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The Relationship Between Supplier Collaboration and Pharmaceutical Firms' Performance in Nairobi City County, Kenya

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Abstract

This study aimed to determine the relationship between supplier collaboration and pharmaceutical firms' performance in Nairobi City County, Kenya. This study adopted a descriptive research design. The target population comprised procurement managers and supply chain (SC) managers working in 171 pharmaceutical firms in Nairobi County, including 22 local manufacturers and 149 importers and distributors. A sample of 184 respondents was selected using stratified random sampling to ensure balanced representation, with 92 procurement managers and 92 SC managers. Data were collected using structured questionnaires, which provided consistent and focused responses relevant to the study objective. It was analysed using descriptive and inferential statistics. Descriptive statistics entailed means and standard deviations, while the inferential statistics entailed Pearson's Correlation and regression analysis. The findings indicate that collaborating with suppliers on risk mitigation improves customer satisfaction and service delivery. Jointly planning production and delivery schedules enhances order fulfillment accuracy and supply chain alignment. Involving suppliers in strategic decisions contributes to greater market share and responsiveness to customer demands. Engaging in joint sales forecasting and implementing vendor-managed inventory systems reduces lead times and improves inventory control. Sharing IT systems with suppliers enhances communication, data accuracy, and overall performance in pharmaceutical firms. It was concluded that collaborating with suppliers on risk mitigation improves customer satisfaction and service delivery. Joint planning of production and delivery schedules enhances order fulfillment accuracy and supply chain alignment. Involving suppliers in strategic decision-making increases market share and responsiveness to customer demands. Engaging in joint sales forecasting and using vendor-managed inventory systems shortens lead times and improves inventory control. Finally, shared IT systems with suppliers enhance communication, data accuracy, and overall performance of pharmaceutical firms. The study recommends that pharmaceutical companies in Nairobi City County enhance and formalize supplier collaboration by involving suppliers in strategic decision-making, joint production planning, and risk mitigation. Implementing shared IT systems and data-sharing platforms can improve communication, accuracy, and coordination, while adopting joint sales forecasting and vendor-managed inventory systems can reduce lead times, optimize inventory control, and ensure timely delivery, thereby improving service delivery, customer satisfaction, and overall performance.

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1. Introduction

Supply chain agility is viewed as a source of competitive advantage, with supplier collaboration being a critical enabler of responsiveness and efficiency. An agile supply chain integrates information sharing, resource flexibility, and supplier partnerships to quickly adapt to disruptions and shifts in customer demand, ultimately improving firm performance in terms of customer satisfaction, profitability, and market share (Alzoubi & Yanamandra, 2020; Oliveira-Dias et al., 2022). Effective supplier collaboration strengthens agility by ensuring timely access to inputs, enhancing market sensitivity, and reducing lead times, which are essential in the dynamic pharmaceutical sector.

Pharmaceutical firms worldwide leverage supplier collaboration to strengthen supply chain agility. In Europe, Roche, Bayer, and Novartis use digital technologies and real-time supplier contact to sustain continuity and performance (Servais & Aust, 2021), while partnerships enhance transparency and reduce risks (Iazzolino & Bozzo, 2023). In Canada, Apotex Inc. and Bausch Health adopt multi-supplier strategies, digital platforms, and flexible contracting to build resilience (de Beer et al., 2022), with close supplier engagement improving demand alignment, resource use, and profitability (Thambisetty et al., 2021). In India, Cipla and Aurobindo Pharma rely on strong supplier networks and collaborations with healthcare providers to enhance responsiveness (Chakraborty, 2021), supporting flexible sourcing, efficiency, and competitiveness (Palit & Bhogal, 2022).

Nigeria's pharmaceutical sector struggles with supply chain agility due to fragmented supplier relationships and limited visibility, which weaken collaboration and adaptability despite initiatives like the National Product Supply Chain Management Program (Adeyeye et al., 2023). In Rwanda, firms such as ApexBiotech Ltd and Rwanda Medical Supply Ltd leverage technology-driven supplier collaboration, using real-time data analytics and international supplier networks to improve procurement, distribution efficiency, and timely medication delivery (Mfizi et al., 2023). In contrast, Uganda's sector faces poor infrastructure, limited technology, and regulatory inefficiencies, with firms like Joint Medical Store experiencing weak supplier communication and frequent stockouts, hindering flexibility and performance (Okereke, 2022).

According to Njuguna et al. (2021), in Kenya, pharmaceutical firms show uneven progress in adopting agile practices, with supplier collaboration remaining underdeveloped. Many companies, such as Universal Corporation Ltd, Dawa Life Sciences, and Elys Chemical Industries Ltd, operate with isolated supply chains, minimal information sharing, and outdated demand forecasting. This supplier isolation weakens responsiveness and undermines efficiency, profitability, and competitiveness. Studies show that the lack of strong supplier partnerships is a critical gap limiting supplier collaboration and performance in Nairobi's pharmaceutical sector (Banda et al., 2022; Okok et al., 2024). This gap underscores the need

to investigate how supplier collaboration influences the performance of pharmaceutical firms in Nairobi City County.

Agile supply chain strategies are practices designed to enhance responsiveness and flexibility in dynamic markets. These strategies prioritize customer-centricity by using advanced analytics to anticipate demand shifts and quickly adjust to consumer preferences. They allow firms to not only react rapidly to changes but also to proactively anticipate customer needs, making agility a vital factor for competitiveness and long-term success (Shashi et al., 2020; Korucuk et al., 2023).

Agile supply chain techniques enhance collaboration among participants by aligning resources with business goals, reducing inefficiencies, and improving responsiveness to market changes (Zhu et al., 2022), while also driving innovation, profitability, and sustainability (Waqas et al., 2022). Supplier collaboration, through joint forecasting, synchronized production, shared inventory, and supplier-led logistics, improves visibility, speeds problem-solving, and reduces inefficiencies. Such practices strengthen responsiveness, customer retention, market share, and overall performance by aligning goals and resources (Mishra et al., 2024; Dahinine et al., 2024).

According to Tarigan et al. (2021), supplier collaboration is a key part of agile supply chain strategies because it builds strong relationships between firms and their suppliers. This helps reduce disruptions and allows companies to take advantage of market opportunities quickly. When firms and suppliers develop trust and long-term relationships, they can share information more openly, which makes demand forecasting more accurate and improves inventory management. As a result, collaboration makes the supply chain more resilient and directly boosts overall performance (Baah et al., 2022).

Strong supplier collaboration fosters innovation by enabling suppliers to share expertise and solutions, leading to faster adoption of advanced manufacturing and reduced lead times in pharmaceuticals (Solaimani & van der Veen, 2022; Ogbuagu et al., 2023). In Nairobi City County, where firms face fragmented supply chains, poor forecasting, and frequent disruptions, strategic alliances with suppliers enhance visibility, align supply with healthcare demand, and improve efficiency and profitability, making collaboration a key driver of performance (Kioko, 2023; Rajab, 2024).

Organizational performance is the extent to which firms achieve goals efficiently and effectively, encompassing financial and non-financial outcomes such as profitability, revenue growth, product quality, and market share (Al-Qudah et al., 2020; Soomro et al., 2021; Sahibzada et al., 2021; Setyawan, 2021). While traditionally measured through financial indicators like ROI and shareholder returns (Su et al., 2022), modern frameworks such as the balanced scorecard also include learning, internal processes, customer satisfaction, sustainability, and CSR (Sharma et al., 2023; Antony et al., 2022). This study adopts Setyawan's (2021) view of organizational performance as achieving both financial and non-financial objectives through effective management and governance.

Kenya's pharmaceutical sector includes 22 local manufacturers, 149 importing and distribution firms, multinational corporations, wholesalers, and retailers serving about 4,758 health facilities (KAPI, 2023; Ngundi, 2022). With around 9,600 registered pharmaceutical items classified by outlet levels, local firms such as Cosmos Limited and Regal Pharmaceuticals focus on generics and over-the-counter drugs, while companies like Phillips Pharmaceuticals

import advanced medicines for chronic conditions (Ngaruiya et al., 2023a; Okok et al., 2024). The sector is regulated by the Ministry of Health through the Pharmacy and Poisons Board under Chapters 244 and 245, requiring stringent product evaluations for safety, efficacy, and quality (Okok et al., 2024).

Kenya's pharmaceutical sector has seen reforms to improve access to affordable medicines, yet firms in Nairobi City County still face stockouts, delayed distribution, revenue losses, and shrinking market share (PSK, 2021; KAPI, 2022; 2023). These challenges stem from weak supplier collaboration marked by fragmented supply chains, limited information sharing, and poor coordination, which reduce responsiveness and competitiveness. While studies have examined organizational culture, strategic management, and reverse logistics in relation to performance (Ngaruiya et al., 2023), little focus has been given to supplier collaboration as a driver of supply chain agility and performance (Obong'o, 2021), creating a gap that this study seeks to address.

1.1 Research Objective

The objective of this study was to determine the relationship between supplier collaboration and pharmaceutical firms' performance in Nairobi City County, Kenya.

2. Literature Review

2.1 Theoretical review

The Relational View Theory, proposed by Dyer and Singh (1998), suggests that companies can perform better by working closely with their partners and combining resources and capabilities. In supply chains, where firms rely on each other, strong relationships improve performance by sharing knowledge, creating mutual benefits, and making operations more efficient. Trust, commitment, and open communication are essential for these partnerships to succeed. It shows that collaboration enables organizations to navigate complexities and uncertainties in the supply chain, ultimately fostering resilience, innovation, and improved performance in competitive markets. Studies have applied this theory in practice, such as Ferrigno et al. (2024), who looked at how partnerships help recover from disruptions, and Hailu et al. (2023), who found that strong inter-firm relationships improved efficiency in Ethiopian pharmaceutical supply chains. Research also shows that good collaboration reduces costs and improves responsiveness (Baah et al., 2022).

The theory does have some limitations. Critics point out that it can oversimplify the complexities of partnerships since not every collaboration works well, depending on partner capabilities and motivations (Hakamoui & Berrada, 2021), and it doesn't fully consider external factors that may affect success (McCauley & Palus, 2020). Despite this, the theory is valuable because it explains how trust, commitment, and shared resources can drive better performance. This study, provided a framework to understand how supplier collaboration among pharmaceutical firms improves operations and overall performance in a rapidly changing market.

2.2 Empirical review

Baah et al. (2022) investigated the impact of supply chain collaboration on stakeholder trust, visibility, environmental performance, and financial outcomes in Ghanaian manufacturing firms selected for their key supplier relationships and resource usage patterns. Using a quantitative survey approach, data were collected from 300 stakeholders involved in supply

chain activities through structured questionnaires. Analysis via PLS-SEM revealed that collaboration positively and significantly influenced visibility, stakeholder trust, environmental performance, and financial performance, demonstrating the mutual benefits of collaborative practices. However, the study is context-specific to Ghanaian manufacturing firms, which may differ from the dynamics of pharmaceutical firms in Kenya.

Samad et al. (2021) explored the role of collaborative capability in mediating the relationship between Green Supply Chain Management (GSCM) practices and firm performance in 270 Malaysian manufacturing firms. Using a quantitative survey design targeting managers and supply chain personnel, the study found that strong collaborative capability enhances the benefits derived from GSCM practices. Unlike previous studies, this research examined collaboration as a moderating factor, highlighting a conceptual gap for evaluating the direct effect of supplier collaboration on firm performance.

Liu et al. (2020) analyzed the effect of strategic collaboration between buyers and suppliers on operational performance in Chinese firms. The study focused on collaboration elements such as information sharing, joint problem-solving, and long-term partnerships, examining 181 supply chain collaboration announcements by publicly listed firms over 20 quarters. Using a self-control model based on past performance data, the findings showed that joint sales forecasting and vendor-managed inventory significantly improved operational performance, demonstrating the practical impact of strategic supplier collaboration on firm efficiency.

3. Methodology

This study adopted a descriptive research design, which is suitable for collecting detailed information on the variables and generalizing findings from the sample to the wider population of pharmaceutical firms. The target population comprised procurement managers and supply chain (SC) managers working in 171 pharmaceutical firms in Nairobi County, including 22 local manufacturers and 149 importers and distributors (Kenya Association of Pharmaceutical Industry, 2024). Nairobi County was chosen due to its high concentration of pharmaceutical firms and its strategic importance in supply chain operations in Kenya. A sample of 184 respondents was selected using stratified random sampling to ensure balanced representation, with 92 procurement managers and 92 SC managers. These respondents were considered suitable due to their direct involvement in supply chain operations and their expertise in procurement and supply chain management practices. Data were collected using structured questionnaires, which provided consistent and focused responses relevant to the study objective. Data was analysed using descriptive statistics and inferential statistics. Descriptive Statistics entailed means and standard deviations, while the inferential statistics entailed Pearson's Correlation and regression analysis.

4. Results and Discussion

4.1 Response Rate

One hundred and eighty-four questionnaires were distributed to the sample respondents. Table 1 indicates the response rate. From the table, 159 questionnaires were correctly completed and returned, representing a response rate of 86.41%. The remaining 25 questionnaires, which make up 13.59%, were either not returned, partially filled, or contained inaccuracies that made them unsuitable for inclusion in the analysis. The 86.41% return rate reflects a high level of participant cooperation and provides a dependable dataset for analysis and interpretation. As

Antonakaki et al. (2021) note, a response rate exceeding 70% is generally sufficient for ensuring the validity and generalizability of research findings.

Table 1: Response Rate

Questionnaires	Frequency	Percentage
Properly filled and reverted	159	86.41%
Not returned, had errors, or not filled	25	13.59%
Total	184	100.00%

4.2 Demographic Results of Respondents

Table 2: Demographic Results of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	91	57.23%
	Female	68	42.77%
Education Level	Bachelor's Degree	74	46.54%
	Master's Degree	64	40.25%
	PhD	21	13.21%
Job Position	Procurement Manager	86	54.09%
	Supply Chain Manager	73	45.91%
Years of Service	Less than 3 years	19	11.95%
	3–5 years	42	26.42%
	6–10 years	60	37.74%
	11–15 years	26	16.35%
	Over 15 years	12	7.55%
Total		159	100%

The demographic results in Table 2 show that the majority of respondents were male (57.23%), while females accounted for 42.77%, indicating a male-dominated representation in roles relevant to the study. Most participants held at least an undergraduate degree, with 46.54% possessing a Bachelor's Degree, 40.25% a Master's Degree, and 13.21% a PhD, reflecting a highly educated respondent pool capable of informed decision-making. Regarding job positions, procurement managers constituted 54.09% of the sample, while supply chain managers made up 45.91%, ensuring a near-even representation of professionals from

complementary organizational functions. In terms of years of service, the largest group had 6-10 years of experience (37.74%), followed by 3-5 years (26.42%), 11-15 years (16.35%), less than 3 years (11.95%), and over 15 years (7.55%), indicating that most respondents were mid-career professionals with substantial experience in procurement and supply chain operations.

4.3 Descriptive Results

4.3.1 Descriptive Results for Supplier Collaboration

The study aimed to determine the relationship between supplier collaboration and pharmaceutical firms' performance in Nairobi City County, Kenya. Participants of the research were supposed to indicate their agreement with statements provided concerning supplier collaboration practice in their organization. A scale ranging from 1-5 was used, where 1 indicated strong disagreement, while the highest possible value of 5 indicated strong agreement. A neutral stand was represented by (3). Findings are indicated in Table 3.

From the outcomes, the majority of respondents (77.36%) confirmed that their firms collaborate with suppliers in developing and implementing risk mitigation strategies, while 5.03% dissented and 17.61% remained indifferent. The mean score of 3.99 and standard deviation of 0.88 suggest a consistently positive view toward shared risk planning. This collaborative risk posture likely enhances preparedness and resilience in the face of supply chain disruptions, which is essential in the pharmaceutical sector where supply continuity is critical. These results are in line with Baah et al. (2022), who showed the importance of supplier collaboration in fostering proactive risk responses and ensuring supply continuity. When asked about joint production and delivery scheduling, 79.25% of respondents agreed, whereas 15.10% expressed dissent and only 5.66% maintained a neutral position. The mean response of 3.93 and a standard deviation of 1.22 indicate a strong but slightly more varied opinion across firms. The relatively higher variability may be linked to differing operational structures or the degree of supplier integration across firms. Nonetheless, the results reflect substantial commitment to synchronizing production and delivery, which improves resource utilization and reduces lead times.

On the matter of supplier involvement in strategic decision-making, 75.47% confirmed the presence of this practice in their organizations, while 18.24% did not, and 6.29% neither affirmed nor rejected the statement. With a mean of 3.75 and a standard deviation of 1.16, the data imply a moderately strong integration of suppliers in critical supply chain decisions. Such involvement may foster alignment between supplier capabilities and firm strategies, leading to improved coordination and supply efficiency. Liu et al. (2020) similarly found that involving suppliers in strategic planning enhances performance by improving mutual understanding and trust. A larger share, 83.65%, indicated that their firms collaborate with suppliers to conduct joint sales forecasting. Only 11.95% were opposed, and 4.40% opted for neutrality. The mean of 4.09 and the standard deviation of 1.11 show that collaborative forecasting is both prevalent and positively perceived. Accurate joint forecasting minimizes stockouts and overproduction, enhancing both service levels and inventory performance. This finding corroborates Samad et al. (2021), who demonstrated that collaborative forecasting enhances supply chain agility and responsiveness.

On vendor-managed inventory (VMI), 74.84% supported the statement, 18.24% disagreed, and 6.92% expressed neutrality. The mean response of 3.68 and the standard deviation of 1.18 reflect moderate adoption levels. VMI implementation can reduce inventory holding costs and

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improve responsiveness to demand changes, though its relatively lower mean score may reflect structural or technological limitations within some firms. Use of shared IT systems for communication and data exchange received affirmation from 80.50% of respondents, whereas 12.58% opposed and 6.92% were non-committal. The mean score of 3.90 and standard deviation of 0.95 indicate widespread use of integrated systems that facilitate real-time data sharing and transparency between firms and their suppliers. This form of digital collaboration supports process automation, reduces delays, and strengthens supply chain visibility. This aligns with Okereke (2022), who observed that digital integration fosters greater transparency and operational efficiency in supplier relationships.

The aggregate mean across all six dimensions of supplier collaboration was 3.89, with a standard deviation of 1.08. This composite score signifies a broadly positive perception of supplier collaboration practices in the pharmaceutical sector, although variability in responses suggests room for enhancing uniformity and depth of supplier collaboration.

Table 3: Supplier Collaboration

	SD	D	N	A	SA	Mean	SD
We collaborate with our suppliers to develop and implement risk mitigation strategies	1.89%	3.14%	17.61%	48.43%	28.93%	3.99	0.88
We actively collaborate with suppliers to develop joint production and delivery schedules	8.81%	6.29%	5.66%	41.51%	37.74%	3.93	1.22
Suppliers participate in strategic decision-making related to supply chain operations	6.92%	11.32%	6.29%	50.31%	25.16%	3.75	1.16
Our company and suppliers engage in joint sales predictions	5.66%	6.29%	4.40%	40.25%	43.40%	4.09	1.11
Our firm has adopted vendor-managed inventory	9.43%	8.81%	6.92%	54.09%	20.75%	3.68	1.18
We utilize shared IT systems to ensure seamless communication and data sharing between our company and our suppliers.	1.89%	10.69%	6.92%	56.60%	23.90%	3.9	0.95
Aggregate mean						**3.89**	**1.08**

4.3.2 Descriptive Results for Performance

The respondents were also asked to indicate their perspectives on the performance of their pharmaceutical firms. Table 4 shows the responses. Results indicated that 69.18% of the participants attested to consistent improvement in their firm's profitability over the past three years. In contrast, 16.99% challenged this view while 13.84% expressed no definitive opinion. The mean score of 3.72 and a standard deviation of 1.04 indicate a generally positive trend, albeit with moderate dispersion. This pattern suggests that most firms have maintained profitability, possibly through cost optimization or improved sales volumes. However, the presence of dissenting responses signals that some firms may still face financial constraints or market volatility. As observed by Endri et al. (2020), firm-level profitability often hinges on both internal efficiencies and external economic dynamics.

When asked about market share growth, 64.15% affirmed progress, 26.41% disagreed, and 9.43% remained indifferent. The mean value stood at 3.52 with a standard deviation of 1.31, revealing the widest variation among all performance indicators. The elevated standard deviation suggests inconsistency in market share gains across the firms, meaning that some firms had successfully gained an increase in market share, and others were struggling or experienced fluctuations from time to time. According to Ali et al. (2021), shifts in market share are often shaped by how effectively firms respond to evolving customer demands and competitive threats. Customer satisfaction received immense agreement from 79.24% of the respondents, while 9.43% disagreed and 11.32% were ambivalent. The mean was 4.03, and the standard deviation was 0.91. The findings imply that many firms have invested in customer-centric strategies such as service responsiveness, product quality, and feedback mechanisms to enhance satisfaction outcomes (Antony et al., 2022).

In terms of service delivery improvements, 83.64% of the respondents acknowledged progress, only 10.07% negated the claim, and 6.29% remained indifferent. The mean score of 4.00 and standard deviation of 0.90 reinforce a positive performance trend, pointing to enhanced service delivery across most of the pharmaceutical firms. This resonates with Ali (2020) that service delivery effectiveness is closely linked to supply chain maturity and internal coordination. Order fulfillment accuracy received the strongest affirmation, with 79.25% endorsing it and just 2.52% expressing contrary views. Meanwhile, 18.24% expressed neutrality. The highest mean score of 4.20 and the lowest standard deviation of 0.83 among all variables signal strong consistency and operational reliability in meeting order specifications across the pharmaceutical firms. This is in line with Ngundi's (2022) findings that firms that excel in order accuracy often benefit from increased customer trust and reduced returns.

On the question of lead time reduction, 77.98% indicated improved performance, 8.80% disagreed, and 13.21% neither confirmed nor denied any change. The mean of 3.88 and the standard deviation of 0.92 suggest that most firms have made strides in enhancing their delivery speed, possibly through supplier rationalization, process automation, or route optimization. Makaleng and Lambert (2021) assert that shortening lead times contributes to greater responsiveness and improved customer satisfaction. The average composite score across all six indicators was 3.89, with an aggregate standard deviation of 0.99. This result confirms a generally strong performance profile among pharmaceutical firms, though with noticeable variability in market share and profitability.

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Table 4: Performance of Pharmaceutical Firms

	SD	D	N	A	SA	Mean	SD
The firm's profitability has improved consistently in the last 3 years	2.52%	14.47%	13.84%	47.17%	22.01%	3.72	1.04
The firm's market share has improved in the last 3 years	10.69%	15.72%	9.43%	38.99%	25.16%	3.52	1.31
The customer satisfaction index has improved in the last three years	0.00%	9.43%	11.32%	46.54%	32.70%	4.03	0.91
Service delivery has improved in the last three years	1.26%	8.81%	6.29%	55.97%	27.67%	4.00	0.9
The firm has achieved order fulfilment accuracy	0.00%	2.52%	18.24%	35.85%	43.40%	4.20	0.83
The lead times have significantly reduced	3.14%	5.66%	13.21%	55.97%	22.01%	3.88	0.92
Average						**3.89**	**0.99**

4.4 Correlation Analysis

This section presents the results of the Pearson's correlation analysis conducted to determine the nature and strength of the relationship between supplier collaboration and pharmaceutical firms' performance in Nairobi City County, Kenya. A correlation coefficient value ranging from ±0.90 to ±1.00 indicates a very strong relationship, while values between ±0.70 and ±0.89 reflect a strong relationship. A moderate relationship is represented by coefficients between ±0.50 and ±0.69, and a weak relationship falls between ±0.30 and ±0.49. Very weak relationships are identified when the coefficient lies below 0.3.

The correlation analysis revealed a strong and statistically significant positive relationship between supplier collaboration and performance ($r = 0.767$, $p = 0.001 < 0.05$). This indicates that supplier collaboration and firm performance move in the same direction. The results align with Baah et al. (2022), who stressed that collaborative supplier engagement is significantly correlated to quality, delivery reliability, and overall firm competitiveness.

Table 5: Correlation Analysis

		Performance	Supplier Diversification
Performance	Pearson Correlation	1	
	Sig. (2-tailed)		
Supplier Collaboration	Pearson Correlation	.767**	1
Performance	Pearson Correlation	1	

** Correlation is significant at the 0.01 level (2-tailed).

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4.5 Regression Analysis

This section displays regression analysis outcomes undertaken to examine the extent to which supplier collaboration predicts the performance of pharmaceutical firms in Nairobi City County, Kenya.

Table 6: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.767a	0.588	0.585	0.50667

a Predictors: (Constant), Supplier Collaboration

As shown in Table 6, the model summary indicates that supplier collaboration demonstrates a strong explanatory power on performance among pharmaceutical firms. The coefficient of determination (R^2) was 0.588, suggesting that 58.8% of the variation in performance can be accounted for by supplier collaboration. The remaining 41.2% is linked to other variables not examined in this study.

Table 7: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	57.473	1	57.473	223.882	.000b
	Residual	40.304	157	0.257		
	Total	97.777	158			

a Dependent Variable: Performance

b Predictors: (Constant), Supplier Collaboration

ANOVA results in Table 7 confirm the reliability of the model in explaining the relationship between supplier collaboration and pharmaceutical firms' performance. The model produced an F statistic of 223.882, which exceeds the critical F value of 2.44 at the 5% significance level (Fcal = 223.882> Fcrit = 2.44). Additionally, the corresponding p-value of 0.000 is well below the 0.05 threshold, reinforcing the statistical significance of the model. This outcome indicates that supplier collaboration provides a meaningful explanation for differences in performance across the firms analyzed.

Table 8: Regression coefficients for Supplier Diversification and Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.768	0.216		3.557	0.000
	Supplier Collaboration	0.803	0.054	0.767	14.963	0.000

a Dependent Variable: Performance

From the findings in Table 8, the constant value ($\alpha = 0.768$) implies that in the absence of supplier collaboration, performance would decline by 0.768 units.

The regression coefficient for supplier collaboration was 0.803 with a p-value of 0.000 (β = 0.803, p = 0.000), indicating a strong and statistically significant influence on performance. A unit increase in supplier collaboration is expected to improve performance by 0.803 units. This finding is consistent with Baah et al. (2022), who argued that effective supplier collaboration enhances responsiveness and promotes sustainable operational performance in manufacturing organizations.

The resultant regression model was:

Performance = 0.768+ 0.803 (Supplier Collaboration) + ε

4.6 Discussion of Findings

The analysis showed that pharmaceutical firms in Nairobi City County have increasingly adopted supplier collaboration practices as a means of improving their overall performance. Many firms actively engage their suppliers in joint planning, risk mitigation, sales forecasting, and inventory coordination, demonstrating a commitment to building strong and cooperative relationships. This collaboration is further supported by the use of shared information systems, which enhance communication and data exchange between firms and their suppliers. Supplier involvement in strategic decision-making also appears to be a common practice, fostering alignment and mutual understanding in supply chain operations. While the adoption levels vary slightly across firms, the overall perception of supplier collaboration was largely positive, and statistical analysis confirmed a strong and significant relationship between this collaborative approach and improved firm performance. This suggests that pharmaceutical companies that focus on supplier relationships tend to accomplish operational efficiency, strategic cohesion, and long-term competitiveness within the evolving healthcare market.

5. Conclusion

It was concluded that collaborating with suppliers to develop and implement risk mitigation strategies is associated with improved customer satisfaction and service delivery. Furthermore, it was concluded that jointly planning production and delivery schedules with suppliers correlates with increased accuracy in fulfilling orders and aligning supply chain activities. A conclusion was made that involving suppliers in strategic decision-making contributes to expanded market share and greater responsiveness to customer demands. Additionally, the findings suggest that engaging in joint sales forecasting and adopting vendor-managed inventory systems leads to shorter lead times and enhanced inventory control. Lastly, the use of shared IT systems with suppliers was found to positively influence communication and data accuracy, thereby enhancing the overall performance of pharmaceutical firms.

6. Recommendations

It is recommended that pharmaceutical companies in Nairobi City County increase and formalize supplier collaboration processes to improve overall performance. Suppliers should be actively involved in strategic decision-making, cooperative production planning, and risk mitigation activities to improve operational efficiency, responsiveness, and market competitiveness. Using common IT systems and data-sharing platforms can improve communication, accuracy, and collaboration throughout the supply chain. Furthermore, adopting methods such as joint sales forecasting and vendor-managed inventory systems is recommended to shorten lead times, optimize inventory control, and ensure product delivery

on time. Pharmaceutical firms can make long-term improvements in service delivery, customer happiness, and performance by implementing collaborative techniques.

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