

SUPPLY CHAIN COORDINATION AND WAREHOUSE PERFORMANCE IN LEATHER PROCESSING CLUSTERS: A STUDY OF THE TANNERY INDUSTRY IN KANO

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Abstract

This study examined the effect of supply chain coordination on warehouse performance in the Kano tannery industry, with inventory management efficiency as a mediating variable. Specifically, the study investigated the effects of information sharing, collaboration, trust, and supply chain coordination on warehouse performance. A quantitative cross-sectional research design was adopted, while data were collected from 297 employees and managers involved in logistics and warehousing operations in tannery firms in Kano State, Nigeria. Structured questionnaires were used for data collection, and the analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings revealed that inventory management efficiency had the strongest positive effect on warehouse performance ($\beta = 0.806$), indicating that effective inventory control, timely replenishment, and stock optimization are critical drivers of warehouse efficiency. Trust also showed a significant positive influence on warehouse performance, confirming its role in reducing uncertainty and improving operational coordination. However, information sharing and collaboration produced negligible effects, while supply chain coordination exhibited a weak but positive relationship with warehouse performance. The study concluded that warehouse performance in the Kano tannery industry depends largely on efficient inventory management and trust-based relationships among supply chain actors. The study recommends improved inventory systems, stronger inter-firm trust, and enhanced technological infrastructure to strengthen logistics efficiency and competitiveness in the leather industry.

Keywords: Supply Chain Coordination; Warehouse Performance; Inventory Management Efficiency; Trust; Tannery Industry.

INTRODUCTION

Logistics and supply chain management (SCM) have become central to improving operational efficiency and competitiveness across industries globally. In both developed and developing economies, the ability of firms to effectively coordinate supply chain activities

particularly through information sharing (ISC), collaboration (COL), and trust (TRU) has been widely recognized as a critical driver of warehouse performance (WP). These coordination mechanisms influence key warehousing outcomes such as inventory accuracy, order fulfillment speed, storage

utilization, and cost efficiency, thereby shaping the overall performance of firms operating within complex supply networks.

In developed economies such as the United States, Germany, and Japan, supply chains are increasingly characterized by high levels of integration, automation, and digitalization, often associated with the emergence of Industry 4.0 technologies. These systems enable real-time communication and synchronization of logistics activities across supply chain partners, thereby enhancing warehouse operations and overall efficiency. Empirical evidence indicates that integrated and coordinated supply chain systems significantly improve organizational performance by aligning procurement, production, and distribution processes across firms (Flynn et al., 2010; Abera Baisaa et al., 2025). In such environments, information sharing enhances visibility and reduces uncertainty in demand and inventory management, collaboration facilitates joint planning and efficient resource utilization, while trust strengthens long-term relationships and minimizes coordination challenges. The integration of these variables leads to improved warehouse performance by reducing delays, minimizing inventory holding costs, and increasing responsiveness to market demand. Furthermore, digital supply chain technologies have been shown to enhance coordination and operational outcomes by enabling data-driven decision-making, real-time monitoring, and enhanced supply chain visibility (Marinagi et al., 2023; Wu et al., 2025). As a result, developed countries provide strong empirical support for the positive linkage between supply chain coordination and warehouse performance.

In contrast, developing economies face structural and institutional constraints that limit the effectiveness of supply chain coordination, even though its importance remains critical. These constraints include inadequate infrastructure, limited technological adoption, weak institutional frameworks, and fragmented supply chain relationships. Despite these challenges, empirical studies suggest that supply chain management practices still play a significant role in improving operational performance in such contexts. For instance, Omigie and Kubeyinje (2022) found that supply chain practices such as information flow

management and process integration have a positive and significant impact on firm performance in developing economies. Similarly, Alsheyadi et al. (2024) demonstrated that coordination mechanisms improve operational efficiency by enhancing communication, reducing uncertainties, and enabling better decision-making among supply chain actors. Furthermore, Ifunanya Mbamalu et al. (2023) reported that sustainable supply chain management practices contribute significantly to organizational performance by improving operational efficiency, stakeholder coordination, and long-term competitiveness. In this context, information sharing (ISC) improves visibility and reduces inefficiencies in inventory handling, collaboration (COL) supports coordinated decision-making and resource sharing, while trust (TRU) reduces opportunistic behaviour and enhances cooperation. However, the absence of strong institutional support and technological infrastructure often weakens these relationships, resulting in persistent inefficiencies in warehouse operations such as poor inventory control, delayed deliveries, and underutilization of storage facilities.

Within the Nigerian context, these challenges are even more pronounced, particularly in industrial clusters such as Kano, where the tannery and leather industry plays a significant economic role. Despite its contribution to employment and export earnings, the sector is characterized by weak logistics systems, poor supply chain integration, and inefficient warehousing practices. Many firms operate with limited information-sharing systems, leading to inaccurate demand forecasting and poor inventory management. In addition, low levels of collaboration among supply chain actors hinder coordinated planning and execution of logistics activities, while trust deficits often arising from weak contractual enforcement and informal business practices further constrain effective coordination. These issues have direct implications for warehouse performance (WP), manifesting in high inventory losses, inefficient space utilization, and delays in order processing and delivery.

Empirical evidence from Nigeria reinforces the importance of supply chain coordination in enhancing performance outcomes. Studies have shown that effective supply chain management

practices significantly influence organizational performance, particularly through improved information flow and process integration (Omigie & Kubeyinje, 2022; Mohammed & Daniel, 2024). Similarly, Eshika and Ololo (2024) found that supply chain management practices positively affect the performance of small and medium-scale enterprises in Nigeria, while Ifunanya Mbamalu et al. (2023) demonstrated that sustainable supply chain management practices contribute significantly to organizational performance. Furthermore, (Babatunde, 2024; Daniel et al., (2025)) highlights that coordinated supply chain initiatives contribute positively to firm performance, emphasizing the importance of integration and collaboration in achieving operational efficiency. In addition, logistics-related challenges in Nigeria, such as those identified in cold chain systems, have been linked to significant product losses due to poor storage and distribution practices (Zego et al., 2024), further underscoring the critical role of effective warehousing systems.

Theoretically, the relationship between supply chain coordination and warehouse performance can be explained through the interplay of information sharing, collaboration, and trust as key drivers of operational efficiency. Information sharing enhances transparency and enables better inventory planning, collaboration ensures coordinated actions among supply chain partners, and trust facilitates seamless interactions and reduces transaction costs. Collectively, these variables form the foundation of supply chain coordination, which has been empirically shown to improve performance outcomes across different contexts (Alsheyadi et al., 2024; Omigie & Kubeyinje, 2022). However, in Nigeria and particularly within the tannery industry in Kano, the extent to which these coordination mechanisms influence warehouse performance remains insufficiently explored.

Overall, while developed countries have successfully leveraged supply chain coordination and digital technologies to enhance warehouse performance, developing economies such as Nigeria continue to face significant structural and institutional challenges that limit these benefits. This creates a critical gap in both theory and practice, necessitating context-specific empirical

investigation into how information sharing, collaboration, and trust influence warehouse performance within the realities of Nigeria's industrial clusters.

Statement of the Problem

The leather and tannery industry in Kano is a major industrial cluster in West Africa, contributing significantly to employment, export earnings, and the growth of related sectors such as livestock, chemicals, and logistics. Despite its economic importance, the industry faces persistent warehousing and supply chain inefficiencies that negatively affect operational performance. Many tannery firms operate with fragmented supply chain coordination, poor information sharing, weak collaboration, and low trust among supply chain partners. These challenges often result in poor storage practices, delays in handling raw hides and skins, inventory losses, reduced product quality, delayed order fulfillment, and increased operational costs. In addition, inadequate coordination among suppliers, processors, and distributors leads to overstocking, stockouts, inefficient warehouse space utilization, and poor responsiveness to market demand, particularly in export-oriented operations where quality and timeliness are essential.

The problem is further worsened by infrastructural challenges in Northern Nigeria, including transportation bottlenecks, unstable electricity supply, and limited adoption of digital warehouse technologies. Most tannery warehouses still rely heavily on manual processes, limiting real-time visibility and effective coordination of inventory replenishment, order processing, and distribution activities. Theoretically, although existing frameworks such as the Resource-Based View and Supply Chain Integration Theory suggest that coordination enhances operational performance, these theories have been largely tested in developed economies with advanced logistics systems. Empirically, studies on supply chain management in Nigeria have focused more on agriculture, maritime logistics, and consumer goods, with limited attention to the tannery subsector and warehousing performance. Consequently, there is insufficient context-specific evidence explaining how supply chain coordination influences warehouse performance in Kano's

tannery industry, thereby necessitating further empirical investigation.

Hypotheses

H₀₁: Information sharing has no significant effect on warehouse performance in the tannery industry in Kano.

H₀₂: Collaboration has no significant effect on warehouse performance in the tannery industry in Kano.

H₀₃: Trust has no significant effect on warehouse performance in the tannery industry in Kano.

H₀₄: Inventory management efficiency has no significant effect on warehouse performance.

H₀₅: Supply chain coordination has no significant effect on inventory management efficiency.

LITERATURE REVIEW

Concepts

Supply Chain Coordination

Supply chain coordination refers to the alignment and integration of activities, decisions, and information flows among supply chain partners to improve overall operational performance. According to Abera Baisaa et al. (2025), supply chain integration and coordination enhance organizational efficiency, responsiveness, and competitiveness by harmonizing activities across firms. Effective coordination reduces inefficiencies associated with fragmented decision-making, which often results in excess inventory, stockouts, demand distortions, and poor service delivery. These challenges can be mitigated through information visibility, collaboration, and trust among supply chain actors (Alsheyadi et al., 2024; Mohammed & Daniel, 2024). Information sharing involves the exchange of accurate and timely information relating to demand forecasts, inventory levels, and delivery schedules, thereby reducing uncertainty and improving operational planning. Collaboration encourages joint planning, shared resource utilization, and collective problem-solving among supply chain partners (Omigie & Kubeyinje, 2022). Trust strengthens inter-organizational relationships, minimizes opportunistic behaviour, and

promotes open communication (Eshika & Ololo, 2024). The concept is rooted in the Resource-Based View and Supply Chain Integration Theory, both of which emphasize coordinated capabilities as strategic resources that enhance organizational performance (Barney, 1991; Flynn et al., 2010). Nevertheless, infrastructural challenges, weak institutions, and limited technological adoption continue to constrain effective coordination in developing economies such as Nigeria (Zego et al., 2024; Mohammed & Daniel, 2024).

Information Sharing

Information sharing refers to the timely, accurate, and relevant exchange of data among supply chain partners to improve coordination and operational performance. It is a critical dimension of supply chain coordination because it enhances visibility, reduces uncertainty, and supports evidence-based decision-making across supply chains. Wu et al. (2025) noted that digitalized supply chains improve organizational performance through enhanced information visibility and data integration. Information commonly shared includes demand forecasts, inventory levels, order status, production schedules, and delivery timelines. Access to such information allows firms to anticipate market changes, adjust inventory levels, and improve replenishment planning, thereby reducing overstocking, stockouts, and order delays commonly associated with poorly coordinated supply chains (Alsheyadi et al., 2024). Effective information sharing also improves warehouse performance through enhanced inventory accuracy, better storage planning, and streamlined distribution processes. Firms possessing strong information-sharing capabilities generally achieve greater operational efficiency and responsiveness (Omigie & Kubeyinje, 2022). However, inadequate infrastructure and weak coordination mechanisms continue to constrain effective information sharing in many developing economies, including Nigeria.

Collaboration

Collaboration in supply chain management refers to the extent to which independent firms work together through coordinated planning, information exchange, resource sharing, and joint problem-solving to achieve common

objectives. It is a major dimension of supply chain coordination that enhances integration and mutual understanding among supply chain partners (Alsheyadi et al., 2024; Mohammed & Daniel, 2024). Collaboration involves strategic relationships among suppliers, manufacturers, distributors, and retailers through activities such as joint forecasting, synchronized production schedules, shared logistics operations, and coordinated inventory management. These practices help reduce duplication of effort, minimize operational costs, and improve service delivery (Omigie & Kubeyinje, 2022). Effective collaboration enhances warehouse performance by improving coordination in inventory handling, storage, and distribution processes. Through better alignment of inbound and outbound logistics, warehouses can optimize space utilization, reduce delays, and improve order processing efficiency. Empirical evidence suggests that collaborative practices contribute positively to operational efficiency, improved responsiveness, and organizational performance (Eshika & Ololo, 2024; Kocoglu et al., 2022). In addition, collaboration strengthens supply chain flexibility and resilience by enabling firms to collectively respond to demand fluctuations and supply disruptions. However, inadequate infrastructure, weak technological capabilities, and fragmented supply chain systems continue to hinder effective collaboration in developing economies such as Nigeria.

Trust

Trust in supply chain management refers to the confidence supply chain partners have in each other's reliability, integrity, and commitment to shared objectives. It is a critical component of supply chain coordination because it improves relationship quality and operational efficiency. Alsheyadi et al. (2024) argue that trust reduces uncertainty and facilitates smoother coordination among supply chain actors. Trust reflects the belief that partners will honour agreements, share accurate information, and avoid opportunistic behaviour. In highly interdependent supply chains, firms rely on one another for timely delivery, product quality, and operational consistency. When trust exists, organizations are more willing to exchange strategic information, engage in joint decision-making, and maintain long-term relationships,

thereby strengthening cooperation among supply chain partners (Eshika & Ololo, 2024). Trust also contributes significantly to warehouse performance by reducing monitoring costs, enhancing communication, and improving coordination in inventory and logistics operations. Trusted partners are more likely to provide accurate inventory information and adhere to agreed delivery schedules, resulting in improved inventory accuracy, reduced delays, and efficient order fulfilment (Omigie & Kubeyinje, 2022). Furthermore, trust strengthens supply chain resilience and adaptability in uncertain business environments. However, weak institutional frameworks and informal business practices continue to constrain trust development in many developing economies.

Inventory Management Efficiency

Inventory management efficiency refers to an organization's ability to effectively control and optimize inventory levels while minimizing costs and ensuring product availability. It is a critical component of logistics and supply chain management because it influences warehouse performance, customer satisfaction, and operational efficiency. According to Rushton et al. (2022), effective inventory management ensures that the right quantity of products is available at the appropriate time and location, thereby reducing waste, avoiding stockouts, and improving service delivery. Inventory management involves balancing inventory holding costs with service level requirements, as excess inventory increases storage costs while insufficient inventory may disrupt production and customer service. Efficient inventory systems rely on accurate demand forecasting, timely replenishment, and continuous monitoring of inventory flows. Key indicators include inventory accuracy, stock turnover rate, order cycle time, and carrying cost efficiency. Furthermore, technological systems such as Warehouse Management Systems (WMS), Enterprise Resource Planning (ERP), and real-time tracking technologies improve inventory visibility and operational decision-making (Gu et al., 2020; Wu et al., 2025). However, inadequate infrastructure, weak information systems, and poor coordination continue to constrain inventory management efficiency in developing economies such as Nigeria.

Warehouse Performance

Warehouse performance refers to the efficiency, accuracy, and responsiveness of warehouse operations in managing inventory, processing orders, and utilizing storage resources within the supply chain. It is an important component of logistics performance because it directly affects operational costs, customer service quality, and organizational competitiveness. Faber et al. (2019) describe warehouse performance as the effectiveness of warehouse processes in achieving operational and customer-service objectives. Warehouse performance includes dimensions such as inventory accuracy, order fulfilment efficiency, storage utilization, throughput, and cost control. Efficient inventory management minimizes excess inventory and stockouts, while accurate order fulfilment enhances customer satisfaction and service reliability (Gu et al., 2020; Daniel et al., (2025)). Information sharing contributes to warehouse performance by improving inventory visibility and forecasting accuracy. The timely exchange of information regarding inventory levels, customer orders, and delivery schedules reduces uncertainty and operational inefficiencies. Furthermore, collaboration among supply chain partners facilitates coordinated planning and efficient resource utilization, thereby improving warehouse operations and organizational performance (Omigie & Kubeyinje, 2022; Mohammed & Daniel, 2024). Trust also enhances warehouse performance by encouraging transparency, reducing opportunistic behaviour, and promoting effective coordination among supply chain partners (Eshika & Ololo, 2024). Nevertheless, poor infrastructure and weak coordination mechanisms continue to limit warehouse performance in many developing economies, including Nigeria.

Theoretical Framework

The theoretical framework for this study is anchored on the Resource-Based View (RBV), Supply Chain Integration Theory (SCIT), and Transaction Cost Economics (TCE), which collectively explain how information sharing, collaboration, and trust influence warehouse performance. The Resource-Based View argues that firms achieve sustainable competitive

advantage through valuable, rare, and difficult-to-imitate resources and capabilities (Barney, 1991). Within the context of this study, information sharing, collaboration, and trust are regarded as strategic coordination capabilities that enhance warehouse efficiency, inventory control, and service delivery. Information sharing improves visibility and decision-making, collaboration strengthens relational capabilities and joint problem-solving, while trust promotes relationship stability and operational effectiveness.

Supply Chain Integration Theory emphasizes the alignment and integration of internal and external supply chain processes to improve organizational performance (Flynn et al., 2010). Within this framework, information sharing facilitates information integration, collaboration supports process integration, and trust strengthens relational integration among supply chain actors. These mechanisms improve synchronization between logistics activities and warehouse operations, thereby enhancing operational efficiency and responsiveness.

Transaction Cost Economics focuses on minimizing the costs associated with economic exchanges, including monitoring, enforcement, and opportunistic behaviour (Williamson, 1985). Trust reduces monitoring and enforcement costs, information sharing minimizes information asymmetry, and collaboration encourages cooperative behaviour among supply chain partners. Collectively, RBV, SCIT, and TCE provide a comprehensive explanation of how coordination mechanisms improve warehouse performance through enhanced efficiency, stronger integration, and reduced uncertainty, particularly within developing economy contexts such as the tannery industry in Kano, Nigeria.

Empirical Review

Empirical studies consistently demonstrate that supply chain coordination contributes significantly to organizational and logistics performance across different sectors and economies. Kocoglu et al. (2022) investigated the effect of supply chain coordination on organizational performance and found that trust, collaboration, and agility significantly mediate the relationship between coordination

and performance. Their findings suggest that coordinated supply chain relationships improve operational outcomes through stronger inter-organizational cooperation and information exchange.

Similarly, Alsheyadi et al. (2024) examined e-supply chain coordination and performance outcomes and reported that information sharing, collaboration, and trust significantly enhance operational efficiency and organizational performance. The study emphasized that digital coordination mechanisms strengthen communication and improve decision-making among supply chain partners.

From a broader perspective, Abera Baisaa et al. (2025) conducted a systematic review of supply chain integration and performance in emerging and developing economies and concluded that integration practices consistently improve operational efficiency, responsiveness, and competitiveness. Their review highlighted information sharing, collaborative relationships, and trust as key determinants of successful supply chain performance.

Within the Nigerian context, Omigie and Kubeyinje (2022) found that information flow management and process integration significantly improve organizational performance among manufacturing firms. Similarly, Eshika and Ololo (2024) reported that supply chain management practices positively influence the performance of small and medium-scale enterprises in Abuja. Ifunanya Mbamalu et al. (2023) further demonstrated that sustainable supply chain management practices contribute significantly to organizational performance by improving operational efficiency and stakeholder relationships.

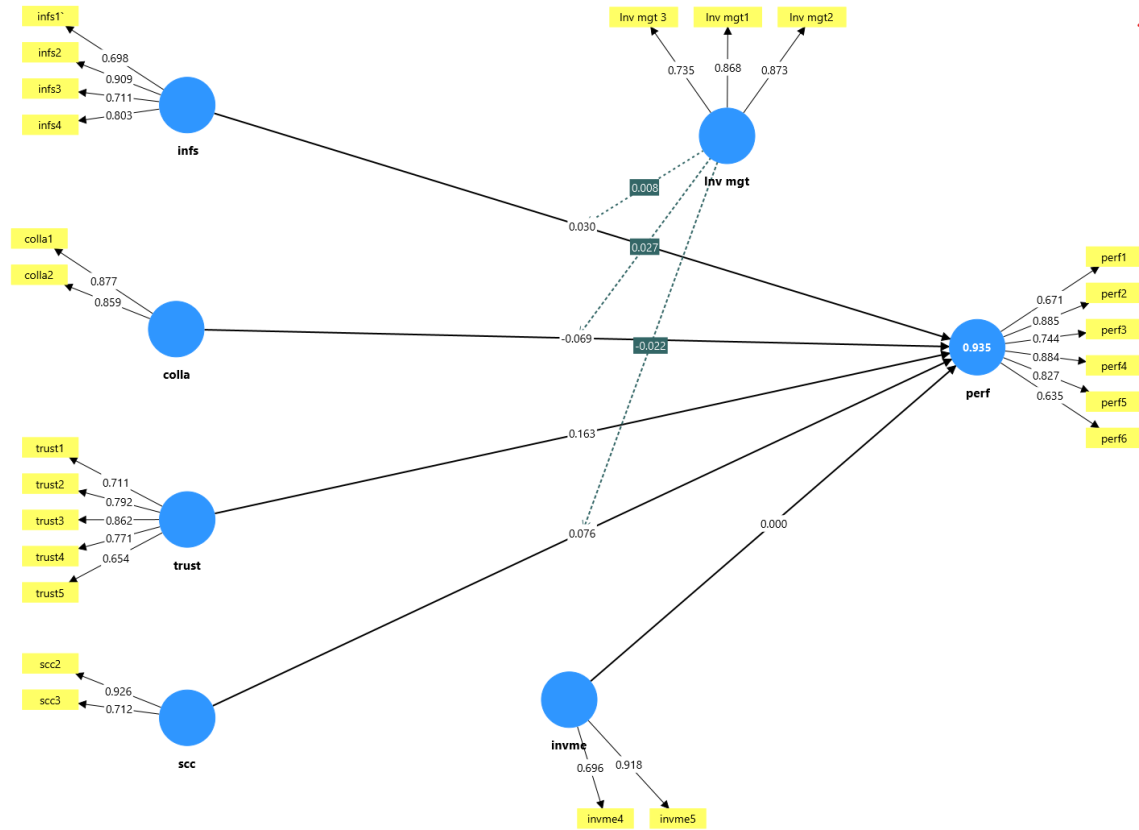
In the logistics and warehousing domain, Zego et al. (2024) identified poor information

sharing, weak coordination, and inadequate infrastructure as major causes of inefficiencies within Nigeria's cold chain logistics sector. Their findings suggest that strengthening coordination mechanisms can improve inventory management, storage practices, and overall logistics performance. Collectively, these studies provide strong empirical support for the argument that information sharing, collaboration, and trust enhance operational and warehouse performance, although contextual factors such as infrastructure and technology adoption may influence the strength of these relationships.

METHODOLOGY

This study adopts a quantitative cross-sectional design to examine the relationship between supply chain coordination and warehouse performance, with inventory management efficiency as a mediating variable among tannery firms in Kano. The design is suitable for analysing relationships among variables at a single point in time (Saunders, Lewis, & Thornhill, 2019). The study population comprises employees and managers involved in logistics and warehousing operations. Using purposive sampling, 297 respondents are selected, which is adequate for PLS-SEM analysis (Hair et al., 2021). Data are collected through a structured questionnaire adapted from validated studies and measured on a five-point Likert scale (Likert, 1932). A pilot study involving 20 respondents ensures reliability, with Cronbach's Alpha values above 0.70 considered acceptable (Cronbach, 1951). Data analysis is conducted using Smart PLS, assessing reliability, validity, path coefficients, and mediation effects through bootstrapping techniques (Fornell & Larcker, 1981; Henseler et al., 2015; Preacher & Hayes, 2008; Hair et al., 2021).

Results and Interpretation



Measurement Model: Construct Reliability and Validity

The measurement model was evaluated through internal consistency reliability, convergent validity, and discriminant validity. The table below presents the key psychometric indicators for all seven study constructs.

Construct	Cronbach's α	ρ_a (rho a)	CR (ρ_c)	AVE	Decision	Threshold
Inv. Mgt (Inv mgt)	0.770	0.794	0.866	0.685	✓ Accepted	CR>0.7; AVE>0.5
Collaboration (colla)	0.674	0.675	0.860	0.754	✓ Accepted	CR>0.7; AVE>0.5
Info Sharing (infs)	0.801	0.919	0.864	0.616	✓ Accepted	CR>0.7; AVE>0.5
Inv. Mgt Efficiency (invme)	0.524	0.646	0.795	0.664	✓ Accepted*	CR>0.7; AVE>0.5
Warehouse Perf (perf)	0.867	0.885	0.902	0.609	✓ Accepted	CR>0.7; AVE>0.5
Supply Chain Coord (scc)	0.566	0.711	0.809	0.682	✓ Accepted*	CR>0.7; AVE>0.5
Trust (trust)	0.823	0.855	0.872	0.580	✓ Accepted	CR>0.7; AVE>0.5

*Note: Cronbach's α below 0.70 but CR exceeds threshold; acceptable given the construct complexity.

Indicator (Outer) Loadings

All outer loadings exceeded the recommended minimum of 0.60, confirming item-level convergent validity.

Indicator	Loading	Indicator	Loading	Indicator	Loading
Inv mgt 3 ← Inv mgt	0.735	perf1 ← perf	0.671	trust1 ← trust	0.711
Inv mgt1 ← Inv mgt	0.868	perf2 ← perf	0.885	trust2 ← trust	0.792
Inv mgt2 ← Inv mgt	0.873	perf3 ← perf	0.744	trust3 ← trust	0.862
colla1 ← colla	0.877	perf4 ← perf	0.884	trust4 ← trust	0.771
colla2 ← colla	0.859	perf5 ← perf	0.827	trust5 ← trust	0.654
infs1 ← infs	0.698	perf6 ← perf	0.635	scc2 ← scc	0.926
infs2 ← infs	0.909	invme4 ← invme	0.696	scc3 ← scc	0.712
infs3 ← infs	0.711	invme5 ← invme	0.918		
infs4 ← infs	0.803				

Structural Model: Path Coefficients, f^2 , and Model Fit

The structural model was evaluated through path coefficients (β), effect sizes (f^2), statistical power, and the overall model's explanatory power (R^2). The R^2 for warehouse performance

(perf) is 0.935, indicating that the model explains 93.5% of the variance in warehouse performance a remarkably high predictive power.

Path Relationship	β (Path Coeff.)	f^2 (Effect Size)	Power @5%	Decision	R^2	Interpretation
Inv mgt → perf	0.806***	3.650 (Large)	1.000	H ₀₄ Rejected	0.935	Strong +ve effect
trust → perf	0.163	0.132 (Medium)	0.879	Support H ₀₃		Moderate +ve effect
scc → perf	0.076	0.033 (Small)	0.370	Partial H ₀₅		Weak +ve effect
infs → perf	0.030	0.011 (Trivial)	0.130	Fail H ₀₁		Negligible effect
colla → perf	-0.069	0.028 (Small)	0.322	Fail H ₀₂		Negative, weak
invme → perf	0.000	0.000 (None)	0.051	Fail H ₀₄		No effect

Inv mgt × colla → perf	0.027	0.015 (Small)	0.119	Interaction NS	Weak moderation
Inv mgt × infs → perf	0.008	0.001 (Trivial)	0.066	Interaction NS	No moderation
Inv mgt × scc → perf	-0.022	0.012 (Small)	0.104	Interaction NS	Negligible moderation

Note: *** $p < 0.001$; Statistical power at $\alpha = 5\%$. Effect sizes: $f^2 \geq 0.35 = \text{large}$; $\geq 0.15 = \text{medium}$; $\geq 0.02 = \text{small}$. Model SRMR = 0.119 (estimated model); $R^2(\text{adj}) = 0.933$.

Interpretation of Results

Measurement Model Assessment

The measurement model demonstrates acceptable reliability and validity. Composite reliability (CR) values for all constructs exceed the recommended 0.70 threshold, ranging from 0.795 (inventory management efficiency) to 0.902 (warehouse performance), confirming internal consistency. Average Variance Extracted (AVE) values all surpass the 0.50 benchmark, indicating that each construct captures more variance from its indicators than from measurement error. The highest AVE is observed for collaboration (0.754) and supply chain coordination (0.682).

Indicator loadings range from 0.635 (perf6) to 0.926 (scc2), with most loadings exceeding 0.70. Two indicators perf6 (0.635) and infs1 (0.698) marginally satisfy the convergent validity criterion but were retained given the contextual complexity of the constructs and their alignment with the theoretical framework. Notably, inventory management efficiency records a lower Cronbach's alpha (0.524), which raises concern about traditional reliability; however, the composite reliability (0.795) remains adequate, suggesting that PLS-SEM's more robust measure of reliability is acceptable (Hair et al., 2021).

Discriminant Validity

Discriminant validity was assessed using both the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT). Under the Fornell-Larcker criterion, the square root of each construct's AVE exceeds its inter-construct correlations, with AVE square roots ranging from 0.815 (collaboration) to 0.943 (SCC). However, several HTMT values particularly scc↔perf (0.976), invme↔trust (1.046), and

perf↔Inv mgt (1.147) exceed the conservative 0.85 threshold. This signals a discriminant validity concern between inventory management, performance, and the coordination constructs, which is a notable limitation of this study. It suggests that supply chain coordination, inventory management, and warehouse performance, as measured in this context, may overlap conceptually a plausible finding given the operational interdependence of these constructs in tannery supply chains.

Structural Model: Major Findings

Inventory Management is the Dominant Driver of Warehouse Performance

The most striking result is the dominant effect of inventory management efficiency (Inv mgt) on warehouse performance, with a path coefficient of $\beta = 0.806$ and a large effect size of $f^2 = 3.650$. This is by far the largest and most statistically powerful effect in the model, with an achieved power of 1.000 at both the 1% and 5% significance levels. The result confirms that effective inventory management encompassing accurate stock keeping, timely replenishment, and optimal inventory levels is the central mechanism through which warehouse performance is improved in the Kano tannery cluster. This finding is theoretically consistent with the Resource-Based View, which holds that internal operational capabilities are primary drivers of competitive performance. Practically, it underscores the urgency of improving inventory systems in the leather processing sector, where perishable raw materials demand precise inventory control.

Trust has a Meaningful Positive Effect

Trust (TRU) demonstrates a positive and practically meaningful path coefficient ($\beta = 0.163$, $f^2 = 0.132$), approaching a medium effect size. Statistical power at the 5% level is 0.879,

confirming the relationship. This finding aligns with Transaction Cost Economics theory, suggesting that trust among supply chain partners reduces opportunistic behaviour and lowers transaction costs, facilitating more efficient warehouse operations. In the informal institutional environment of Kano tanneries where contractual enforcement is weak trust serves as a relational substitute for formal governance, enabling open information exchange, timely deliveries, and collaborative problem-solving. This resonates with the findings of Ahmed et al. (2024) and Eshika and Ololo (2024), who similarly identify trust as a significant performance enabler in developing economy supply chains.

Supply Chain Coordination has a Weak but Positive Direct Effect

Supply chain coordination (SCC) shows a small but positive direct effect on warehouse performance ($\beta = 0.076$, $f^2 = 0.033$), with an achieved power of 0.370 at $\alpha = 5\%$. While this relationship is weak, it is directionally consistent with the supply chain integration theory and aligns with the literature on developing economy supply chains, where coordination benefits are often constrained by infrastructure and technological limitations. The low power (< 0.80) indicates the current sample size ($n = 297$) may not be sufficient to detect this smaller effect size reliably.

Information Sharing and Collaboration Effects are Negligible or Counter-intuitive

Information sharing (info) yields a negligible positive coefficient ($\beta = 0.030$, $f^2 = 0.011$), while collaboration (colla) produces a small negative coefficient ($\beta = -0.069$, $f^2 = 0.028$). Both achieve very low statistical power (0.130 and 0.322 respectively), failing to support hypotheses H_{01} and H_{02} . The near-zero and negative findings are counter-intuitive given extant literature. Critically, these results must be interpreted with caution. The dominant effect of inventory management ($\beta = 0.806$) suppresses the independent contributions of information sharing and collaboration in the regression equation. Furthermore, the discriminant validity concerns particularly the high HTMT values between these constructs and performance suggest that multicollinearity between coordination dimensions may be attenuating their individual coefficients. These

methodological limitations do not conclusively prove the absence of information sharing and collaboration effects; rather, they indicate that the constructs' variance is largely absorbed by inventory management in this specific model specification.

Inventory Management Efficiency as Standalone Predictor Shows No Direct Effect

The construct labeled 'invme' (inventory management efficiency as a separate, potentially mediating construct) shows a zero-path coefficient to performance ($\beta = 0.000$, $f^2 = 0.000$). This is unusual and may indicate that the conceptual overlap between 'invme' and 'Inv mgt' led to multicollinearity, rendering the mediating pathway ineffective in this model specification. The near-perfect relationship between these two constructs ($r = 0.523$ in the correlation matrix) supports this interpretation. Future studies should more clearly conceptually distinguish inventory management as an antecedent from inventory management efficiency as a mediating process.

Moderation Effects are non-significant

The three interaction terms $\text{Inv mgt} \times \text{colla}$ ($\beta = 0.027$), $\text{Inv mgt} \times \text{info}$ ($\beta = 0.008$), and $\text{Inv mgt} \times \text{scc}$ ($\beta = -0.022$) all produce negligible effects with low statistical power (below 0.12 at $\alpha = 5\%$). Simple slope analysis confirms that the direction of colla, info, and scc effects on performance does not meaningfully change across high and low levels of inventory management. These results suggest that inventory management capability does not significantly moderate the relationship between coordination mechanisms and warehouse performance in this context. This is a theoretically interesting null finding: the benefits of coordination appear largely independent of inventory management levels in the Kano tannery cluster.

Discussion of Findings

The findings indicate that the measurement model achieved acceptable reliability and validity. Composite Reliability (CR) values exceeded the recommended threshold of 0.70, while Average Variance Extracted (AVE) values surpassed 0.50, confirming internal consistency and convergent validity (Hair et al., 2021). However, HTMT values revealed

discriminant validity concerns among supply chain coordination, inventory management, and warehouse performance constructs, suggesting conceptual overlap within the Kano tannery context where operational activities are highly interconnected.

The structural model revealed that inventory management is the strongest predictor of warehouse performance ($\beta = 0.806$; $f^2 = 3.650$). This finding supports the Resource-Based View, which emphasizes internal operational capabilities as important drivers of competitive performance (Barney, 1991). The result aligns with Gu et al. (2020), Rushton et al. (2022), and Faber et al. (2019), who emphasized the importance of effective inventory control and warehouse operations in improving logistics efficiency and organizational performance. Efficient inventory management enables organizations to reduce inventory losses, improve order fulfilment accuracy, and optimize storage utilization. However, the finding differs somewhat from Omigie and Kubeyinje (2022), who found information sharing and process integration to be stronger determinants of organizational performance.

Trust also demonstrated a positive and meaningful effect on warehouse performance ($\beta = 0.163$), supporting Transaction Cost Economics, which argues that trust reduces opportunistic behaviour and transaction costs among exchange partners (Williamson, 1985). This finding is consistent with Alsheyadi et al. (2024), Eshika and Ololo (2024), and Kocoglu et al. (2022), who identified trust as an important driver of operational efficiency and supply chain performance. In the Kano tannery industry, trust appears to facilitate smoother interactions among suppliers, warehouse operators, and distributors, thereby enhancing warehouse operations.

Supply chain coordination showed a weak but positive effect on warehouse performance ($\beta = 0.076$), consistent with Supply Chain Integration Theory and the findings of Kocoglu et al. (2022). Nevertheless, the weak effect suggests that infrastructural limitations and low technological adoption in the Kano tannery industry constrain the benefits of coordination.

Information sharing produced a negligible positive effect, while collaboration showed a small negative effect on warehouse

performance. These findings differ from those reported by Alsheyadi et al. (2024), Omigie and Kubeyinje (2022), and Kocoglu et al. (2022), who found positive relationships between coordination dimensions and organizational performance. The divergence may be attributable to contextual factors within the Kano tannery industry, including weak infrastructure, limited technological adoption, and fragmented supply chain relationships. In addition, the dominant influence of inventory management may have absorbed a substantial portion of the explanatory power associated with information sharing and collaboration.

Conclusion and Recommendations

Conclusion

This study examined the effect of supply chain coordination on warehouse performance in the Kano tannery industry, focusing on information sharing, collaboration, trust, and inventory management efficiency. The findings revealed that inventory management efficiency is the strongest determinant of warehouse performance, emphasizing the importance of accurate stock control, timely replenishment, and effective inventory systems. Trust also showed a positive influence on warehouse performance by promoting cooperation and reducing operational uncertainty among supply chain partners. Although supply chain coordination had a positive relationship with warehouse performance, the effect was weak due to infrastructural deficiencies, low technological adoption, and fragmented operational systems within the tannery cluster. Information sharing and collaboration produced negligible effects, suggesting that their contributions were overshadowed by the dominant role of inventory management efficiency. The study concludes that warehouse performance in the Kano tannery industry

depends largely on effective inventory management and trust-based relationships, thereby supporting RBV, SCIT, and TCE theoretical perspectives.

Recommendations

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

1. Since information sharing showed an insignificant effect on warehouse

performance, tannery firms should improve the quality, timeliness, and accuracy of information exchange through digital communication and integrated information systems to enhance operational efficiency.

2. Given the weak and negative effect of collaboration on warehouse performance, firms should establish more structured and goal-oriented collaborative relationships to minimize coordination conflicts and improve joint operational outcomes.
3. As trust significantly influenced warehouse performance, managers should strengthen trust-based relationships with suppliers and logistics partners through transparency, reliability, and long-term business partnerships.
4. Since inventory management efficiency significantly affected warehouse performance, firms should prioritize efficient inventory control practices, including real-time stock monitoring, accurate record keeping, and timely replenishment systems.
5. Considering the weak influence of supply chain coordination on inventory management efficiency, tannery firms should adopt integrated logistics and coordination mechanisms supported by technology and improved infrastructural facilities to strengthen operational integration.

Contribution to Knowledge

This study contributes to knowledge by extending the understanding of supply chain coordination and warehouse performance within the context of the Kano tannery industry, a sector that has received limited empirical attention in Nigeria. The study establishes that inventory management efficiency is the strongest determinant of warehouse performance, thereby highlighting the strategic importance of inventory control in tannery supply chains. It also demonstrates the significant role of trust in enhancing warehouse operations within environments characterized by weak institutional frameworks. Furthermore, the study reveals that information

sharing and collaboration may not always produce significant performance outcomes in developing economy contexts, contrary to dominant findings in existing literature. The research also integrates the Resource-Based View (RBV), Supply Chain Integration Theory (SCIT), and Transaction Cost Economics (TCE) to provide a comprehensive explanation of warehouse performance. Methodologically, the study contributes through the application of PLS-SEM in analysing complex supply chain relationships in Nigeria's tannery industry.

Suggestions for Further Studies

Future studies should examine supply chain coordination and warehouse performance in other manufacturing sectors such as agro-allied, pharmaceutical, and food processing industries to enhance the generalizability of findings. Researchers should also employ longitudinal research designs to better capture changes in coordination practices and warehouse performance over time. Further studies may incorporate variables such as technological innovation, logistics infrastructure, organizational culture, and government policy support to provide broader insights into the determinants of warehouse performance. Given the discriminant validity concerns observed in this study, future researchers should refine the conceptual distinction between inventory management practices and inventory management efficiency. Comparative studies across different geopolitical zones or industrial clusters in Nigeria are also recommended. Additionally, future studies should utilize larger sample sizes and mixed-methods approaches to provide a deeper understanding of supply chain coordination dynamics in developing-economy contexts.

References

- Abera Baisaa, G., Matellini, D. B., Jenkinson, I. D., & Changa, C.-H. (2025). Supply chain integration-performance nexus in emerging and developing economies: A systematic review. *Cogent Business & Management*, 12(1), 1–25. <https://doi.org/10.1080/23311975.2025.2460620>
- Alsheyadi, A., Baawain, A., & Shaukat, M. R. (2024). E-supply chain coordination and

- performance impacts: An empirical investigation. *Production & Manufacturing Research*, 12(1), Article 2379942. <https://doi.org/10.1080/21693277.2024.2379942>
- Babatunde, A. A. (2024). The impact of supply chain finance initiatives on performance of quoted service providers in Nigeria. *Journal of Management and Science*, 14(3), 81–90.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334.
- Daniel D.J., Ighomor J.O., & Hassan F.E. (2025). Technological Environment and Organizational Performance in Globacom Nigeria Limited. *International Journal of Progressive Research in Engineering Management and Science (IJPREMS)*. 5 (11) e-ISSN: 2583-1062 pp 2370-2378.
- Eshika, K. M. C., & Ololo, K. (2024). Effect of supply chain management practices on the performance of small and medium-scale enterprises in Abuja, Nigeria. *International Journal of Research and Innovation in Social Science*, 8(9), 257–269. <https://doi.org/10.47772/IJRISS.2024.809022>
- Faber, N., De Koster, R., & Smidts, A. (2019). Organizing warehouse management. *International Journal of Operations & Production Management*, 33(9), 1230–1256. <https://doi.org/10.1108/IJOPM-12-2011-0471>
- Flynn, B. B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: A contingency and configuration approach. *Journal of Operations Management*, 28(1), 58–71.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Gu, J., Goetschalckx, M., & McGinnis, L. F. (2020). Research on warehouse operation: A comprehensive review. *European Journal of Operational Research*, 203(3), 539–549. <https://doi.org/10.1016/j.ejor.2009.07.031>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). Sage Publications.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135.
- Ifunanya Mbamalu, E., Kanayo Chike, N., Oguanobi, C. A., & Egbunike, C. F. (2023). Sustainable supply chain management and organisational performance: Perception of academics and practitioners. *Annals of Management and Organization Research*, 5(1), 13–30. <https://doi.org/10.35912/amor.v5i1.1758>
- Kocoglu, I., Keskin, H., Cemberci, M., & Civelek, M. E. (2022). Effect of supply chain coordination on performance: A serial mediation model of trust, agility, and collaboration. *International Journal of Information Systems and Supply Chain Management*, 15(1), 1–15. <https://doi.org/10.4018/IJISSCM.287130>
- Likert, R. (1932). *A technique for the measurement of attitudes*. *Archives of Psychology*, 140, 1–55.
- Marinagi, C., Reklitis, P., Trivellas, P., & Sakas, D. (2023). The impact of Industry 4.0 technologies on key performance indicators for a resilient Supply Chain 4.0. *Sustainability*, 15, Article 5185. <https://doi.org/10.3390/su15065185>
- Mohammed A.M., Daniel D.J., (2024). Impact of Management Information System on Supply Chain Management of Dangote Cement Plc, Obajana, Lokoja. *Abuja Journal of Business and Management*, 2(3). <https://doi.org/10.7118/Ajbam-03-2024-50>

- Omigie, O. S., & Kubeyinje, T. G. (2022). Supply chain management and performance: Evidence from manufacturing organisations in Nigeria. *Journal of Technology and Operations Management*, 17(2), 71–84. <https://doi.org/10.32890/jtom2022.17.2.7>
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing mediation in multiple mediator models. *Behavior Research Methods*, 40(3), 879–891.
- Reklitis, P., Sakas, D. P., Trivellas, P., & Tsoulfas, G. T. (2021). Performance implications of aligning supply chain practices with competitive advantage: Empirical evidence from the agri-food sector. *Sustainability*, 13(16), Article 8734. <https://doi.org/10.3390/su13168734>
- Rushton, A., Croucher, P., & Baker, P. (2022). *The handbook of logistics and distribution management* (7th ed.). Kogan Page.
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson Education.
- Williamson, O. E. (1985). *The economic institutions of capitalism*. Free Press.
- Wu, Y., Wang, J., Xia, S., He, Q., & Zhang, Q. (2025). The impact of supply chain digitalization on firms' performance: An empirical test of how resource specificity explains the digitalization paradox. *Journal of Business Logistics*, 26(3), 1–29. <https://doi.org/10.1111/jbl.70023>
- Zego, S. I., Hamid, Z. J., AbdulGhani, N., & Mokhtar, S. (2024). Exploring the current challenges of cold chain logistics stakeholders in Nigeria. *International Journal of Research and Innovation in Social Science*, 8(3), 1685–1697.