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Supply Chain Risk and Performance of Food and Beverage Manufacturing Firms in Nairobi City County, Kenya

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Abstract

The food and beverage manufacturing sector serves as a vital engine for Kenya's industrial growth, contributing to the Gross Domestic Product (GDP) and national food security. However, this sector is increasingly vulnerable to complex supply chain risks that threaten its stability and long-term viability. This study investigates the relationship between supply chain risk and the performance of food and beverage manufacturing firms within Nairobi City, Kenya. The research is driven by the persistent challenges that local firms face, including unpredictable raw material availability, logistical infrastructure deficits, currency fluctuations affecting imports and the lack of real-time visibility across globalized supply networks. These disruptions often lead to increased operational costs, stockouts and reduced market share. The primary objective of this study is to assess the influence of four critical risk dimensions: supply risk, demand risk, operational risk and information risk, on the multi-dimensional performance of these firms. Furthermore, the study adopts a descriptive research design, which is appropriate for documenting the current risk landscape and firm responses in a systematic manner. The target population includes registered food and beverage manufacturing firms operating in Nairobi, chosen for its status as the country's industrial hub. A structured questionnaire, designed with Likert-type scales, was the primary data collection tool, targeting supply chain managers, procurement officers and operations directors. Data analysis was conducted using descriptive statistics, including frequencies, percentages, mean scores and standard deviations, facilitated by the Statistical Package for Social Sciences (SPSS) version 29. The findings revealed that logistics risks are the most severe disruptors (77.6%), primarily driven by infrastructure bottlenecks and high freight costs. Operational risks (73.4%) were impacted by power instability, while supplier risks (73.2%) stemmed from agricultural value chain disruptions and lead-time variances. Although information risks ranked lowest (71.4%), the lack of real-time visibility and advanced digital tools acted as a silent inhibitor of efficiency. The analysis of firm performance (64.8%) highlighted a significant disparity between market success and financial stability. The study concluded that firms are absorbing high costs of inventory and utility failures to protect service levels, which is financially unsustainable in the long term. Recommendations emphasize a change from reactive to structural resilience through localized sourcing, collaborative logistics, government energy subsidies and the adoption of Industry 4.0 technologies.

Keywords: *Supply Chain Risk, Firm Performance, Food and Beverage Manufacturing, Nairobi City County, Kenya*

1.0 Background of the Study

The food and beverage manufacturing sector occupies a critical position in ensuring food security, supporting employment and driving economic growth in both developed and developing countries. Globally, this sector has experienced transformation due to technological advances, globalization and changing consumer preferences. However, these same dynamics have also increased the exposure of food and beverage supply chains to a wide range of risks. Therefore, understanding and managing these risks has become essential for sustaining performance. This is particularly evident in highly competitive markets where disruptions can quickly translate into financial losses and reputational damage.

Distributors, retailers and food and beverage companies depend on complex and interconnected supply networks involving multiple suppliers, manufacturers and logistics providers. This complexity, while favouring efficiency and scale, creates several points of failure. Alfaro and Chor (2023) show that globalization has intensified supply chain disruptions through cross-border dependence. The Producer Price Index of transportation and warehousing services in the US rose by 13.5% in 2022, increasing the cost of finished food items. The American Farm Bureau Federation confirmed that labour shortages disrupted production and distribution in nearly three-quarters of farmer cases, while geopolitical conflicts such as the war in Ukraine contributed to a 20% rise in international wheat prices by 2024 (Silvis et al., 2020). The UK food and beverage sector, valued at approximately €104.5 billion, also suffered trade barriers, raw material shortages and higher costs following Brexit, with 73% of businesses sustaining unanticipated supply chain losses (Dani & Deep, 2024).

In the African context, food and beverage markets are growing but remain highly vulnerable to internal and external disruptions. The continent's market is projected to grow from $5.95 billion in 2024 to $8.57 billion by 2031 (Statista, 2024). However, risks are substantial; Nigeria's food processing industry faces frequent interruptions from logistics delays, power outages and supply constraints (Okoumba et al., 2020). South Africa's dependency on imports and energy shortages worsens these risks, with fuel prices rising 23% in 2023, increasing transport and production costs (Tchonkouang et al., 2024). Egypt's currency fluctuations directly affect input costs since the country imports 60% of its wheat and 90% of its sugar and vegetable oils, making local production insufficient to absorb external shocks (Elzarka, 2021).

The food and beverage processing industry in Kenya is the country's largest manufacturing sub-sector, generating 33.4% of total manufacturing output (Kenya Food and Drink Report, 2022). Nairobi, as the main manufacturing hub, hosts more than half of the country's major food and beverage companies (Thuita et al., 2023). Manufacturers in Kenya face a complex network of suppliers and distributors extending beyond national limits. Bor (2021) describes that supply chains tend to be lean to save costs by reducing inventory, but this comes at the price of flexibility when common disruptions such as transport delays, input price spikes and power cuts arise. Various performance trends show that many firms experience slower growth and even profitability declines owing to continuous supply chain-related issues (Kenya Association of Manufacturers, 2024). The risk is worsened by limited local sourcing, exposing companies to exchange rate volatility and global market fluctuations (Deshpande et al., 2023). The research thus seeks to evaluate the relationship between supply chain risks and performance in Nairobi's food and beverage manufacturing sector.

1.1 Statement of the Problem

The food and beverage manufacturing sector in Nairobi is the basis of Kenya's industrial economy, contributing to the manufacturing sector's 7.8% share of the national GDP (KNBS, 2023). However, the sector is increasingly affected by supply chain vulnerabilities that undermine organizational stability. According to Ho, Zheng and Yildiz (2015), supply chain risks are no longer isolated events but integrated threats that can lead to total operational disruptions if not managed through empirical frameworks. In Nairobi, many firms continue to experience under-performance, fluctuating production outputs and high inventory carrying costs. Jüttner (2025) asserts that supply chain resilience is a prerequisite for firm performance; however, there is a distinct empirical gap regarding the specific interaction of risks such as supplier, logistics, operational and information risks within the confined context of Nairobi's manufacturing sector.

Supplier risks, affected by raw material quality and lead-time variability, have been identified as a primary cause of production interruptions. Christopher (2016) suggests that supplier instability is the most significant external threat to just-in-time systems, while Awino (2019) notes that Kenyan food firms face unique supplier unreliability due to agricultural value-chain disruptions, leading to a direct decline in customer satisfaction. Nairobi's unique infrastructure bottlenecks and regulatory delays at customs often result in high transit costs. The World Bank (2022) notes that logistics inefficiencies in Sub-Saharan Africa increase total landed costs by up to 40%. Internally, resource scarcity and equipment downtime hinder throughput, and many Nairobi-based firms fail to utilize advanced Material Requirement Planning (MRP) to mitigate these risks. A lack of real-time data visibility further leads to bullwhip effects where information silos cause inventory spoilage and stockouts (Lee et al., 2024). Despite these documented disruptions, there remains a critical lack of sector-specific research in Kenya that quantifies how these variables interact to impact firm performance, justifying the need for this study.

1.2 Research Objectives of the Study

i. To determine the effect of supplier risks on the performance of food and beverage manufacturing firms in Nairobi City.
ii. To evaluate the impact of logistics risks on the performance of food and beverage manufacturing firms in Nairobi City.
iii. To assess the influence of operational risks on the performance of food and beverage manufacturing firms in Nairobi City.
iv. To analyze the effect of information risks on the performance of food and beverage manufacturing firms in Nairobi City.

2.0 Literature Review

This chapter provides an all-inclusive review of the relevant literature relating to supply chain risk and its impact on the performance of food and beverage manufacturing firms. The section evaluates theoretical frameworks, empirical studies and existing knowledge to establish a strong foundation for the current research. The literature review aims to identify key concepts, identify research gaps and provide a framework for understanding the relationship between supply chain vulnerabilities and firm performance within the context of Nairobi City, Kenya.

2.1 Theoretical Framework

The Supply Chain Disruption Theory, first advanced by Christopher and Peck (2004) and later extended by Tang (2006), explains that supply chains are vulnerable to unforeseen and uncontrollable events including natural disasters, political unrest, pandemics, cyber-attacks and external shocks (Messina et al., 2020). The theory highlights that companies reliant on single or few suppliers for raw materials are at particular risk, as disruptions to any one node resonate downstream through the supply chain, affecting overall performance. This theoretical perspective is especially relevant within the context of food and beverage manufacturing firms in Nairobi, which often encounter delays, stockouts and customer dissatisfaction that undermine profitability and competitiveness. In this study, the theory provides a framework for examining how specific categories of risks, including inventory, operational and informational risks, affect the performance outcomes of the dependent variable.

The Contingency Theory, pioneered by Fiedler (1964) and later expanded by Lawrence and Lorsch (1967), suggests that there is no universally optimal way to organize or manage supply chains; instead, strategies must be tailored to fit the internal and external conditions facing a firm. The theory highlights that organizational effectiveness depends on aligning structures, processes and decision-making mechanisms with contextual factors such as resource availability, environmental uncertainty and competitive pressures (Bhatia & Kumar, 2023). Nairobi manufacturers express this adaptability by rerouting shipments, transferring production to alternative facilities and temporarily suspending supply of certain products during disruptions (Kaya & Kaya, 2023). Contingency Theory therefore acts as a reliable platform for examining how unique types of supply chain risk impair the operational efficiency and performance of food and beverage firms in Nairobi, arguing that managing supply chain risks is a dynamic and adaptive activity necessary to maintain reliable delivery, profitability and competitiveness.

The Relational View Theory (RVT), as articulated by Boholm and Corvellec (2011), contends that sustainable competitive advantage and supply chain resilience are outcomes of inter-organisational relations and cooperative capabilities. Trust in relationships allows open communication and information sharing that enhances supply chain performance. Collaboration is essential in Nairobi's food and beverage manufacturing sector, where industries greatly depend on their suppliers, distributors and logistics providers for punctuality, and most products are perishable, making real-time visibility critical (Chen & Kitsis, 2017). Secure data transmission platforms communicate timely information regarding order status, inventory and logistics for transparency and coordination (Iyer et al., 2014), thereby diminishing the need for large safety stocks, reducing operating costs and instilling greater delivery certainty. In this study, RVT provides a theoretical perspective on how internal communication-related risk factors, such as information flow inefficiencies, affect firm performance.

The Supply Chain Network Theory (SCNT) visualises supply chains as complex systems of interconnected organisations where the performance of each node affects the efficiency, resilience and competitiveness of the network as a whole (Hearnshaw & Wilson, 2013). In such a perspective, risks are not one-off incidents attributed to an individual node, but emerge from vulnerabilities and interdependencies rooted within the network. Disruptions in one part of the network, whether from unreliable suppliers, weak logistics providers or infrastructure bottlenecks, may propagate along the chain, building up risks and restricting firm performance. The Theory of Constraints (TOC) further concentrates on identifying

bottlenecks that constrain performance along supply chain processes and managing them to improve output, cut inventories and reduce costs (Modi et al., 2019). Viewed together, these theories provide a comprehensive multi-level foundation for understanding how supplier, logistics, operational and information risk factors collectively influence the competitiveness of Nairobi-based food and beverage manufacturers.

2.2 Conceptual Framework

A conceptual framework acts as an outline for the research, highlighting the key concepts and their relationships. The concept helps to visually represent how various variables are connected (Karpov, 2010). The conceptual framework below identifies the critical relationship between supply chain risk scopes and the overall performance of food and beverage manufacturing firms. It structures the independent variables into four distinct risk categories: supplier, logistics, operational and information risk. Supplier risk focuses on the reliability and quality of raw materials, while logistics risk addresses the complexities of distribution, for example, transit variances and customs delays, factors that are volatile in the food industry due to product perishability. Internally, the framework highlights operational risk through metrics like machine downtime and inventory spoilage, alongside information risk, which emphasizes the need of data accuracy and system uptime for continuous coordination. Therefore, the model serves as a strategic direction for manufacturers to strengthen resilience. Figure 1 presents the conceptual framework

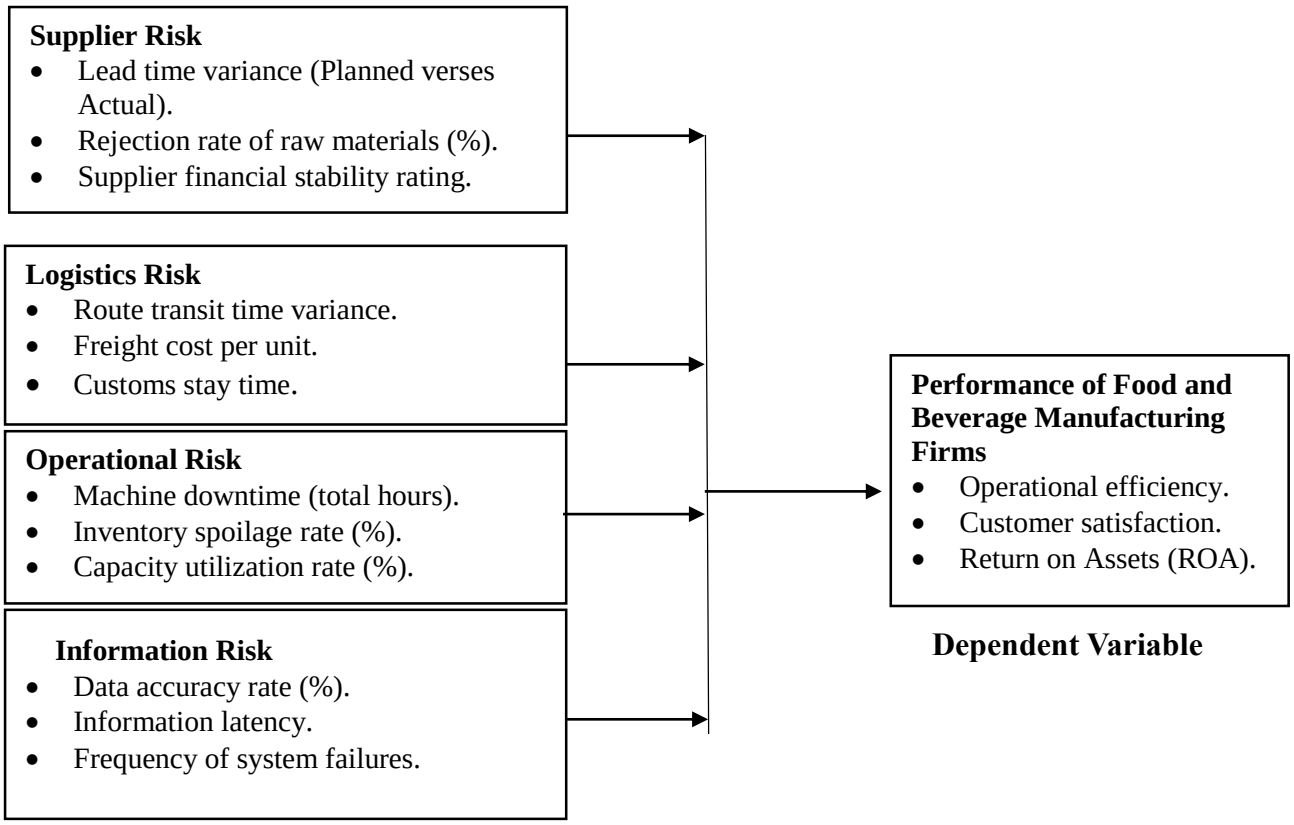

Figure 1: Conceptual Framework

Source: Author (2025)

2.3 Empirical Review

Supplier risks dictate the operational stability of manufacturing firms. Awino (2019) found a strong negative correlation between lead time deviations and quality non-conformance on one hand, and customer satisfaction levels on the other, among manufacturing firms in Kenya. Osoro and Muturi (2021) further established that supplier financial stability directly impacts a firm's ability to maintain lean inventory levels. Kamenya (2014) identified that lead time variance directly inhibited sales growth and customer service levels among large-scale beverage manufacturers in Nairobi, while suppliers with poor financial ratings were significantly more likely to trigger production halts that forced emergency procurement at premium rates, reducing profit margins. Research by Njiru et al. (2023) similarly established that supplier financial stability rating is a leading indicator of resilience, with high-risk suppliers frequently demanding advance payments that limited manufacturer working capital and hindered the ability to scale production.

Logistics efficiency is critical in the food and beverage sector due to product perishability. Mutua and Moronge (2023) emphasized that route transit time variance and freight cost per unit are the most significant predictors of margin erosion among Kenyan manufacturers. Kibe (2020) highlighted that customs dwell time remains a major bottleneck for firms in Nairobi, directly increasing the cost-to-revenue ratio and reducing the market competitiveness of local beverages compared to imported alternatives. Kariuki and Ngugi (2020) found that inbound and outbound logistics disruptions directly correlated with increased operational costs and reduced order fulfilment rates. Gitau and Kwasira (2021) further observed that poor warehouse climate control and Logistics Information System (LIS) failures caused high wastage levels, with manufacturers who integrated digital warehouse management systems achieving a 15% reduction in logistics-related overheads.

Internal production volatility often stems from equipment and resource constraints. Ochieng (2019) found that firms with high machine downtime experienced a decline in waste reduction percentages among Nairobi-based manufacturing firms. Wambua (2022) established that inventory spoilage rates in the food sector are a direct result of capacity constraints, confirming that operational throughput is a key driver of overall firm performance. Zhang et al. (2020) argue that uncertain production capacity represents a supply chain risk factor that can disrupt responsiveness and lead to missed demand, demonstrating that production capacity risk affects quick-response system performance and that ordering flexibility can help mitigate this risk.

The flow of data is as vital as the flow of goods. Daniel and Mwangangi (2020) explored the bullwhip effect in Kenyan supply chains, revealing that information silos lead to excessive inventory investments. Mulweye (2025) identified that frequency of system failures in ERP modules leads to order-to-delivery cycle delays, suggesting that digital resilience is a prerequisite for modern performance in the food and beverage industry. Jacobs et al. (2016) highlighted that poor internal communication is a critical risk factor causing production scheduling misalignments and inventory management errors. Their research using Social Capital Theory demonstrated that improved internal communication leads to higher employee satisfaction and better supply chain integration, ultimately leading to improved financial performance. The multidimensional performance of food and beverage firms is further shaped by participative leadership styles, intangible resource optimization and cost-leadership strategies, as demonstrated by Muchiri (2024), Osano and Namusonge (2025) and Ngenoh and Noor (2024) respectively.

3.0 Research Methodology

The study adopted a descriptive research design, which is appropriate as it allows for the collection of data that describes the characteristics of supply chain risks and their impact on the performance of food and beverage firms without manipulating the variables. The target population for this study consisted of key management and technical personnel within the food and beverage manufacturing firms in Nairobi City, Kenya, registered with the Kenya Association of Manufacturers (KAM). The study focused on a population of 142 key personnel across registered firms, categorized into six distinct professional roles including supply chain managers, logistics and transport managers, production and operations managers, procurement officers, ICT and systems administrators and finance and risk managers. Targeting specific professionals ensures that the data collected is from individuals with direct oversight of supply chain, logistics and operational risks.

A stratified random sampling method was utilized to sample individuals from the target population. This method entailed dividing the population into separate strata based on appropriate characteristics and conducting random sampling within each stratum to provide balanced representation, reduce selection bias and enable more valid and generalizable results. The sample size was determined using Yamane's (1967) formula, yielding a calculated sample of 104 key respondents. The study employed a questionnaire design to collect data, including both closed-ended and open-ended questions. The questionnaire implemented a five-point Likert scale to convert perceptions into numerical data suitable for correlation and regression analysis. Pilot testing was conducted with approximately 10% of the total sample (ten respondents) to assess clarity and comprehensiveness of the questionnaire using the Content Validity Index (CVI) and Cronbach's alpha. CVI scores for all variables ranged from 0.80 to 0.88, exceeding the minimum requirement of 0.78, while Cronbach's alpha coefficients ranged from 0.78 to 0.85, all above the threshold of 0.70, confirming strong internal consistency and validity. Quantitative data were analyzed using SPSS through descriptive statistics, Pearson correlation and multiple regression analysis, while open-ended qualitative responses were analyzed thematically.

4.0 Data Analysis and Presentation

This chapter presents the results and findings of the study based on the data collected from the field. The chapter is organized into several sections: response rate, demographic characteristics of the respondents and descriptive analysis organized by the study's specific objectives. The data was analyzed using frequencies, percentages, means and standard deviations, and supported by inferential statistics including Pearson correlation and multiple regression analysis.

4.1 Response Rate

The study targeted a sample size of 104 respondents from food and beverage manufacturing firms in Nairobi City. A total of 92 questionnaires were returned and found suitable for analysis, representing a response rate of 89.4%. According to Mugenda and Mugenda (2003), a response rate of 70% and above is excellent for analysis and reporting, confirming that the obtained response rate is satisfactory for statistical analysis and generalization.

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Table 1: Response Rate

Category	Number	Percentage (%)
Questionnaires Distributed	104	100.0
Questionnaires Returned and Valid	92	88.5
Unreturned or Invalid	12	11.5

4.2 Descriptive Statistics for Study Variables

This section provides the descriptive statistics for each of the five study variables, namely supplier risks, logistics risks, operational risks, information risks and firm performance. Each variable had six items rated on a five-point Likert scale with 1 indicating Strongly Disagree and 5 indicating Strongly Agree. The analysis covers the mean and standard deviation of each item and a discussion of the results. The means differ among items, with some indicating moderate levels and others high levels of risk presence or performance outcome. This difference represents the varied realities across the sampled firms and gives a balanced perspective of supply chain risk exposure in Nairobi City County.

Descriptive Statistics for Supplier Risks

The measure of supplier risks employed six items that evaluated the degree to which firms experience lead time variances, production delays from supplier unreliability, raw material rejection, supplier instability, financial instability of suppliers and agricultural value-chain disruptions. The respondents rated each item on a five-point Likert scale. Table 2 shows the mean and standard deviation of each item.

Table 2: Descriptive Statistics for Supplier Risk Items

Statement	Mean	Std. Dev.	Rank
Supplier instability as a major external threat	3.85	1.04	1
Agricultural value-chain disruptions lead to unreliability	3.85	1.02	2
Production delays due to supplier unreliability	3.67	1.08	3
Significant lead time variances between planned and actual	3.65	1.12	4
Financial instability or defaults of suppliers	3.55	1.15	5
High rate of raw material rejection due to non-conformance	3.36	1.21	6
Total Score	3.66	1.10	

The statistical findings reveal a total mean score of 3.66, corresponding to a total mean percentage of 73.2%, indicating a high occurrence of supplier-related risks within the industry. The highest levels of risk impact were recorded in supplier instability (Mean=3.85) and value-chain disruptions (Mean=3.85), equal rankings that highlight how

instability is often a direct consequence of broader agricultural value-chain failures such as seasonal fluctuations and political interference in farming sectors. The standard deviations for these variables, ranging from 1.02 to 1.21, indicate a moderate level of dispersion. The highest standard deviation was observed in raw material rejection rates (1.21), suggesting that quality-related risks vary from one firm to another, likely depending on the specific nature of the food product and the consistency of internal quality assurance. The mean score of 3.66 confirms that supplier risks are a main factor affecting firm performance, demanding supplier relationship management and diversification strategies to mitigate the impact of external shocks.

Descriptive Statistics for Logistics Risks

The second objective of the study was to evaluate the influence of logistics risks on firm performance. Six items evaluated the extent to which firms experience route transit fluctuations, high freight costs, regulatory and customs delays, infrastructure bottlenecks, physical flow disruptions and inefficient logistics systems. Table 3 provides the mean and standard deviation of each item.

Table 3: Descriptive Statistics for Logistics Risk Items

Statement	Mean	Std. Dev.	Rank
Nairobi infrastructure bottlenecks cause frequent delays	4.08	0.88	1
High freight costs negatively impact pricing and competitiveness	4.04	0.95	2
Inefficient regional logistics systems increase total landed costs	3.97	0.96	3
Route transit time fluctuations disrupt distribution schedules	3.86	1.01	4
Physical flow disruptions contribute to supply chain inefficiencies	3.83	1.02	5
Regulatory and customs delays hinder timely delivery	3.47	1.15	6
Total Score	3.88	1.00	

The statistical analysis reveals a high total mean score of 3.88, representing a mean percentage of 77.6%, which is higher than that of supplier risks (73.2%), indicating that logistics risks are perceived as more severe disruptors to firm performance. The highest-ranked risk, Nairobi infrastructure bottlenecks (Mean=4.08), is the only variable in the study to exceed a mean of 4.0, indicating a very high impact level and suggesting that the local operating environment presents a structural risk that individual firms find difficult to manage internally. High freight costs followed closely (Mean=4.04), confirming that logistics is a major cost centre for food and beverage firms. The low standard deviations

for these top two risks (0.88 and 0.95) indicate strong agreement among respondents that infrastructure and cost are universal challenges. The mean of 3.88 suggests that logistics risk critically pressures profit margins and delivery reliability, pointing to a need for investment in localized warehousing and fleet management technologies.

Descriptive Statistics for Operational Risks

The third objective of the study was to assess the influence of operational risks on firm performance. Six items evaluated the degree of machine downtime, inventory spoilage, capacity utilization struggles, production process bottlenecks, waste from poor management and power-related disruptions. Table 4 shows the mean and standard deviation for each item.

Table 4: Descriptive Statistics for Operational Risk Items

Statement	Mean	Std. Dev.	Rank
Power-related disruptions cause unscheduled factory shutdowns	3.98	0.98	1
Machine downtime and equipment failures reduce production throughput	3.75	1.06	2
Production process bottlenecks constrain operational output	3.69	1.02	3
Capacity utilization struggles due to internal resource scarcity	3.59	1.13	4
Poor internal management practices lead to increased waste	3.50	1.14	5
High rates of inventory spoilage due to production or storage delays	3.48	1.16	6
Total Score	3.67	1.08	

The statistical data reveals a total mean score of 3.67 (73.4%), identifying operational risk as a major disruptor. Power-related disruptions ranked highest with a mean of 3.98, confirming that utility reliability is the single most impactful operational variable. This high mean, coupled with a standard deviation below 1.00 (0.98), indicates a high degree of uniformity in this experience across the sampled firms, a finding that is particularly critical given that the food and beverage industry relies on continuous cold chains and energy-intensive processing. Machine downtime followed with a mean of 3.75, reinforcing the need for preventative maintenance schedules. The overall mean of 3.67 highlights that while firms can manage internal practices to some degree, they are delayed by external factors like power supply instability, which decreases capacity utilization and increases waste, pointing toward a need for investment in alternative energy sources.

Descriptive Statistics for Information Risks

The fourth objective of the study was to analyze the effect of information risks on firm performance. Six items evaluated data system inaccuracies, information latency, ICT downtime, lack of real-time visibility, poor internal communication and the lack of advanced digital tools. Table 5 shows the mean and standard deviation for each item.

Table 5: Descriptive Statistics for Information Risk Items

Statement	Mean	Std. Dev.	Rank
Lack of advanced digital tools limits supply chain performance	3.68	1.11	1
ICT downtime and system failures disrupt supply chain coordination	3.66	1.07	2
Lack of real-time visibility leads to the bullwhip effect	3.63	1.04	3
Information latency prevents real-time operational decisions	3.53	1.04	4
Data system inaccuracies lead to inventory management errors	3.47	1.18	5
Poor internal communication leads to scheduling misalignments	3.46	1.19	6
Total Score	3.57	1.11	

The descriptive statistics show a total mean score of 3.57 (71.4%), ranking information risks as the lowest of the four risk categories studied. However, the individual means for lack of advanced digital tools (Mean=3.68) and ICT downtime (Mean=3.66) indicate that these are still strong disruptors, with firms recognizing their technological obsolescence as a performance inhibitor. The standard deviations for information risks are among the highest in the study, ranging from 1.04 to 1.19, particularly for data inaccuracies and internal communication. This high spread indicates that information management quality varies considerably between firms, with some having modernized successfully while others struggle with outdated systems. The mean of 3.57 suggests that while information risks are less visible than a broken-down truck or a power outage, they act as indirect challenges that prevent firms from accurately predicting demand, thereby leading to the inventory spoilage and capacity utilization issues noted in earlier sections.

Descriptive Statistics for Firm Performance

Firm performance was assessed as the dependent variable through six items evaluating operational efficiency, delivery speed and reliability, ROA and profit margins, customer satisfaction, market share growth and response flexibility. Table 6 shows the mean and standard deviation for each item.

Table 6: Descriptive Statistics for Firm Performance Items

Statement	Mean	Std. Dev.	Rank
Customer satisfaction levels are high due to supply predictability	3.45	1.13	1
Delivery speed and reliability targets are consistently met	3.34	1.16	2
Response flexibility to market demands is high	3.28	1.12	3
Market share has been maintained or increased despite competition	3.21	1.18	4
High operational efficiency through minimizing costs and waste	3.12	1.19	5
Steady return on assets and improved net profit margins	3.02	1.22	6
Total Score	3.24	1.17	

The descriptive statistics reveal a total mean score of 3.24, translating to a performance level of 64.8%. This score is significantly lower than the mean scores for logistics risk (77.6%) and operational risk (73.4%), suggesting an inverse relationship where high-risk environments correlate with suppressed performance. The highest-ranked performance indicator is customer satisfaction (Mean=3.45), demonstrating that firms are effectively shielding their customers from supply chain disorder. The lowest-ranked indicator is ROA and profit margins (Mean=3.02), indicating that for many food and beverage firms in Nairobi, financial performance is barely at a break-even state due to the cumulative weight of supply chain risks. The standard deviation for profitability (1.22) is the highest in the entire study, indicating extreme volatility across firms. The overall mean of 3.24 indicates that while the industry is resilient enough to survive, it is struggling to thrive, validating the study's focus that without mitigating the identified risks, the long-term financial viability of the sector remains at risk.

4.3 Correlation Analysis

This section presents the Pearson product-moment correlation analysis conducted to determine the strength and direction of the relationship between supply chain risks and organizational performance among food and beverage manufacturing firms in Nairobi City County. The analysis was important because it provided an initial indication of whether improvements in risk management were linked to improved firm performance before conducting regression analysis. A negative correlation indicates that an increase in the severity of a supply chain risk is associated with a decrease in organizational performance. The results are presented in Table 7.

Table 7: Pearson Correlation Matrix

Variable	Supplier Risk	Logistics Risk	Operational Risk	Information Risk
Supplier Risk	1.000			
Logistics Risk	0.412	1.000		
Operational Risk	0.385	0.521	1.000	
Information Risk	0.298	0.443	0.487	1.000
Firm Performance	-0.645	-0.712	-0.688	-0.554

The results in Table 7 show that all supply chain risk categories had significant negative relationships with organizational performance. Logistics risk showed the strongest negative correlation (r = -0.712), indicating that firms experiencing more severe logistics disruptions report significantly lower performance outcomes. Operational risk followed closely (r = -0.688), with supplier risk also showing a strong negative relationship (r = -0.645). Information risk, while still significant, recorded the lowest negative correlation (r = -0.554). The positive inter-correlations among the risk categories, ranging from 0.298 to 0.521, suggest that the risks are interrelated and tend to compound one another. These findings confirm that all four practices were important in explaining firm performance, with logistics risk showing the closest negative association with SACCO performance.

4.4 Regression Analysis

This section presents the regression analysis conducted to determine the predictive influence of supply chain risks on organizational performance. Regression analysis was necessary because correlation only shows association, while regression shows the extent to which each risk category predicts firm performance. Multiple regression examined the combined effect of the four risk variables on firm performance and identified the strongest predictor among them. The results are presented in Tables 8, 9 and 10.

Table 8: Model Fitness Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.822	0.676	0.661	0.342

The model fitness results in Table 8 show that the combined supply chain risk variables had a strong relationship with organizational performance, as indicated by R = 0.822. The R Square value of 0.676 means that supplier risks, logistics risks, operational risks and information risks jointly explained 67.6% of the variation in firm performance in Nairobi City County. This indicates that the four risk categories are strong predictors of organizational performance when considered together. The Adjusted R Square value of 0.661 further shows that the model would explain about 66.1% of the variation in the wider population after adjusting for the number of predictors. Overall, the model had strong explanatory power.

Table 9: ANOVA: Overall Model Significance

Model	Sum of Squares	df	Mean Square	F	p-value
Regression	24.542	4	6.135	45.281	< 0.001
Residual	11.785	87	0.135		
Total	36.327	91			

The ANOVA results in Table 9 show that the overall multiple regression model was statistically significant, $F(4, 87) = 45.281$, $p < 0.001$. This means that the model using the four supply chain risk categories predicted firm performance better than a model without these predictors. The regression sum of squares was 24.542, while the residual sum of squares was 11.785, showing that a large portion of the variation in performance was explained by the supply chain risk variables. Since the p-value was well below 0.05, the model is considered statistically significant and suitable for further interpretation.

Table 10: Regression Coefficients

Variable	Unstandardized B	Std. Error	Standardized Beta (β)	t	p-value
Constant	1.242	0.214		5.81	< 0.001
Supplier Risk	-0.298	0.071	-0.275	4.20	< 0.001
Logistics Risk	-0.385	0.068	-0.362	5.66	< 0.001
Operational Risk	-0.310	0.074	-0.291	4.19	< 0.001
Information Risk	-0.198	0.079	-0.184	2.51	0.014

The regression coefficients in Table 10 show that all four supply chain risk categories had negative and statistically significant effects on firm performance. Logistics risk was the strongest negative predictor ($\beta = -0.362$, $p < 0.001$), meaning that when all variables were considered together, logistics disruptions made the greatest contribution to performance decline. Operational risk was the second strongest predictor ($\beta = -0.291$, $p < 0.001$), followed by supplier risk ($\beta = -0.275$, $p < 0.001$). Information risk, while recording the smallest effect, was still statistically significant ($\beta = -0.184$, $p = 0.014$). The negative coefficients confirm that an increase in any supply chain risk category is associated with a decline in organizational performance, with the effect being strongest for logistics risks, followed by operational risks, supplier risks and information risks.

5.0 Conclusion

The study concludes that supply chain risks are a prevalent and integrated threat to the food and beverage manufacturing sector in Nairobi, directly validating the concerns raised in the statement of the problem. The R-Square value of 0.676 confirms that nearly two-thirds of the performance fluctuations in the sector are directly attributable to the systemic

compounding effect of supplier, logistics, operational and information risks. Logistics and operational risks are the primary drivers of performance deprivation, acting as largely uncontrollable environmental constraints that inflate landed costs and disrupt production volatility specific to this sector.

The study also identifies a significant performance inconsistency. Despite documented disruptions, firms have shown remarkable resilience in maintaining high customer satisfaction (69.0%). However, this resilience is achieved through a survivalist strategy of costly cushioning, including maintaining high inventory levels and absorbing the financial shocks of power outages and transit delays. This confirms Jüttner's (2025) assertion that resilience is a prerequisite for performance, yet reveals that the current form of resilience in Nairobi is financially unsustainable, as evidenced by the low scores for Return on Assets (60.4%) and profit margins. A noteworthy digital divide also exists within Nairobi's manufacturing confinement, where the lack of real-time visibility and advanced MRP tools has created information rigidity that worsens the bullwhip effect. The study therefore concludes that improving the sector's competitive stance requires a multi-stakeholder approach to address the structural logistics and energy inefficiencies that currently limit firm-level productivity.

6.0 Recommendations

The study makes the following recommendations based on the findings and conclusions. First, food and beverage firms should pursue localized sourcing strategies to reduce overdependence on imported raw materials and limit exposure to exchange rate volatility and global freight disruptions. This risk-adjusted approach makes local sourcing more attractive despite potentially higher unit prices. Second, firms and industry associations should explore collaborative logistics arrangements where non-competing manufacturers share transport assets and warehouse facilities, thereby reducing per-unit freight costs and empty return trip inefficiencies that currently inflate landed costs.

Third, given that power-related disruptions were identified as the single most impactful operational variable, policymakers should provide industrial power subsidies or tax rebates for firms investing in off-grid renewable energy solutions. This intervention would decouple firm performance from utility-based risks, reducing machine downtime and batch losses. Fourth, dedicated freight lanes and improved road bypasses should be created specifically for industrial transport to separate commercial cargo from public commuter traffic, directly addressing the structural logistics bottleneck identified as the strongest predictor of performance decline. Fifth, to bridge the existing digital divide, SACCO regulators and industry associations should advocate for reduced import duties on advanced supply chain software and MRP systems to help local firms adopt predictive maintenance technologies and real-time visibility platforms. Sixth, firms should transition from reactive risk management to proactive, data-driven frameworks by investing in organizational learning cycles that analyze past disruptions, implement concrete mitigation strategies and continuously monitor the efficacy of those implementations over time.

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