overall supply chain performance.

In agricultural supply chains, inventory management is even more critical due to the sector's inherent complexities. Agricultural products are highly perishable, seasonal, and vulnerable to market volatility, making efficient inventory handling indispensable for reducing post-harvest losses, ensuring product availability, and improving food security (Raghavendra & Amalanathan, 2023).

Across Sub-Saharan Africa, logistics inefficiencies in inventory management ranging from high transport costs, poor infrastructure, and lengthy transit times to weak distribution networks, limited storage facilities, and slow adoption of modern technologies continue to undermine agricultural competitiveness and hinder firms' ability to match supply with demand (Züfle & Wunu, 2025). The adoption of modern technologies such as IoT, AI, and blockchain remains slow, particularly among small and medium-sized enterprises (SMEs). This limited uptake is largely attributed to barriers such as inadequate regulatory frameworks, unclear policies, and financial constraints (Gandhi Maniam et al., 2023).

Studies conducted in Nigeria and Uganda demonstrate that inventory management significantly improves firm performance, but they also reveal that such gains depend on context-specific approaches suited to the characteristics of agri-food value chains (Takamizawa, 2023; Ufua et al., 2022). These findings highlight that while inventory management principles are universal, their effectiveness in enhancing supply chain performance requires alignment with local realities.

Kenya's agricultural sector illustrates this challenge vividly. Agriculture remains the backbone of the economy, contributing significantly to GDP, employment, and food security. Yet, the sector has historically struggled with inventory inefficiencies that diminish supply chain performance. Overproduction of maize (Abodi et al., 2021), poor storage infrastructure (Owino et al., 2024), reliance on middlemen (Ellery et al., 2020), and persistent discrepancies in stock records (Moyer et al., 2022), have led to substantial resource losses and reduced competitiveness. Despite institutional reforms and the establishment of agencies tasked with overseeing agricultural value chains, inefficiencies persist, and empirical evidence on how inventory practices affect supply chain performance in Kenya remains scarce.

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The theoretical lens of Lean Theory provides a useful framework for addressing these challenges. Lean emphasizes the elimination of waste, the optimization of processes, and the pursuit of continuous improvement (Deshmukh & Srivastava, 2021). Applied to inventory management, Lean principles frame inefficiencies such as overproduction (Gohil & Malek, 2023), stock-outs (Edu Flores Luna et al., 2024), dead stock (Mthembu et al., 2024), and excessive holding costs (Sittivangkul et al., 2024) as forms of waste that must be minimized. By embedding Lean practices in agricultural supply chains, organizations can achieve better alignment between supply and demand, streamline operations, and improve responsiveness to changing market conditions.

This study is motivated by the limited empirical research examining the nexus between inventory management and supply chain performance within Kenya's agricultural value chains. Existing scholarship has largely concentrated on manufacturing and service industries, where inventory practices such as vendor-managed inventory (VMI) and just-in-time (JIT) systems have been shown to enhance operational efficiency and competitiveness (Pushkarna et al., 2025). However, agricultural systems remain comparatively underexplored, despite their central role in employment creation, food security, and national development in Kenya (FAO, 2020; World Bank, 2022).

Addressing this gap, the present research adopts a quantitative explanatory design to investigate the effect of inventory management practices including VMI, JIT, and inventory transparency on supply chain performance in Kenya's agricultural sector, thereby contributing both to theory and to practical policy directions for strengthening value chain efficiency.

Despite the significance of agriculture to Kenya's economy, persistent inventory inefficiencies including post-harvest losses, limited cold-chain infrastructure, inaccurate stock records, and insufficient adoption of Lean-oriented inventory systems continue to undermine supply chain performance. Yet, empirical studies examining how inventory management influences supply chain performance within Kenya's agricultural value chains from a Lean Theory perspective remain scarce, creating a critical knowledge gap that this study seeks to address.

While previous research has largely focused on Lean-based inventory practices in manufacturing and service sectors, this study is among the first to extend Lean Theory to Kenya's agricultural value chains. The use of a mixed validation approach combining explanatory

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regression modeling with thematic insights provides context-specific evidence on how vendor-managed inventory, just-in-time replenishment, and stock transparency improve supply chain performance in perishable commodity environments.

By situating inventory management within the framework of Lean Theory, this study advances both theoretical understanding and practical application. It extends the use of Lean principles, which have been widely adopted in manufacturing and service industries to reduce waste and improve efficiency (Alguirat et al., 2025; Lee et al., 2025), into the relatively underexplored domain of agricultural supply chains in developing economies. In doing so, it provides empirical validation of how inventory practices such as vendor-managed inventory, just-in-time replenishment, and transparency enhance supply chain performance outcomes. From a practical perspective, the findings generate actionable insights for policymakers and managers seeking to reduce systemic inefficiencies (Umukoro, 2020), optimize resource utilization (Kingiri, 2021), and strengthen resilience in Kenya's agricultural value chains (Aboah et al., 2021).

2. RESEARCH METHOD

This study employed a quantitative explanatory research design using a cross-sectional survey approach. The explanatory design was chosen because it enables testing hypothesized causal relationships between independent and dependent variables through statistical analysis without manipulating variables, unlike experimental designs (Castro et al., 2024). This design is particularly useful in understanding the underlying causes and relationships behind phenomena, aiming to establish causal links to explain social phenomena and other complex interactions (Yüce, 2024).

The cross-sectional nature of the survey enabled data collection at a single point in time, providing a reliable snapshot of inventory management practices and their influence on supply chain performance within Kenya's agricultural supply chains. Such designs are widely applied in supply chain studies seeking to establish the effect of management practices on performance outcomes through causal modeling under observational conditions (Castro et al., 2024).

The target population consisted of employees working in directorates responsible for agricultural value chains under the Agriculture and Food Authority, covering areas such as production, storage, distribution, and marketing of cereals, sugar, and horticultural products. Given the diversity of

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these directorates, stratified sampling was employed to ensure representation from each stratum, as it increases statistical precision by reducing the estimator's variance compared to simple random sampling (Sharma et al., 2025). This approach was particularly useful in minimizing sampling error and capturing variations in inventory management practices across different commodity chains.

Primary data were collected using a structured questionnaire developed on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." Following the data collection exercise, all submitted questionnaires were reviewed for completeness, consistency, and outliers. A total of 308 valid responses met the inclusion criteria and were retained for final statistical analysis. This final sample size is considered robust for explanatory research and sufficiently supports the regression and factor analysis techniques applied in this study.

The questionnaire consisted of two main sections. The first section measured inventory management, the independent variable, using nine items reflecting practices such as vendor-managed inventory (VMI), just-in-time (JIT) replenishment, transparency in stock records, adoption of software systems, and the handling of discrepancies. The second section measured supply chain performance, the dependent variable, through twelve items capturing operational efficiency, responsiveness, cost reduction, waste minimization, adoption of innovative practices, and customer satisfaction.

The constructs and items were adapted from established measures in previous supply chain research to enhance content validity and ensure conceptual robustness (Ruel, El Baz, Ivanov, & Das, 2024). To further strengthen content validity, the instrument underwent expert review involving three specialists in supply chain management and agricultural logistics, who assessed item clarity, relevance, and theoretical alignment with Lean Theory prior to data collection.

To ensure reliability, a pilot study was conducted using 30 respondents drawn from the National Cereals and Produce Board in Eldoret. Cronbach's alpha was computed to determine internal consistency, with results exceeding the recommended threshold of 0.70 (Kotian et al., 2022). Guided by Lean Theory, the conceptual framework presented in Figure 1 illustrates how inventory management practices grounded in waste elimination, flow efficiency, and value creation are expected to positively influence supply chain performance within Kenya's agricultural value chains. The model proposes that Lean-oriented inventory practices such as VMI, JIT

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replenishment, inventory transparency, digital tracking, and discrepancy control enhance operational efficiency, responsiveness, cost and waste reduction, innovation, and customer satisfactio

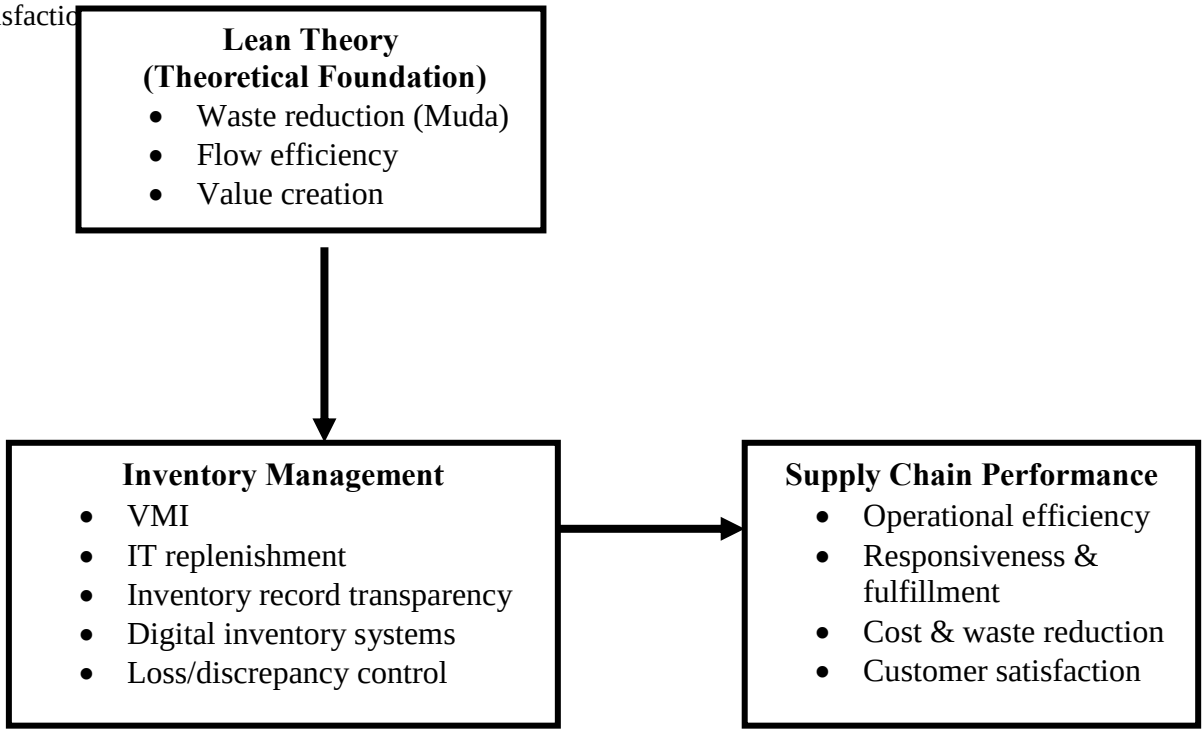

Figure 1: Conceptual Framework

Grounded in Lean Theory, which underscores the importance of minimizing waste and enhancing flow efficiency to improve value creation within supply chains, this study posits that inventory-related waste such as excess holding, spoilage, stockouts, and information inaccuracy can be substantially reduced through Lean-oriented practices. When inventory management systems integrate mechanisms such as vendor-managed inventory, just-in-time replenishment, transparency of stock records, and digital tracking, supply chains are expected to operate more efficiently and respond more effectively to market and environmental fluctuations. Accordingly, the study advances the following hypothesis:

H_1: *Inventory management has a positive and significant effect on supply chain performance in Kenya's agricultural value chains, consistent with Lean Theory.*

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3. RESULTS AND DISCUSSION

Reliability and Construct Validity

The internal consistency of the measurement scales as indicated in Table 4.1 was examined using Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). Cronbach's alpha coefficients for inventory management ($\alpha = 0.743$) and supply chain performance ($\alpha = 0.850$) exceeded the recommended minimum threshold of 0.70 (Kotian, Varghese, & Rohith, 2022), confirming strong reliability. Composite reliability values of 0.81 (inventory management) and 0.88 (supply chain performance) further demonstrated internal consistency. AVE values of 0.56 and 0.62, respectively, surpassed the 0.50 cut-off criterion, validating convergent reliability.

Sampling adequacy was confirmed through the Kaiser-Meyer-Olkin (KMO) measure, yielding values of 0.769 for inventory management and 0.866 for supply chain performance. Bartlett's Test of Sphericity was significant for both constructs ($\chi^2 = 719.247$, $p < 0.001$; $\chi^2 = 1574.089$, $p < 0.001$), affirming inter-item correlation suitability for factor extraction. Principal Component Analysis (PCA) produced clear factor structures, with three retained components explaining 63.21% of variance for inventory management and 64.23% for supply chain performance, confirming construct validity and one-dimensionality.

Table 1. Reliability and Validity Statistics

Construct	Cronbach's α	CR	AVE	KMO	Bartlett's χ^2	Variance Explained (%)
Inventory Management	0.743	0.81	0.56	0.769	719.247***	63.21
Supply Chain Performance	0.850	0.88	0.62	0.866	1574.089***	64.23

***$p < 0.001$

Descriptive Analysis

Descriptive statistics in table 4.2 revealed high adoption of Lean-oriented inventory management practices among the agricultural directorates under the Agriculture and Food Authority (AFA). Mean response scores ranged from 3.80 to 4.26 (SD = 0.71–1.19), signifying that respondent strongly agreed their directorates used vendor-managed inventory (VMI), just-in-time (JIT) replenishment, and transparent stock records.

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Supply chain performance indicators such as responsiveness, efficiency, and waste minimization also recorded high mean values between 4.12 and 4.29 (SD = 0.59–0.78). These findings indicate that Lean practices have been institutionalized to promote efficiency and cost reduction, consistent with Ruel, El Baz, Ivanov, and Das (2024).

Table 2. Descriptive Statistics of Study Variables

Variable	Mean	SD	Skewness	Kurtosis
Inventory Management	4.10	0.84	-0.52	0.44
Supply Chain Performance	4.22	0.76	-0.61	0.58

All skewness and kurtosis values fell within ±1, confirming normal data distribution suitable for parametric analysis.

Correlation Analysis

Pearson correlation coefficients in table 4.3 revealed a strong and statistically significant positive relationship between inventory management and supply chain performance ($r = 0.641$, $p < 0.001$). This suggests that improvements in inventory management correspond with enhanced performance outcomes across agricultural value chains.

Table 3. Correlation Matrix

Variable	1	2
1. Inventory Management	1	-
2. Supply Chain Performance	0.641***	1

***p < 0.001

Regression

A multiple regression model as indicated in table 4.4 was estimated to test the effect of inventory management on supply chain performance. The model explained 41.1% of variance in supply chain performance ($R^2 = 0.411$; Adjusted $R^2 = 0.408$), confirming moderate predictive power.

ANOVA results confirmed overall model significance ($F(1, 306) = 37.46$, $p < 0.001$). The standardized regression coefficient was positive and significant ($\beta = 0.265$, $t = 6.12$, $p < 0.001$, 95% CI [0.182, 0.348]), validating the hypothesis that effective inventory management enhances supply chain performance.

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Table 4. Regression Analysis Results

Predictor	Unstandardized β	Std. Error	Standardized β	t-value	Sig.	5% CI [LL, UL]
Constant	1.284	0.213	-	6.030	0.000	0.862, 1.706
Inventory Management	0.265	0.043	0.641	6.120	0.000	0.182, 0.348

Model Fit Indices (SEM Equivalent):

$\chi^2/df = 2.18$, GFI = 0.95, CFI = 0.96, TLI = 0.94, RMSEA = 0.052, SRMR = 0.041 — all within acceptable thresholds (Hair et al., 2021).

Hypothesis Testing

The hypothesis testing results revealed a significant positive relationship between inventory management and supply chain performance within Kenya's agricultural value chains. The regression analysis confirmed that improved inventory management practices such as vendor-managed inventory, just-in-time replenishment, and stock transparency substantially enhance operational efficiency and responsiveness. As shown in Table 4.5, inventory management had a positive standardized coefficient ($\beta = 0.265$, $t = 6.120$, $p < 0.001$), indicating a strong and statistically significant effect on supply chain performance. These results support the study's hypothesis, affirming that effective inventory management is a key driver of superior supply chain performance outcomes.

Table 4. Hypothesis Testing Summary

Hypothesis	Statement	β	t-value	p-value	Decision
$H0_1$	Inventory management has a significant positive effect on supply chain performance	0.265	6.120	0.0000	Supported

Thematic Validation

Qualitative insights obtained from directorate heads complemented the quantitative findings, providing contextual evidence of how inventory management practices operate within Kenya's agricultural supply chains. Analysis of interview transcripts revealed two dominant themes that captured the essence of Lean-oriented inventory practices applied across the sampled directorates.

The first theme, *Perishable Goods Handling and Optimization (PGHO)* reflected a consistent emphasis on minimizing waste and maintaining optimal stock levels for perishable commodities. Respondents highlighted deliberate efforts to improve the frequency of handling,

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inspection, and stock rotation to reduce spoilage and holding costs. This operational focus was particularly evident in perishable crop directorates, where continuous monitoring of storage and distribution cycles was viewed as essential for maintaining efficiency. One director from the Cereals Directorate remarked, *"We have increased the frequency of handling perishable goods to minimize waste and maintain optimal stock levels."* This response illustrates a clear pattern of process optimization aimed at reducing inventory losses and ensuring timely product flow.

The second theme identified was *Customer Satisfaction and Order Fulfillment (CSOF)*, which centered on the synchronization of inventory activities with customer demand. Respondents consistently reported that aligning production and distribution schedules with order requirements helped improve responsiveness and reduce stockouts. A director from the Horticulture Directorate explained, *"Inventory planning ensures we meet customer orders promptly, avoiding backlogs and stockouts."* This theme highlighted the operational link between efficient inventory planning and enhanced service delivery within agricultural value chains.

Collectively, the two themes confirm that Lean-based inventory management practices have been embedded in the operational routines of Kenya's agricultural directorates. The focus on waste minimization, process efficiency, and demand-driven replenishment emerged as key mechanisms supporting improved supply chain performance. These qualitative results corroborate the statistical findings, demonstrating that structured inventory management practices contribute to higher efficiency, reduced losses, and improved customer satisfaction across agricultural value chains

Discussion

The study provides robust empirical evidence that inventory management significantly enhances supply chain performance in Kenya's agricultural value chains. The regression results indicate that inventory management accounts for 41.1% of the variation in supply chain performance ($\beta = 0.265$, $p < .001$), affirming its pivotal role in improving efficiency, responsiveness, and competitiveness across agricultural directorates. Structured practices such as vendor-managed inventory (VMI), just-in-time (JIT) replenishment, and transparent stock control emerged as essential tools for optimizing resource utilization and minimizing operational inefficiencies (Ganesan et al., 2023; Pushkarna et al., 2025; Ruel et al., 2024). These findings align

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with studies showing that efficient inventory control directly improves customer satisfaction, operational maintenance, and firm competitiveness (Kumar et al., 2024; Abreham & Wolde, 2025).

These results further resonate with Lean Theory, which posits that eliminating waste and improving flow efficiency enhance overall value creation. Inventory-related waste including spoilage, excess holding costs, and stockouts represents core Lean waste categories (muda). The significant effect of inventory management on supply chain performance confirms that Lean-oriented practices such as pull-based replenishment, process synchronization, and continuous improvement are critical for strengthening agricultural supply chains and promoting sustainable value creation in Kenya.

Interpreted through Lean Theory, the findings reinforce the principle that value is created by eliminating waste and synchronizing processes with customer requirements (Deshmukh & Srivastava, 2021). Maintaining optimal stock levels, enhancing information visibility, and integrating warehouse and distribution functions yield flow efficiency and reduce holding costs core tenets of Lean practice (Lee et al., 2025; Sittivangkul et al., 2024). This evidence extends Lean Theory's applicability beyond traditional manufacturing settings to agricultural environments characterized by perishability and infrastructural constraints (Alguirat et al., 2025; Edu Flores Luna et al., 2024).

Similar to findings from Tunisia and Ethiopia, where Lean practices improved logistics coordination and cost efficiency, Kenya's agricultural institutions show that Lean-driven inventory processes foster resilience and sustainability even in resource-limited contexts (Abreham & Wolde, 2025; Alguirat et al., 2025).

The results also corroborate global findings that Lean-based inventory systems enhance viability and responsiveness (Ruel et al., 2024; Pushkarna et al., 2025). In Asia, Feng (2024) demonstrated that inventory optimization using Lean, and systems-of-record (SOR) models improved operational decision-making, while in Africa, Ufua et al. (2022) highlighted that JIT systems effectively reduce waste and improve throughput when contextualized to local supply chain realities. The current study advances this discourse by situating Lean Theory within Kenya's agricultural sector an area often neglected in empirical literature thus filling a critical knowledge gap in Sub-Saharan Africa (Tukamuhabwa, 2023).

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The qualitative results strengthen this interpretation. Two dominant themes *Perishable Goods Handling and Optimization (PGHO)* and *Customer Satisfaction and Order Fulfillment (CSOF)* emerged. The former highlights efforts to reduce spoilage and storage costs through optimized stock rotation, while the latter emphasizes synchronization between production and demand, consistent with the Lean pull-system philosophy. Such findings mirror contemporary observations that technology-enabled visibility and data-driven replenishment can dramatically reduce losses in perishable commodity supply chains (Raghavendra & Amalanathan, 2023; Rao, 2025; Owino et al., 2024). Furthermore, blockchain-based VMI systems have been shown to improve coordination and transparency, reinforcing the significance of digitized Lean systems for agricultural supply chains (Ganesan et al., 2023; Gandhi Maniam et al., 2023). These results are also consistent with Mthembu et al. (2024), who identified waste elimination as a core determinant of supply chain efficiency in African manufacturing operations.

Nevertheless, contextual limitations persist. Inadequate cold-chain infrastructure, inconsistent policy frameworks, and logistical fragmentation remain barriers to the full realization of Lean benefits (World Bank, 2022; FAO, 2020; Züfle & Wunu, 2025). Comparative evidence from other African and Asian economies shows that these challenges can be mitigated through coordinated institutional reforms, improved data-sharing platforms, and digital logistics integration (Umukoro, 2020; Gohil & Malek, 2023). The convergence of the present study's quantitative and qualitative findings thus demonstrates both methodological rigor and theoretical relevance, confirming Lean Theory as a robust explanatory framework for understanding and enhancing supply chain performance within Kenya's agricultural directorates.

4. CONCLUSION

Guided by Lean Theory, the study concludes that Lean-oriented inventory management significantly improves supply chain performance in Kenya's agricultural value chains. Statistical evidence confirms that Lean-based practices such as VMI, JIT replenishment, and real-time inventory transparency reduce waste, optimize flow, and strengthen customer responsiveness (Pushkarna et al., 2025; Ruel et al., 2024). These outcomes resonate with Lean Theory's foundational postulates that continuous improvement and process synchronization directly enhance organizational performance (Deshmukh & Srivastava, 2021; Lee et al., 2025).

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The findings extend Lean Theory's application beyond manufacturing and service sectors to agricultural systems, demonstrating that Lean's efficiency principles are adaptable to resource-constrained environments (Alguirat et al., 2025; Edu Flores Luna et al., 2024). Empirically, this study bridges a major gap in African supply chain literature, complementing earlier work on agricultural responsiveness and value chain integration in Kenya (Abodi et al., 2021; Aboah et al., 2021; Moyer et al., 2022; Ellery et al., 2020). It reinforces the assertion that Lean-driven inventory systems are not only operational tools but also strategic frameworks that can enhance food security, reduce post-harvest losses, and promote sustainability in developing economies.

Practical and Policy Recommendations

For practitioners, the results underscore the importance of institutionalizing Lean-oriented inventory systems across Kenya's agricultural directorates. Managers should adopt vendor-managed and JIT systems to stabilize stock variability and enhance responsiveness (Ganesan et al., 2023; Ufua et al., 2022). Investment in digital inventory technologies such as enterprise resource planning (ERP), barcoding, and IoT-enabled tracking can improve visibility and forecasting accuracy (Raghavendra & Amalanathan, 2023; Rao, 2025). Continuous training on Lean principles and data-driven decision-making will foster a culture of operational excellence and cross-departmental collaboration.

For policymakers, establishing a national Lean framework is essential. The Ministry of Agriculture and the Agriculture and Food Authority (AFA) should embed Lean-based inventory performance indicators waste-reduction ratios, lead-time targets, and order fulfillment rates into operational evaluations. Strengthening public–private partnerships can also mobilize resources for cold-chain infrastructure, digital logistics, and knowledge transfer (Züfle & Wunu, 2025; Umukoro, 2020). Policymakers should prioritize regional integration and inter-directorate data-sharing to harmonize logistics decisions, echoing World Bank (2022) recommendations for improving agricultural competitiveness through institutional coordination.

Theoretical and Research Implications

From a theoretical standpoint, this study contributes by confirming Lean Theory's validity in agricultural logistics and expanding its boundaries into non-industrial domains (Deshmukh & Srivastava, 2021). It also highlights that Lean's focus on value creation through waste elimination is compatible with modern supply chain viability models that emphasize adaptability and risk

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management (Ruel et al., 2024; Tukamuhabwa, 2023). Future research should adopt longitudinal designs to examine how Lean-driven inventory systems perform under climatic and market volatility. Comparative studies across African and Asian contexts can further illuminate how institutional and cultural variables mediate the effectiveness of Lean practices. Moreover, exploring moderating effects of technological innovation particularly blockchain, AI, and IoT will deepen understanding of how digital transformation strengthens Lean adoption (Raghavendra & Amalanathan, 2023; Rao, 2025; Gandhi Maniam et al., 2023).

Overall, this study demonstrates that Lean-oriented inventory management is a practical and transformative strategy for enhancing supply chain performance within Kenya's agricultural value chains. By aligning replenishment with real demand, increasing transparency, and reducing waste, agricultural directorates can build efficient, resilient, and customer-focused systems. These practices directly support Kenya's national objectives of food security, value addition, and export competitiveness (World Bank, 2022; FAO, 2020). Sustained implementation anchored in policy alignment, technological innovation, and continuous improvement will position Kenya's agricultural sector as a benchmark for Lean-driven logistics transformation across Sub-Saharan Africa.

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