

ROLE OF SUPPLY CHAIN COLLABORATION ON OPERATIONAL PERFORMANCE OF MANUFACTURING FIRMS IN NAIROBI COUNTY, KENYA

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ABSTRACT

Supply chain collaboration has become a critical focus for manufacturing firms facing increasing disruptions that threaten operational performance. In an increasingly volatile global market, supply chain disruptions have become a persistent challenge for manufacturing firms, particularly in developing economies. Geopolitical conflicts, economic uncertainties, logistical bottlenecks, and infrastructural inefficiencies have significantly impacted the supply chain networks for manufacturers, leading to increased operational costs, production delays, and decreased competitiveness. This study examines the role of supply chain collaboration on operational performance of manufacturing firms in Nairobi County, Kenya. Supply chain Collaboration strategies, including resource Sharing, strategic supplier partnerships, information sharing, incentive alignment and collaborative demand forecasting were assessed for their role on operational performance of manufacturing firms. This study employed a descriptive research design. Data were collected using structured questionnaires administered to 240 manufacturing firms. The gathered data were then analyzed with the Statistical Package for Social Sciences (SPSS), and Pearson correlation analysis revealed a strong, positive relationship between supply chain collaboration and the operational performance of these firms.. The findings underscore the importance of fostering trust, transparency, and technological integration among supply chain partners to optimize resource utilization and responsiveness. The study recommends that manufacturing firms enhance supply chain collaboration to strengthen operational performance, improve competitiveness, and mitigate the impact of disruptions. These insights provide valuable guidance for industry leaders, policymakers, and researchers seeking to develop robust supply chain frameworks.

Keywords: Supply chain collaboration, supply chain disruptions, supply chain networks, Operational Performance of manufacturing firm.

1.0 INTRODUCTION

In an era characterized by increasing global competition, supply chain disruptions, and rapidly changing market dynamics, supply chain collaboration has emerged as a critical strategy for enhancing firm operational performance. Collaboration in supply chain management is a coordinated effort of supply chain partners such as suppliers, manufacturers, distributors and customers to share information, resources, and responsibilities to achieve mutual benefits Baah & Faibil, D. (2022). This strategic approach fosters transparency, trust, and agility, enabling firms to anticipate and respond effectively to disruptions while maintaining operational efficiency.

Collaboration in supply chains can take various forms, including strategic partnerships, joint decision-making, resource-sharing, and synchronized planning. These collaborative practices enhance supply chain flexibility, reduce lead times, and improve responsiveness to market fluctuations. Research indicates that firms that engage in strong collaboration strategies experience higher levels of supply chain visibility and risk mitigation, leading to better overall

performance (Bag et al., 2024). For instance, effective collaboration between suppliers and manufacturers can result in more accurate demand forecasting, optimized inventory management, and reduced production bottlenecks, ultimately improving efficiency and customer satisfaction (Mahfudz et al., 2025).

One of the fundamental components of supply chain collaboration is information sharing, which plays a crucial role in improving supply chain coordination. Transparent communication among supply chain partners enables real-time decision-making, enhances demand forecasting accuracy, and reduces the risk of stock-outs or excess inventory Ghosh & Abotaleb, M. (2024). Furthermore, incentive alignment between supply chain entities ensures that all parties are working toward common goals, fostering long-term cooperation and minimizing conflicts (Cao & Tao, 2025).

Despite its benefits, supply chain collaboration is not without challenges. Trust deficits, organizational silos, and reluctance to share sensitive data often hinder effective collaboration, especially in highly competitive industries (Holloway, 2025). Additionally, technological barriers and inadequate digital integration can limit seamless communication and data exchange between supply chain partners (Huang et al., 2023). Overcoming these challenges requires firms to invest in relationship management, digital transformation, and governance frameworks that facilitate collaborative engagements.

Given the growing importance of supply chain collaboration in the wake of increased supply chain disruptions, this study sought to explore its role on the operational performance of manufacturing firms. By analyzing key dimensions such as resource Sharing, strategic supplier partnerships, information sharing, incentive alignment and decision Synchronization, this research aims to provide insights into best practices that can enhance supply chain efficiency and long-term competitiveness.

1.1 Statement of the Problem

In today's highly interconnected and volatile global market, supply chain disruptions have become increasingly rampant, posing significant challenges for manufacturing firms. These disruptions stem from a range of factors, including geopolitical conflicts, economic uncertainties, natural calamities, logistical bottlenecks, and infrastructural inefficiencies. The impact of such disruptions has been particularly severe in developing economies like Kenya, where supply chain vulnerabilities have led to increased operational costs, prolonged production downtimes, and even business closures. While some firms have struggled to withstand these shocks leading to shutdowns and reduced industrial output others have managed to remain resilient and sustain their operations, raising critical questions about the strategies that enable firms to navigate disruptions successfully.

One of the key yet underexplored strategies for enhancing firms operational performance is supply chain collaboration, the ability of firms to work closely with supply chain partners, share critical information, and jointly develop contingency plans to mitigate disruptions. Supply chain collaboration fosters transparency, trust, and agility, enabling firms to anticipate risks and respond effectively to unforeseen challenges. Research suggests that firms that engage in strong collaboration with suppliers, logistics providers, and other stakeholders benefit from improved supply chain visibility, reduced lead times, and optimized resource allocation, ultimately enhancing operational performance (Bag et al., 2024). However, in the Kenyan manufacturing sector, collaboration remains a challenge due to fragmented supply chains, lack of trust among stakeholders, and inadequate technological integration (Achoki, 2024). Many firms continue to operate in isolation, making them more susceptible to disruptions and limiting their ability to adapt to changing market conditions.

This study, therefore, sought to investigate whether supply chain collaboration strategies can enhance the operational performance of manufacturing firms in Nairobi County, Kenya. By examining key collaborative practices such as information sharing, joint decision-making, and supplier partnerships, the research aims to provide actionable insights on how collaboration contributes to supply chain adaptability and responsiveness. Understanding the role of collaboration in building resilient supply chains is crucial for ensuring sustainable industrial growth, reducing operational risks, and enhancing the global competitiveness of Kenyan manufacturers.

1.2 General Objective of the Study

To investigate the role of supply chain collaboration on operational performance of manufacturing firms in Nairobi County, Kenya.

1.2.2 Research Hypothesis

H₀₁: Supply chain collaboration does not have a statistically significant role on operational performance of manufacturing firms in Nairobi County, Kenya.

2. THEORETICAL REVIEW

2.1 Stakeholder theory

The stakeholder theory was propounded by Freeman in 1984, who identified individuals and groups as those who either influence or are impacted by an organization's operations. Jones (1995) asserts that companies engage in agreements with their stakeholders with the expectation that reciprocal trust and cooperation will give them a competitive advantage over their counterparts. The goal of instrumental stakeholder theory is to link financial performance metrics based on stakeholder effect on a firm's bottom line to corporate supply chain accountability. According to Coombs (1998), stakeholders are associations within corporations whose constituents have a common understanding, power, and expectation toward the company. Customers, suppliers, and stakeholders today depend on a successful supply chain (Seuring & Muller, 2008) as a result, the supply chain must live up to expectations in terms of environmental and financial concerns (Carter & Rogers, 2008) in order to support SCI and continuity of supplies.

Pettit et al. (2010) assert that SCI increases an organization's capability, which in turn leads to resilience. According to Freeman (1999), the primary goal of stakeholder theory is to help managers understand stakeholders and proactively manage them. Managers are crucial to the success of stakeholders' efforts (Skouloudis *et al.*, 2015). Thus, supplier, customer, and stakeholder integration helps ensure the output of the business remains consistent. SCI increases an organization's capacity, which promotes resilience (Pettit *et al.*, 2010). This study was connected to the theory of stakeholders, which states that manufacturing companies should consider the expectations of its influential stakeholders and strive to fulfil those needs in order to increase company performance.

Managers play a vital role in managing stakeholders' expectations to ensure success (Freeman, 1999; Skouloudis *et al.*, 2015). Supply chain collaboration involves the integration of suppliers, customers, and other stakeholders to enhance organizational capacity and ensure consistent operations. This aligns with stakeholder theory, as organizations must address stakeholders' expectations to foster trust, cooperation, and accountability. Propounded by Freeman (1984), stakeholder theory identifies individuals and groups who influence or are impacted by an organization's operations. Jones (1995) highlights that trust and cooperation between companies and their stakeholders provide competitive advantages. Instrumental stakeholder theory (Frank, 1988) connects financial performance to stakeholder influence on a firm's accountability. Stakeholders such as customers, suppliers, and internal associations expect organizations to meet environmental, financial, and operational standards (Seuring & Muller, 2008; Carter & Rogers, 2008). Managers play a vital role in managing stakeholders' expectations to ensure success (Freeman, 1999; Skouloudis *et al.*, 2015). Supply chain collaboration involves the integration of suppliers, customers, and other stakeholders to enhance organizational capacity and ensure consistent operations. This aligns with stakeholder theory, as organizations must address stakeholders' expectations to foster trust, cooperation, and accountability.

Stakeholder theory is relevant to this study in that by proactively engaging stakeholders through collaboration, companies strengthen relationships and enhance their supply chain's ability to withstand and recover from crises, aligning stakeholder interests with long-term performance goals.

2.2 Empirical Review

2.2.1 Supply Chain Collaboration on Operational Performance of Manufacturing Firms

A high correlation between supply chain collaboration and performance levels has been verified by researchers. Lee & Yoon (2024) looked into the causes of supply chain Collaboration and its effect on business performance, as well as how governance structures lessen these interactions. They also looked into the reasons behind collaboration and transaction cost advantage. An online poll was done to collect data from Korean manufacturers. The hypotheses were tested using hierarchical regression analysis, and the large-scale survey's dimensionality, validity, and reliability were

assessed using confirmatory factor analysis. Collaboration among enterprises within a supply chain has been shown to enhance their efficiency and provide them with a cost advantage over transactions. Contractual governance improves supply chain collaboration and company performance in terms of transaction cost advantage, according to a subsequent investigation of the moderating impact of governance structures. Despite the study's valuable insights into business performance, the ramifications of supplier management approaches on supply chain procedures were not disclosed.

Kipruto and Namusonge (2021) carried out a study on how third-party LSPs in Kenya performed operationally as a result of supply chain collaboration. The link between the study variables in this study was described using the RBV theory and stakeholder theory. The study's target population was 129 people in total. With 84 completed surveys, the study was assessed to have a respectable response rate of 65.12%. Descriptive and inferential statistics, including frequencies, percentages, correlations, and regressions, were used to evaluate the collected data. The results demonstrate how 3PL service providers have embraced supplier, internal, and customer supply chain collaboration to a significant extent. The results demonstrate that operational performance was greatly enhanced via customer collaboration.

Antai & Eze (2023) studied on how supply chain cooperation impacts the strength of business- to-business (B2B) ties in Kenya's SMEs that deal with IT and telecoms. A descriptive research survey approach was used in this study. This study's objective was to survey 134 ICT SMEs located in Kenya. A representative sample of one hundred medium-sized businesses was selected. The primary data was collected using a standardized questionnaire that was self-administered. The study found a significant correlation between supply chain collaboration and business-to-business (B2B) partnerships, but it withheld the selection criteria that determined the sample of 100 SMEs. It's also unclear what analytic scale was applied in this investigation.

Bor, J. K. M. (2021) investigated the effect of an integrated supply chain on the performance of Kenyan food and beverage manufacturing companies in order to reduce supply chain inefficiencies. A descriptive research methodology was used because it allows the researcher to document, examine, and report on current events. A sample of 125 food and beverage establishments was selected from among Kenya's 187 million inhabitants for the survey. Primary data was gathered via surveys that respondents filled up. The assessment of numerical data by means of descriptive statistics was made easier by the use of SPSS version 22. Multiple regressions and correlation analysis were used in an inferential statistical study that revealed a significant and positive influence of supplier agreements on the performance of food and beverage manufacturing enterprises in Kenya.

2.3 Conceptual Framework

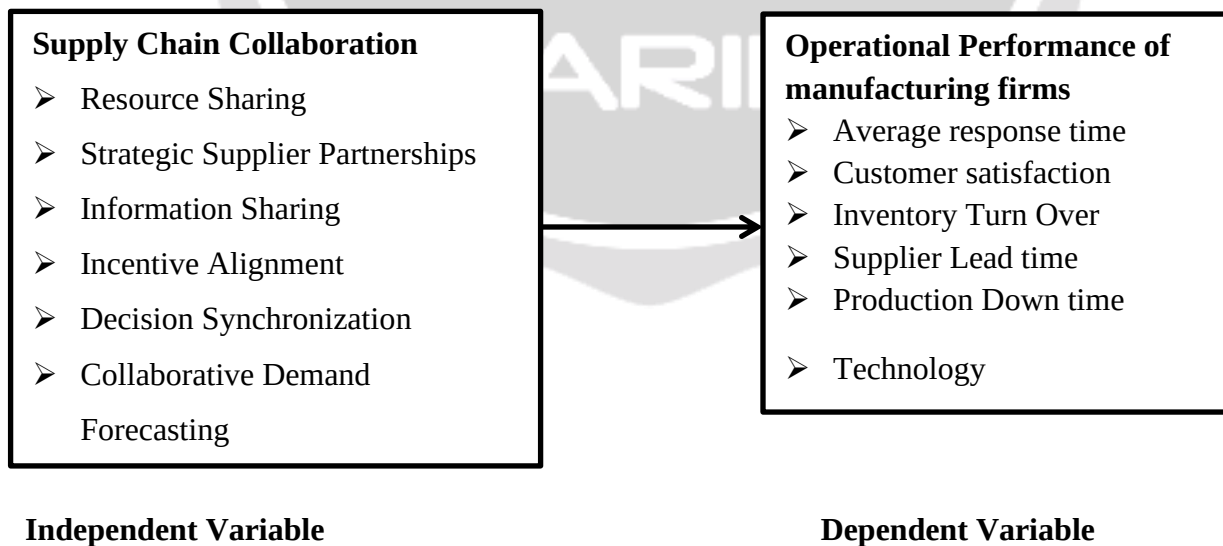


Figure 1.1 *Conceptual Framework*

3.0 RESEARCH METHODOLOGY

The sampling technique employed by this study combined purposive sampling and proportionate stratified random sampling to ensure a representative selection of manufacturing firms. Purposive sampling was first used to select Nairobi County as the study location, given that Nairobi hosts the largest concentration of manufacturing firms in Kenya, making it an ideal setting for analyzing supply chain collaboration. Additionally, purposive sampling was applied to identify manufacturing firms actively engaged in supply chain operations.

Thereafter, proportionate stratified random sampling was utilized to select respondents from a target population of 600 manufacturing firms, ensuring that different manufacturing sub sectors were adequately represented. A final sample size of 240 respondents was drawn from the different manufacturing firms' procurement departments, as these professionals play a critical role in supply chain collaboration and operational decision-making.

To collect data, a structured questionnaire was administered, incorporating both closed-ended and open ended questions to capture both quantitative and qualitative insights. A pilot study was conducted in Thika County involving 24 manufacturing firms to test the reliability and validity of the research instruments. Thika County was chosen to avoid selecting the same respondents that participated in the pilot study, ensuring that the final study's sample remains independent and unbiased.

For data analysis, descriptive and inferential statistical techniques were applied using SPSS software. Descriptive statistics such as means and standard deviations were used to summarize the data, while inferential analysis was conducted to test the study's hypotheses. Multiple linear regression analysis was utilized to assess the relationship between the independent variable (supply chain collaboration) and the dependent variable (operational performance of manufacturing firms). The regression model used in the study was expressed as follows: $Y = \beta_0 + \beta_1 X_1 + \varepsilon$, Where, Y = Operational performance of manufacturing firms, β_0 = Constant (intercept), β_1 = Regression coefficient, X_1 = Supply chain collaboration, ε = Error term

4.0 RESULTS AND FINDINGS

4.1 Descriptive Statistics

4.1.1 Supply chain collaboration

The objective of the study was to examine the role of supply chain collaboration on the operational performance of manufacturing firms in Nairobi County, Kenya. A 5-point Likert scale was used to measure the extent to which respondents agreed with statements related to supply chain collaboration and its role on operational performance. The scale ranged from 1 to 5, where 1 represented Not at all, 2 Small extent, 3 Medium extent, 4 Great extent, and 5 Very great extent. The responses were summarized using descriptive statistics, including mean and standard deviation, as shown in the table below.

Table 4.1: Descriptive Statistics on Supply Chain Collaboration

Statement	Mean	Standard Dev
Resource sharing results in improving operations and meeting Customer needs	3.66	1.59
Resource sharing strategies are employed in the firm	2.91	1.47
Strategic partnerships exist between the firm and suppliers	3.44	1.48
Data is shared between the organization and the suppliers to enhance productivity.	3.39	1.57
Firm's performance is increased when incentive alignment		

strategies are employed	3.23	1.58
Stakeholders are engaged in decision-making processes	3.43	1.41
The company shares demand forecasts with its partners	3.11	1.52
Average	3.31	1.52

Table 4.1 presents statistical data on various supply chain collaboration strategies within a firm, measured through mean and standard deviation values. Higher mean scores indicate stronger agreement or more frequent implementation of the practice, while lower mean scores suggest less agreement or infrequent use. The Standard Deviation measures how spread out the responses were where a higher SD means responses were more varied (some strongly agreed, others strongly disagreed) and A lower SD means responses were more consistent, indicating general agreement among respondents.

Respondents were asked to rate the statement on resource sharing results in improving operations and meeting customer needs and results show that this statement received the highest Mean score of 3.66, suggesting that most respondents agree that resource sharing enhances operations and customer satisfaction, however, the SD of 1.59 shows some variation in responses, indicating that while many agree, some firms may not experience the same benefits. Further respondents were asked to rate whether resource sharing strategies are employed in the firm to which this statement had the lowest Mean score (2.91), meaning that while firms acknowledge the benefits of resource sharing, they may not be actively implement it and The SD of 1.47 suggests moderate variation in responses. Also respondents were asked to rate their agreement on whether strategic partnerships exist between the firm and suppliers where a mean score of 3.44 indicates that many firms recognize supplier partnerships, though the SD of 1.48 shows that the level of these partnerships varies across firms. Further the researcher wanted to know the extent to which data is shared between the organization and suppliers to enhance productivity to which the statement received a mean of 3.39 and SD of 1.57 which suggests that some firms actively share data, while others do not, leading to a mixed distribution of responses. Respondents were asked to rate the statement on whether the firm's performance is increased when incentive alignment strategies are employed and results indicates a Mean of 3.23 meaning firms acknowledge that aligning incentives improves performance, though an SD of 1.58 shows diverse experiences across firms. Respondents were asked to respond to the statement whether stakeholders are engaged in decision-making processes and results had a mean of 3.43 and the lowest SD (1.41) suggesting that most firms have consistent practices regarding stakeholder involvement in decisions. Respondents were asked to rate whether the company shares demand forecasts with its partners and the results attracted a mean score of 3.11 indicating moderate agreement, while an SD of 1.52 suggests variation in how firms approach demand forecasting. The study concludes that the average mean of 3.31 suggests that most firms recognize the importance of supply chain collaboration strategies, though the average SD of 1.52 indicates that implementation varies significantly.

4.2. Operational Performance of Manufacturing Firms in Nairobi County, Kenya

The general objective of this study was to examine the role of supply chain collaboration on the operational performance of manufacturing firms in Nairobi County, Kenya. The study utilized a five-point Likert scale to measure the extent to which respondents agreed with various statements regarding supply chain resilience strategies. The scale was as follows: 1 represented Not at all, 2 Small extent, 3 Moderate extent, 4 Great extent, and 5 Very Great extent. The responses were summarized using descriptive statistics, including mean and standard deviation, as detailed in the table 4.2

Table 4.2: Descriptive Statistics on Operational Performance of Manufacturing Firms

Statements	Mean	Standard Dev
Average response time improved due to supply chain collaboration.	4.01	1.36
Customer satisfaction increased as a result of effective supply chain collaboration.	3.83	1.35
Inventory turnover reduced due to collaboration with supply chain partners.	3.94	1.34
Supplier lead time decreased as a result of supply chain collaboration.	3.51	1.32
Production downtime minimized through collaborative supply chain efforts.	3.62	1.31
Technology use in supply chain operations improved due to collaboration.	3.58	1.3
Average	3.74	1.33

The findings indicate that supply chain collaboration plays a significant role in enhancing the performance of manufacturing firms, particularly in improving response time, customer satisfaction, and cost efficiency. The quicker response time to disruptions ($M = 4.01$, $SD = 1.36$) aligns with Matas et al. (2024), who argue that firms that engage in collaborative supply chain strategies experience improved agility and faster recovery from operational challenges. Similarly, Steen, Haug & Patriarca (2024) highlight that companies with strong supplier partnerships and synchronized decision-making experience fewer operational setbacks and maintain business continuity even in crisis situations.

The improvement in customer satisfaction ($M = 3.83$, $SD = 1.35$) is consistent with Holloway (2025), who found that collaboration in supply chains enhances service delivery, leading to increased customer trust and loyalty. Furthermore, Duong & Truong Quang (2025) emphasize that strong supply chain collaboration contributes to maintaining consistent product availability and minimizing service disruptions, which are key factors in sustaining customer satisfaction.

The role of supply chain collaboration in reducing inventory turnover ($M = 3.94$, $SD = 1.34$) supports the findings of Liu, Costa, and Wu (2024), who suggest that firms with well-coordinated supplier partnerships and shared inventory management strategies achieve better resource utilization and lower operational costs. However, the lower rating for reduced supplier lead time ($M = 3.51$, $SD = 1.32$) suggests that inefficiencies still exist in optimizing supply chain responsiveness. This aligns with Katsaliaki, Galetsi, & Kumar (2022), who argue that while collaboration improves supply chain efficiency, achieving significant lead time reductions requires deeper integration, technology adoption, and improved coordination between suppliers.

The ability of supply chain collaboration to minimize production downtime ($M = 3.62$, $SD = 1.31$) highlights its role in ensuring continuous operations. This finding aligns with Steen et al. (2024), whose study found that firms implementing collaborative supply chain frameworks were better prepared to mitigate disruptions and maintain steady production levels. However, the moderate rating of technology adoption for supply chain optimization ($M = 3.58$, $SD = 1.30$) suggests that while firms recognize the benefits of digital solutions, challenges such as cost, technical expertise, and integration barriers still limit full implementation. This finding is supported by Sutar, Kolte, and Yamini (2025), who state that although digitalization enhances supply chain efficiency, firms often struggle with adoption due to financial and technical constraints.

The overall mean score of 3.74 ($SD = 1.33$) reinforces the importance of supply chain collaboration in sustaining business continuity, operational efficiency, and customer service excellence. These findings are in agreement with

Hamidu et al. (2023), who established that collaborative strategies—such as supplier partnerships, information sharing, and synchronized decision-making—are critical for improving supply chain performance by mitigating risks and ensuring steady operations.

4.3 Qualitative Analysis on Supply Chain Collaboration

The qualitative analysis of the open-ended responses regarding supply chain collaboration revealed that respondents largely emphasized the importance of interdepartmental and cross-organizational cooperation in enhancing the firm's performance. This finding aligns with previous research highlighting that effective supply chain collaboration leads to improved operational efficiency and resilience Shoomal, & Ozay, (2024). Respondents frequently mentioned the establishment of formal partnerships with key suppliers and customers. These collaborations often focused on information sharing, demand forecasting, and joint problem-solving to address supply chain challenges. Similar conclusions were drawn by Holloway, (2025), who found that such partnerships help synchronize production schedules, align inventory management, and improve logistics planning, ultimately leading to more robust supply chains.

One common theme among respondents was that collaboration with suppliers allowed for better alignment of production schedules, inventory management, and logistics planning. This mirrors findings from Alsoussi, & Tahboub, (2025), who emphasized that close supplier relationships enable firms to improve their forecasting, reduce inventory costs, and enhance supply chain responsiveness. Respondents also noted that regular meetings and communication between departments such as procurement, logistics, and production fostered a culture of collaboration that improved the flow of information, reduced delays, and proactively addressed potential disruptions. This supports the work of Anisah (2024), who found that interdepartmental communication is key to reducing operational delays and improving decision-making in supply chains.

In addition to supplier collaboration, several responses emphasized the role of collaborative technologies. The adoption of integrated supply chain management software, which allowed for real-time tracking and monitoring of goods and materials, was seen as a critical tool in improving transparency and communication. This is consistent with studies by Holloway, (2025, who showed that the implementation of collaborative technologies significantly enhances information flow and reduces operational disruptions by providing real-time visibility into supply chain activities. Respondents also noted the increasing trend of collaborative efforts with industry peers to share best practices and benchmark supply chain performance. These findings are in line with the research of Alsharari & Aljohani, (2024), who identified benchmarking and sharing best practices among industry peers as effective strategies for enhancing supply chain performance and adopting continuous improvement.

Overall, the responses indicated that the company's supply chain collaboration strategies were viewed as essential for improving both operational efficiency and flexibility in response to market changes. This finding is aligned with the work of Holloway (2024) who argues that collaborative strategies are crucial for achieving a responsive and flexible supply chain capable of quickly adapting to market fluctuations and disruptions.

4.4 Correlation Analysis

To examine the role of supply chain collaboration on the operational performance of manufacturing firms, Pearson correlation coefficients were calculated. This analysis investigated the strength and direction of associations among supply chain collaboration, Pearson's r values range from -1 to +1, with values closer to ± 1 indicating stronger correlations. The significance level was set at 0.01 (two-tailed), meaning correlations are considered statistically significant if $p < .01$. The results are presented in the correlation matrix in the table 1.3.

Table 4.3: *Correlations Matrix Table*

		Supply Chain Collaboration	Operational Performance
Supply chain collaboration	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	235	

Operational	Pearson Correlation	.729*	1
Performance of	Sig. (2-tailed)	<.001	
Manufacturing firms	N	235	235

The results indicate a strong positive correlation between Supply Chain Collaboration and operational Performance of Manufacturing Firms ($r = .729$, $p < .001$). This suggests that firms with strong supply chain collaboration are more likely to experience improved operational performance. The correlation coefficient of 0.729 indicates a substantial positive relationship, meaning as supply chain collaboration improves, so does the operational performance of manufacturing firms. The p-value ($<.001$) shows that this relationship is statistically significant, indicating that the observed correlation is unlikely to have occurred by chance.

4.5 Regression Analysis

4.5.1. The model summary

R-squared indicates the proportion of the variance in the dependent variable that is explained by the independent variable in a regression model. It measures the goodness of fit of the model to the observed data, indicating how well the model's predictions match the actual data points.

Table 4.4. Model Summary for Role of Supply Chain Collaboration on Operational Performance of Manufacturing Firms

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.729 ^a	.531	.529	.557

a. Predictors: (Constant), supply chain collaboration

The regression analysis produced a coefficient of determination (R^2) of 0.531, indicating that 53.1% of the variance in the operational performance of manufacturing firms can be explained by supply chain collaboration. This suggests that supply chain collaboration plays a substantial role in influencing firm operational performance in Nairobi County, Kenya. The remaining 46.9% of the variance may be attributed to other factors not included in the model, such as market conditions, financial constraints, or regulatory challenges. The standard error of the estimate (SEE) was 0.557, indicating the average deviation of actual firm operational performance values from the predicted values. A lower SEE suggests better predictive accuracy, meaning the model provides a reasonably precise estimate of firm performance based on supply chain collaboration strategies.

Table 4.4: ANOVA^a for role of supply chain collaboration on operational performance of Manufacturing Firm

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	81.850	1	81.850	264.278	<.001 ^b
	Residual	72.163	233	.310		
	Total	154.01	234			

a. Dependent Variable: Operational Performance of Manufacturing Firm

b. Predictors: (Constant), Supply Chain Collaboration

The ANOVA results indicate that the regression model is statistically significant in explaining the role of supply chain collaboration and the operational performance of manufacturing firms ($F = 264.278$, $p < .001$). The regression sum of squares (81.850) represents the proportion of variance in firm performance that is explained by the supply chain collaboration variable, while the residual sum of squares (72.163) reflects the unexplained variance. The significance value ($p < .001$) confirms that the overall model is a good fit and that supply chain collaboration significantly contributes to predicting the operational performance of manufacturing firms in Nairobi County, Kenya.

4.5.2. Regression

The regression analysis was conducted to evaluate the role of supply chain collaboration on operational performance of manufacturing firms in Nairobi County, Kenya. Regression analysis is a statistical approach that models the strength and direction of relationships between a dependent variable (operational performance of manufacturing firms) and one or more independent variables (supply chain collaboration). This analysis provides insights into how variations in supply chain collaboration influence firm operational performance, enabling the identification of key factors driving organizational success.

Table 4.5: Coefficients for role of Supply Chain Collaboration on operational Performance of Manufacturing Firm

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.063	0.156		6.814	.001
Supply chain collaboration	0.712	0.096	0.705	7.417	<.001

a. Dependent Variable: Operational Performance of Manufacturing Firm

The regression analysis revealed the significant role of supply chain collaboration on the operational performance of manufacturing firms. The regression equation derived from the analysis is: $Y = 1.063 + 0.712X_1$. This indicates that when supply chain collaboration increases by one unit, the performance of manufacturing firms improves by 0.712 units, holding all other factors constant. The constant value ($B = 1.063$) represents the predicted level of firm operational performance when no supply chain collaboration is applied. The results further showed that the unstandardized coefficient for supply chain collaboration is statistically significant ($t = 7.417$, $p < .001$), confirming that supply chain collaboration has a substantial positive role on the performance of manufacturing firms.

Hypothesis test

H₀: Supply chain collaboration does not have a statistically significant role on operational performance of manufacturing firms in Kenya

Table 4.6: Summary of the Hypothesis testing results

Hyp othes is	Hypothesis Statement	I.V	β	S.E	t- value	p- value	R^2	Decisi on
H01	S.C collaboration does not have a significant role on the operational performance of manufacturing firms in Nairobi County, Kenya.	supply chain collabora tion	0.712	0.09	7.417	< 0.001	0.53 1	Reject ed

Decision Criteria is, test significance at $\alpha = 0.05$ (5% significance level). If the p-value (Sig.) is less than 0.05, we reject the null hypothesis (H_{01}). If the p-value is greater than 0.05, we fail to reject H_{01} . Results of table 4.6 indicate that the p-value for Supply Chain Collaboration is <0.001, which is far less than 0.05 and the t-value (7.417) is large, further confirming that supply chain collaboration has a strong role. While the Beta coefficient (0.765) indicates that supply chain collaboration positively influences operational performance. Since the p-value is significant (<0.05), the study rejects the null hypothesis (H_{01}) and concludes that: Supply chain collaboration has a statistically significant role in the performance of manufacturing firms in Kenya.

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusions

The study findings underscore the critical role of supply chain collaboration in enhancing the operational performance of manufacturing firms in Nairobi County, Kenya. Both quantitative and qualitative analysis affirms the significant positive role of collaboration on firm operational performance. Regression analysis revealed that supply chain collaboration strategies are generally viewed as beneficial for enhancing the operational performance of manufacturing firms. Respondents emphasized the positive role of supply chain collaboration in enhancing firm performance. Key elements such as resource sharing, strategic partnerships, information sharing, incentive alignment and collaborative demand forecasting were all found to contribute positively to operational efficiency. These strategies were perceived favorably, with relatively high means, indicating strong agreement with their effectiveness. Specifically, resource sharing was seen as a critical factor, and strategic partnerships with suppliers were also recognized for their positive influence on performance. However, certain areas of collaboration, such as technology and machinery sharing, feedback sharing, and conflict resolution, showed more moderate to lower perceptions. The results suggest that while these practices are still considered important, they are not as frequently or effectively implemented in the current context. The variability in perceptions, indicated by higher standard deviations, suggests that the effectiveness and value of these strategies may depend on the specific way they are executed. The analysis

also highlighted the importance of a learning attitude towards partners, which received a relatively high level of agreement suggesting that manufacturing firms value the exchange of knowledge and continuous improvement in collaborative relationships.

5.2 Recommendation

The study recommends that manufacturing firms in Nairobi County, Kenya focus on prioritizing resource sharing, strategic partnerships, information sharing, incentive alignment and collaborative demand forecasting to enhance performance, with an emphasis on building strong partnerships with suppliers. However, areas like technology and machinery sharing, feedback sharing, and conflict resolution require further attention. While important, these practices were perceived as less frequently implemented or effective. The study suggests that the effectiveness of these strategies may depend on their execution and recommends a tailored approach. Additionally, fostering a learning attitude towards partners, encouraging the exchange of knowledge, and focusing on continuous improvement in collaborative relationships were highlighted as essential for enhancing the overall success of supply chain collaborations. Governments and manufacturing industry regulators should create policies and partnerships between manufacturing firms, suppliers, and other stakeholders. Moreover, Policies created should promote the establishment of formal knowledge-sharing networks that support continuous learning, technological advancements, and conflict resolution training for stakeholders.

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