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Building Resilient Retail Supply Chains: The Role of Supply Chain Risk Management in Organizational Performance

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Abstract

Supply chains face numerous risks, including terrorism, political instability, corruption, climate variability, utility failures, and natural disasters. Such disruptions interrupt daily operations, lower revenue streams, reduce customer satisfaction, and undermine business credibility. Over the last two decades, supply chain risk management strategies (SCRMS) have become essential tools for ensuring seamless flow of goods, enhancing resilience, and sustaining competitiveness. By applying continuity management approaches, resilient organizations can recover more rapidly from disruptions and maintain stable performance. This study investigated the effect of SCRMS on the performance of retail chain stores in Kenya. Findings revealed that SCRMS had a statistically significant impact on performance. Mixed-effect modeling showed a strong fixed effect on the employee level ($\beta = 0.618$, $Z = 17.030$, p-value = 0.000) and a significant random effect at the entity level (ICC = 15.8%, LR = 67.13, $p < 0.000$). Regression analysis of secondary data confirmed the influence, with 85.7% of performance variation explained ($R^2 = 0.857$, $F = 83.99$, $\beta = 0.391$, $t = 9.160$, $p < 0.001$). The study concludes that SCRMS are critical for boosting resilience, reducing disruption impacts, and ensuring profitability. Adoption of these strategies strengthens organizational agility and competitiveness, positioning retail chains to withstand the uncertainties of modern business environments.

Keywords

Business Continuity Management, Retail Chain Stores, Supply Chain Resilience, Supply Chain Risk Management, Supply Chain Risk Management Strategies (SCRMS), Supply Chain Vulnerability, Organizational Performance

1. Introduction

Kenya's retail sector plays a vital role in the national economy, contributing significantly to GDP growth. According to the Kenya Economic Survey (2012), wholesale and retail trade accounted for 18.5% (Panigrahi, Bahinipati, & Jain, 2019) of GDP growth over five years, second only to transport at 20%. Despite this contribution, many retail chains have faced performance decline, shrinking profitability, and in some cases closure. This trend is attributed to an increasingly volatile operating environment, intense competition, mismanagement, and uncontrolled expansion. To reverse this decline and restore competitiveness, adoption of supply chain best practices, particularly Supply Chain Risk Management Strategies (SCRMS), is essential. Kenya has experienced repeated disruptions that highlight the vulnerability of supply chains. Examples include the 2007 Budalangi floods that displaced thousands, the 2011 Sinai fire tragedy with over 100 casualties, the 2012 Murang'a landslides, the 2013 Westgate terrorist attack where Nakumatt supermarket was severely affected, the 2013 KEMSA fire that destroyed medical supplies, and the 2014 Mpeketoni terrorist attacks that caused deaths and displacement. These events disrupted supply chains across sectors, leading to human suffering, property loss, and significant revenue declines (Okuna, 2014).

In addition to external disruptions, internal challenges have strained Kenyan retailers. Once-dominant chains such as Nakumatt, Uchumi, and Tuskys collapsed under financial and operational pressures, including liquidity crises and inadequate risk management. These failures underscore the urgent need to understand supply chain risks, evaluate suitable mitigation measures, and assess their impact on retail performance. This study therefore sought to evaluate the influence of SCRMS on the performance of retail chain stores in Kenya. By examining strategies such as avoidance, postponement, speculation, hedging, control, and risk transfer/sharing, the research aimed to determine how continuity planning can improve profitability, delivery reliability, cost efficiency, and sales turnover

2. Theoretical Review

2.1. Systems Theory

Open Systems Theory views firms as complex entities that constantly interact with their internal and external environments. Thompson (1967) argued that organizations are open systems that operate under uncertainty but still strive for rationality and stability. This theory emphasizes two key elements: uncertainty and openness. Haffar and Searcy (2018) note that openness highlights the interdependence between organizations and their environments, while Scott and Davis (2015) explain that external forces inevitably shape organizational operations. In supply chains, disruptions interfere with the normal flow of goods, creating vulnerabilities (Kanike, 2023). Azadegan et al. (2020) add that the magnitude of disruption impacts depends on the continuity measures in place. Ivanov and Dolgui (2020) extend this concept with the idea of "intertwined supply chains", which are highly connected networks that exhibit multiple, dynamic behaviors and face unique risks. Ivanov et al. (2019) emphasize that recovery speed and time must be considered when designing resilience strategies, underscoring the importance of systems thinking in supply chain risk management.

2.2. Normal Accident Theory (NAT)

Normal Accident Theory, proposed by Perrow (1984), argues that in complex socio-technical systems, accidents are inevitable due to tight coupling and interactive complexity. Supply chains exemplify such systems: they consist of interdependent components, minimal buffers, and time-sensitive processes. In tightly coupled chains, small disturbances can cascade quickly, resulting in widespread disruption (Chadist, 2012). Critics argue that NAT is overly pessimistic. Rijpma (2003) suggests that while accidents may be likely, organizations can design safeguards to reduce their impact. Shah and Wiese (2021) show that NAT principles can guide strategies such as introducing redundancy and building flexibility. Complexity in supply chains is further influenced by supplier numbers, diversity, and interrelationships (Choi & Krause, 2006). Daft (2006) and Bode and Wagner (2015) categorize complexity into spatial (geographic dispersion), horizontal (number of suppliers), and vertical (tiers of the supply chain). These dimensions increase uncertainty and reduce transparency, requiring effective risk management (Boonlua et al., 2023).

2.3. Agency Theory

Agency Theory focuses on the relationships between principals and agents, where differences in objectives and information asymmetries create risks (Eisenhardt, 1989). In supply chains, these relationships often involve buyers and suppliers, where trust, incentives, and transparency are critical. Risks are heightened when agents act in self-interest, deviating from the principal's objectives (Chadist, 2012). Cheng and Kam (2008) argue that agency theory helps explain how supply chain actors respond to risks beyond their control. Aigbogun et al. (2022) emphasize that modern supply chains consist of multiple principal-agent relationships, each contributing to the overall value delivered to the end customer. Information sharing between principals and agents is therefore vital in reducing disruptions and strengthening continuity strategies.

2.4. Empirical Review

Supply chain risk management requires strategies that address the full range of vulnerabilities across networks. Cohen and Kunreuther (2007) note that the main challenge for stakeholders is developing comprehensive approaches that can manage multiple risks simultaneously while leveraging relationships among partners. Bandaly et al. (2012) emphasize that strategic risk management involves identifying, assessing, and selecting strategies that reduce both the probability and consequences of adverse events. Manuj and Mentzer (2008a, 2008b) classify supply chain risk strategies into six key categories: acceptance, avoidance, postponement, speculation, hedging, and risk transfer/sharing, with control strategies providing preventive measures. Acceptance is suitable when risks are minor, and mitigation costs outweigh potential losses (Mishra et al., 2018). Avoidance applies when operating in risky markets, collaborating with unreliable suppliers, or engaging in unacceptable levels of uncertainty. This strategy may involve exiting certain relationships or shifting sourcing to safer markets (Giannakis & Papadopoulos, 2016; Lu et al., 2019; Hajmohammad & Vachon, 2016; Um & Han, 2021).

Postponement delays activities such as manufacturing, packaging, or distribution until demand becomes clearer. Wu et al. (2020) and Yang and Yang (2010) note that this helps firms remain flexible while reducing exposure to demand volatility. Dong et al. (2022) add that postponement optimizes inventory in uncertain environments, while Prataviera et al. (2020) and Chhetri et al. (2022) show that the degree of postponement depends on customization levels, product modularity, and life cycles. Speculation, in contrast, involves committing resources early to benefit from economies of scale. While effective in stable markets, it exposes firms to risks in volatile environments (Chanchaichujit et al., 2020; Um & Han, 2021). Hedging spreads risks across suppliers, contracts, or facilities. Tang and Musa (2011) and Chanchaichujit et al. (2020) note that multiple sourcing and contracts help mitigate disruptions by reducing dependency on a lone source.

Risk transfer or sharing shifts responsibility to third parties through contracts, insurance, or outsourcing. Huo et al. (2014) and Wiengarten et al. (2016) show that such approaches reduce exposure but require effective governance. Finally, control strategies involve strengthening supplier relationships, reducing supply chain length, or vertically integrating operations. Giannakis and Papadopoulos (2016) and Tarafdar and Qrunfleh (2017) argue that these strategies reduce uncertainty and build resilience. Across contexts, Lopes et al. (2022) emphasize that no single strategy is sufficient; rather, firms must adopt portfolios aligned with their operational environments. Postponement works well in high-demand uncertainty, hedging is suitable for sourcing risks, and control strategies are effective when governance is weak. Collectively, these approaches improve adaptability, reduce downtime, and enhance resilience in sourcing, production, and delivery.

In Africa, studies highlight the need for resilience-building despite resource constraints. Tukamuhabwa et al. (2017) found that Ugandan firms improved supply chain resilience by investing in redundancy, collaboration, and flexibility. Pereira et al. (2019) stressed that procurement plays a significant role in developing continuity strategies, while Okuna (2014) identified weak continuity management in Kenyan public institutions as a key vulnerability. Kenya's retail sector has been particularly exposed to risks. The collapse of major retailers such as Nakumatt, Uchumi, and Tuskys has been linked to liquidity challenges, governance weaknesses, and poor risk management practices. Sakura (2018) showed that embedding continuity planning improved efficiency and profitability in Nairobi's security firms, while Iddrisu (2022) demonstrated similar benefits for Ghanaian companies. More recently, resilient players such as Naivas and Quickmart have sustained growth by adopting continuity practices and building stronger supplier partnerships.

Although global literature on SCRMS is rich, evidence in developing contexts remains limited, especially in the retail sector. Most studies have relied on conceptual or case-based approaches, while few have applied large-scale survey designs or advanced statistical modeling. This study addresses these gaps by employing both primary and secondary data, applying multilevel mixed-effect modeling, and focusing specifically on Kenyan retail chain stores (Figure 1).

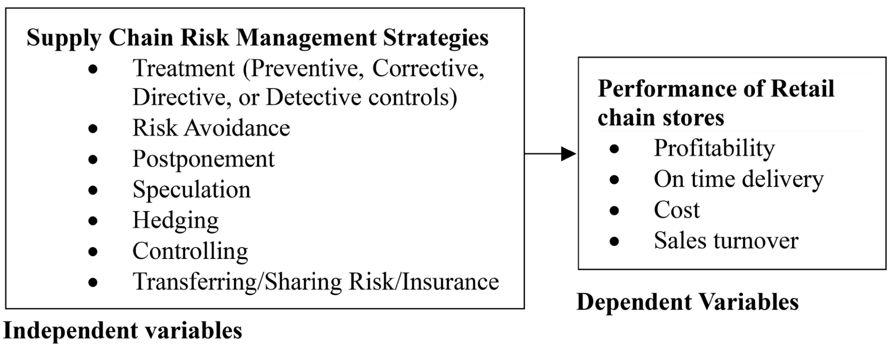

Figure 1. Conceptual framework.

3. Research Methodology

This study employed a longitudinal survey design within a positivist research philosophy, making it suitable for examining the relationship between supply chain risk management strategies (SCRMS) and retail chain performance in Kenya. The design allowed the collection of quantitative data from multiple respondents at one point in time, facilitating hypothesis testing using advanced statistical techniques. The study focused on seventeen (17) retail chain stores selected from Kenya's retail sector to provide a representative mix of large and medium-sized firms with significant operational footprints and established supply chain structures. These firms accounted for a target population of 23,031 employees, from which a sample of 1730 managers, supervisors, and supply chain personnel was developed. Using a multistage sampling procedure and probability proportional to size (PPS) sampling, a representative sample of 315 respondents was drawn and proportionately distributed across the selected retail chains.

In line with Heck et al. (2013), the study adopted a linear mixed-effects model because the data exhibited a hierarchical structure, with observations nested within higher-level organizational units. The mixed-effects approach enabled the simultaneous estimation of relationships at various levels while accounting for variations attributable to both individual and organizational characteristics. The analysis was limited to two levels, whereby employees constituted Level 1 units, representing the smallest unit of observation, while the retail chain stores constituted Level 2 units (entities/clusters). Since the study sought to examine performance differences across organizations while controlling employee-level perceptions, the retail chain stores were treated as a random sample drawn from a larger population of retail entities, thereby generating random effects at Level 2. The multilevel modelling framework was therefore appropriate as it accommodated the nested structure of the data and enabled the assessment of both within-entity and between-entity variations in organizational performance.

Fixed effects represented employee-level perceptions, while random effects accounted for performance variation across entities. Supply Chain Risk Management Strategies (SCRMS) were operationalized as a multidimensional construct comprising six interrelated risk mitigation dimensions: risk avoidance, postponement, speculation, hedging, controlling, and risk transfer/sharing. These dimensions were measured using multiple Likert-scale items adapted from established supply chain risk management literature, with respondents indicating the extent to which each practice was implemented within their organizations.

Risk avoidance assessed actions aimed at eliminating exposure to undesirable risks; postponement measured the extent to which operational decisions were delayed until uncertainty was reduced; speculation captured proactive commitments undertaken in anticipation of future market conditions; hedging evaluated the use of multiple sourcing and diversification strategies to mitigate risk exposure; controlling measured the implementation of preventive and corrective controls designed to reduce vulnerabilities; while risk transfer/sharing assessed the extent to which risks were allocated to third parties through mechanisms such as insurance, outsourcing, contracts, and strategic partnerships.

Composite scores for each dimension were computed from their respective indicators and subjected to reliability and validity assessments before analysis. Subsequently, the six dimensions were aggregated through factor analysis to generate a single latent SCRMS construct, which served as the principal predictor variable in the multilevel regression models. Consequently, while the descriptive analysis examined each SCRMS dimension separately to provide detailed insights into specific risk mitigation practices, the inferential analysis utilised the aggregate SCRMS variable to estimate the overall effect of supply chain risk management strategies on the performance of retail chain stores.

However, variation in performance and the predictors is also expected at level 1 (fixed effects) as each employee is to respond based on their opinion of performance of the firms as designed in the data collection tool. The random-intercept model at the employee level with level-1 predictor would be specified at level 1 and level 2 in hierarchical form separately as;

$$Y_{ij} = \gamma_{0j} + \beta_1 X_{ij} + \varepsilon_{ij}$$

$$\gamma_{0j} = \beta_{0j} + \mu_{0j}$$

The second equation can be substituted into the first equation to yield a formulation given by;

$$Y_{ij} = \beta_{0j} + \beta_1 X_{ij} + \mu_{0j} + \varepsilon_{ij}$$

In the equations:

Y_{ij} is the performance as perceived by employee *i* nested for entity *j;*

X_{ij} is the measurement of predictor variable X as perceived by employee *i* nested for entity *j;*

β_1 is the coefficient of X at level 1;

γ_{0j} is the intercept which has a separate specification equation due to the two levels assumed to cause variation in performance. In the intercept equation;

β_{0j} is the level 1 intercept which is the average performance for the entire population; and

μ_{0j} is the entity specific effect (cluster specific) random intercept.

The independent predictor of the study is Supply Chain Risk Management Strategies (SCRMS), which are treated as covariates expected to influence the performance of retail chain stores. Therefore, variations in performance are not solely due to Level 1 effects but also to variations in the independent variables modeled as Level 2 random-effect covariates. The study thus adopted multilevel random coefficient modelling (MRCM) as the technique model's random coefficient estimates as proposed by Nezlek (2012). The correct specification would therefore include the covariates (independent variables) in the intercept equation, such as;

$$Y_{ij} = \gamma_{0j} + \beta_1 X_{1ij} + \beta_2 X_{2ij} + \varepsilon_{ij}$$

$$\gamma_{0j} = \beta_{0j} + \mu_{1j} X_{1ij} + \mu_{2j} X_{2ij} + \mu_{0j}$$

The second equation can be substituted into the first equation to yield a formulation given by;

$$Y_{ij} = \beta_{0j} + \beta_1 X_{1ij} + \mu_{1j} X_{1ij} + \mu_{0j} + \varepsilon_{ij}$$

where;

Y_{ij} Performance as perceived by employee *i* nested for entity *j;*

X_{ij} Measurement of predictor variable X as perceived by employee *i* nested for entity *j;*

β_1 Coefficients (slope) of the predictors at level 1;

μ_{1j} to μ_{2j} Cluster-specific random slopes (coefficients) of the predictors;

γ_{0j} intercept which a separate specification equation due to the two levels has assumed to cause variation in performance in the intercept equation;

β_{0j} Level 1 intercept which is the average performance for the entire population; and

μ_{0j} The entity specific effect (cluster specific) random intercept.

To confirm the validity of the models: Normality was tested using Q-Q plots, Shapiro-Wilk, and Jaque-Bera tests; Homoscedasticity was examined using residual scatterplots; Autocorrelation was tested using the Durbin-Watson statistic; and Multicollinearity was checked through Variance Inflation Factor (VIF), all values being < 10. Results confirmed that assumptions of homoscedasticity, multicollinearity, and autocorrelation were met, though normality was partially violated; this justified the use of bootstrapped REML estimates.

The quality of the survey instrument was established through pilot testing, validity assessment, and reliability analysis before the main study. A pilot study was conducted to evaluate the clarity, relevance, and suitability of the questionnaire items. Content validity was assessed through expert review and the Content Validity Index (CVI), while construct validity was confirmed using Exploratory Factor Analysis (EFA). Reliability was evaluated using Cronbach's alpha coefficient, with all SCRMS and performance constructs exceeding the recommended threshold of 0.70, indicating satisfactory internal consistency. These results confirmed that the questionnaire was valid and reliable for measuring Supply Chain Risk Management Strategies and organizational performance.

In addition to the questionnaire data, secondary data was collected from the seventeen (17) retail chain stores included in the study over a three-year period. The data were obtained from audited financial statements, management accounts, procurement records, logistics reports, inventory records, and sales reports. Profitability was measured using net profit and profit margin data, delivery performance through order fulfillment and on-time delivery records, cost efficiency using procurement, inventory, warehousing, transportation, and operating cost reports, and sales turnover using annual sales revenue records. The firm-level performance data were matched with survey responses on the six Supply Chain Risk Management Strategy (SCRMS) dimensions by aggregating managerial responses at the organizational level and linking them to the corresponding performance records. This integration of primary and secondary data enhanced the validity of the findings and reduced common method bias in assessing the relationship between SCRMS and performance of retail chain stores in Kenya.

Out of the 315 questionnaires administered, 288 were returned, representing a response rate of 91.43%. After data screening, twenty-four questionnaires with more than 10% missing data were excluded, leaving 264 valid responses for analysis. The multilevel mixed-effects models were therefore estimated using 264 employee-level observations nested within sixteen retail chain stores, with respondent observations treated as Level 1 units and retail chain stores as Level 2 clusters. For the secondary data analysis, performance was assessed using firm-level records from sixteen retail chain stores. The secondary performance indicators included gross profit margin derived from net revenue and direct expenses, delivery-time ratio, order lead time, cost-related measures, and sales turnover records. Although the secondary data covered a five-year period, the regression models reported in the results were based on the sixteen retail-chain-level observations.

4. Findings

The effect of SCRMS on the Performance of Retail Chain stores was also assessed by fitting a bivariate regression model with supply chain risk management strategies as the predictor. First, the supply chain risk management strategies were included in the model (M41) as a level 1 predictor to assess the fixed effects without including it as a level 2 covariate. The results of this model are presented in Appendix III, which demonstrates a significant fixed effects model with a significant random intercept at level 1.

To assess the level 2 random effect of supply chain risk management strategies on the Performance of Retail Chain stores, the predictor was included in the random effect component of the model (M12) as a random covariate. The results of the analysis are shown in Table 1. According to the results, supply chain risk management strategies have a significant coefficient estimate (β = 0.618, Z = 17.030, *p*-value = 0.000) as a level 1 variable in the fixed effects components. The random effect component of the model (level 2) was also found to be significant with random intercepts only, without including the random slope.

The random component, however, remains significant, as indicated by the LR statistic (67.13), which has a p-value of less than 0.05 and an intra-class correlation

Table 1. Effect of supply chain risk management strategy on performance.

Mixed-effects REML regression				Number of obs	=	264
Group variable: Retail store				Number of groups	=	16
		Obs per group:		Min	=	8
				Avg	=	16.5
				Max	=	48
				Wald chi^2 (1)	=	290.01
Log restricted-likelihood = −243.23564				Prob > chi^2	=	0.000

Performance (fac1_1_y)	Observed Coef.	Bootstrap Std. Err.	Z	$p > z$	Normal-based [95% Conf. Interval]	
SCRMS (fac1_4)	0.618	0.036	17.030	0.000	0.547	0.689
_cons	−0.029	0.042	−0.700	0.484	−0.111	0.053

Random-effects Parameters	Observed Estimate	Bootstrap Std. Err.	Normal-based [95% Conf. Interval]	
Retail store				
sd(fac1_4)	0.361	0.057	0.266	0.491
sd(_cons)	0.245	0.065	0.146	0.412
sd(Residual)	0.565	0.035	0.500	0.639

LR test vs. linear regression: chibar2 (01) = 67.13 Prob >= chibar2 = 0.000

Level	ICC	Std. Err.	[95% Conf.	Interval]
Retail store	0.158	0.077	0.057	0.369
Likelihood-ratio test		LR chi^2 (1)	=	9.54
(Assumption: M0 nested in M1)		Prob > chi^2	=	0.000

Model	Obs	ll(null)	ll(model)	Df	AIC	BIC
M41	264	.	−248.008	4.000	504.016	518.320
M42	264	.	−243.236	5.000	496.471	514.351

of 15.8%, suggesting that the model exhibits significant random effects. The variance attributed to the supply chain risk management strategies covariate at level 2 is 0.361, implying a substantial contribution of supply chain risk management strategies to the performance of Retail Chain stores across the retail chain. To confirm whether the level 2 variation due to the independent variable, supply chain risk management strategies, was significant, a likelihood ratio test was conducted to assess the change in the random component of the model resulting from the addition of supply chain risk management strategies as a level 2 covariate.

The LR test is also shown in **Table 1**, where model M41, with no random slope, is nested in model M12, which has a random slope due to SCRMS. The results show a significant improvement to the model due to the addition of the level 2 supply chain risk management strategies covariate. The addition reflects a 9.54 change in the LR chi-square statistic with a p-value of 0.000, which is less than 0.05.

Furthermore, the Bayesian information criterion (BIC) of model M42 (514.351) is lower than that of model M41 (518.320), indicating that model M42 is a better fit; thus, a significant random slope is likely due to supply chain risk management strategies. This confirms that supply chain risk management strategies have both a significant fixed effect on the performance of Retail Chain stores at level 1 and a significant random effect across entities at level 2. The second model (M12), which considered both fixed and random effects due to SCRMS, was thus adopted. The resulting equation from the model with fixed effects of SCRMS within and random intercepts across the retail chain stores is given by the equation below.

$$Y_{ij} = \gamma_{0j} - 0.029 + 0.618 X_{ij} + \varepsilon_{ij}$$

$$\gamma_{0j} = 0.245 + 0.361 X_{0j} + \mu_{0j}$$

The bivariate analysis, based on a multi-level mixed-effects model, revealed that SCRMS exhibits both a significant fixed effect and significant random covariance with the performance of retail chain stores, thereby influencing customer satisfaction. The results of this bivariate analysis were used to evaluate hypothesis H_{01}.

H_{01}: There is no significant influence of supply chain risk management strategy on the Performance of Retail Chain stores.

From the mixed-effects model, the p-value of the fixed effect coefficient for supply chain risk management strategies was found to be 0.000, which is less than 0.05. The null hypothesis was therefore rejected, and the alternative hypothesis was taken. The study concluded that supply chain risk management strategies significantly influenced the Performance of Retail Chain stores. The significant fixed effect coefficient estimate was 0.618, implying that increasing the levels of supply chain risk management strategies as perceived by respondents by one unit would result in a 0.618-unit increase in the level of supply chain perceived performance.

The model results also showed significant random covariance between supply chain risk management strategies and Performance of Retail Chain stores across the clusters of respondents (retail chain stores) thus the variation and levels of

Performance of Retail Chain stores across the retail chain stores are also explained by the variation in supply chain risk management strategies across the entities. This is reflected in **Figure 2**, which shows a significant fixed effect, characterized by an increasing slope, and random effects, represented by equal slopes across retail chain stores. Each line in the figure represents the within-entity influence of supply chain risk management strategies on the Performance of Retail Chain stores. The lines have varying slopes for each entity, implying changes (random covariance effect) on the Performance of Retail Chain stores due to changes in supply chain risk management strategies across entities.

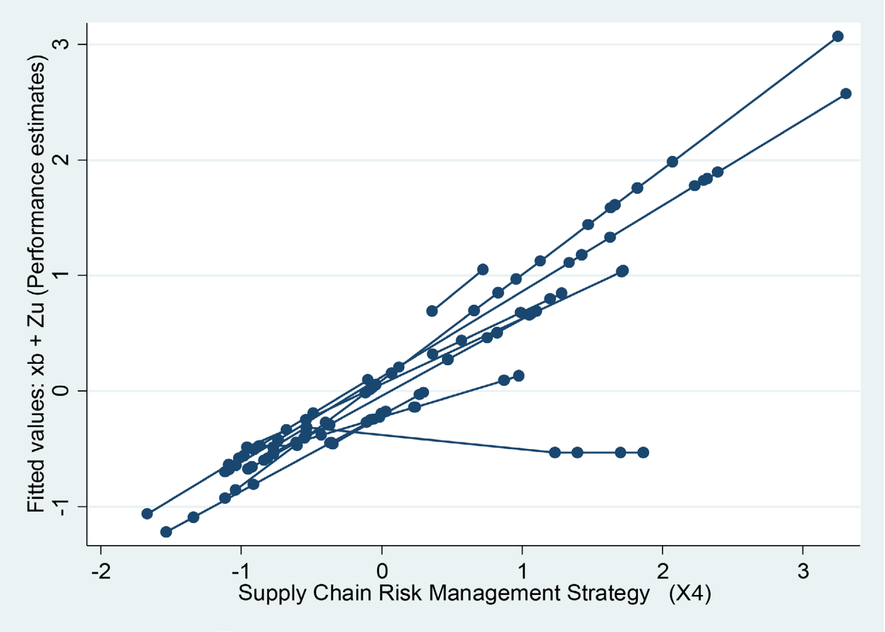

Figure 2. Mixed effects of supply chain risk management strategy on performance of retail chain stores.

Table 2 presents the regression model results, addressing the objective of supply chain risk management strategy in relation to performance based on secondary data on performance. The secondary data profit gross margin was regressed on the primary data collected for the independent variable, supply chain risk management strategy. According to the results, the R-squared value of the model indicates that 85.7% of the variation in performance is explained by the variation in supply chain risk management strategy. The ANOVA F-statistic of 83.99 with a p-value of 0.000, which is less than 0.05, implies that the model is generally significant; thus, the model coefficient is at least not equal to zero. The coefficient of the supply chain risk management strategy ($\beta = 0.391$, $t = 9.160$, p-value = 0.000) indicates that the results align with those based on the primary data on performance. Based on the secondary data on performance, this model suggests that the supply chain information management strategy has a significant impact on performance. The results show that increasing the level of Supply Chain Risk Management strategy by one unit would result in a 0.391-unit increase in performance.

Table 2. Effect of supply chain risk management strategy on performance of retail chain stores.

Model Summary						
Source	SS	df	MS	Number of obs	=	16
Model	0.243	1	0.243	F (1, 14)	=	83.990
Residual	0.041	14	0.003	Prob > F	=	0.000
Total	0.284	15	0.019	R-squared	=	0.857
				Adj R-squared	=	0.847
Model Coefficients						
Performance	Coef.	Std. Err.	t	$p > t$	[95% Conf.	Interval]
SCRMS	0.391	0.043	9.160	0.000	0.299	0.482
_cons	0.088	0.041	2.140	0.051	0.000	0.175

5. Conclusion

This study investigated the effect of Supply Chain Risk Management Strategies (SCRMS) on the performance of retail chain stores in Kenya. Using both primary and secondary data, the results consistently demonstrated that SCRMS significantly improve organizational outcomes. Multilevel modeling confirmed strong fixed effects at the employee level and notable random effects across retail entities, while regression analysis indicated that SCRMS explained over 85% of performance variation. The findings show that strategies such as risk avoidance, postponement, speculation, hedging, control, and transfer/sharing enhance profitability, delivery reliability, and operational efficiency. Profit margins steadily improved over five years, and delivery performance remained consistently strong, demonstrating that continuity planning is critical for resilience. The study concludes that SCRMS are not merely defensive mechanisms but strategic tools that provide competitive advantage. Their adoption enables retail chains to withstand disruptions, minimize financial losses, and sustain long-term growth in a volatile operating environment.

6. Recommendations

Based on the findings, several recommendations are proposed for retail chain managers, policymakers, and practitioners: Retail chains should integrate risk management strategies into core business processes rather than treating them as reactive measures; implementing frameworks such as ISO 31000:2009 will help standardize risk management practices and improve decision-making under uncertainty; Employees, suppliers, and logistics partners should receive regular training to build capacity for risk identification, response, and recovery; digital tools and predictive analytics should be leveraged to monitor supply chain vulnerabilities in real time and provide early-warning signals; closer partnerships with suppliers, distributors, and regulators are necessary to reduce systemic vulnerabilities and enhance resilience across the entire supply network; and Each retail chain should establish scenario-based continuity plans to ensure rapid response and recovery during disruptions. By adopting these measures, Kenyan retail chains can safeguard against disruptions, improve profitability and service delivery, and position themselves for sustainable competitiveness in an unpredictable market environment.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Aigbogun, O., Mohd Suki, N., & Abidin, M. R. Z. (2022). Supply Chain Disruptions and the Agency Theory Perspective: Insights for Resilient Management. *Journal of Supply Chain Management, 58,* 44-62.

Azadegan, A., Mellat Parast, M., Lucianetti, L., Nishant, R., & Blackhurst, J. (2020). Supply Chain Disruptions and Business Continuity: An Empirical Assessment. *Decision Sciences, 51,* 38-73. https://doi.org/10.1111/deci.12395

Bandaly, D., Satir, A., Kahyaoglu, Y., & Shanker, L. (2012). Supply Chain Risk Management I: Conceptualization, Framework and Planning Process. *Risk Management, 14,* 249-271. https://doi.org/10.1057/rm.2012.7

Bode, C., & Wagner, S. M. (2015). Structural Drivers of Upstream Supply Chain Complexity and the Frequency of Supply Chain Disruptions. *Journal of Operations Management, 36,* 215-228. https://doi.org/10.1016/j.jom.2014.12.004

Boonlua, S., Supachaiwat, J., Thongchua, K., & Mohamad, B. (2023). Linking Supply Chain Resilience Strategies for Surviving Major Disruptions. *International Journal of Construction Supply Chain Management, 13,* 154-172.

Chadist, J. (2012). Risk Management in Tightly Coupled Supply Chains: An Agency Theory Perspective. *International Journal of Supply Chain Risk Management, 1,* 113-127.

Chanchaichujit, J., Balasubramanian, S., & Charmaine, N. S. M. (2020). A Systematic Literature Review on the Benefit-Drivers of RFID Implementation in Supply Chains and Its Impact on Organizational Competitive Advantage. *Cogent Business & Management, 7,* Article ID: 1818408. https://doi.org/10.1080/23311975.2020.1818408

Cheng, T. C. E., & Kam, B. H. (2008). A Conceptual Framework for Supply Chain Management with Principal-Agent Interactions. *International Journal of Production Economics, 116,* 28-40.

Chhetri, P., Hashemi, A., Lau, K. H., & Lim, M. K. (2022). Aligning Supply Chain Complexity with Product Demand and Design Characteristics. *International Journal of Logistics Research and Applications, 25,* 1137-1163. https://doi.org/10.1080/13675567.2021.1885020

Choi, T. Y., & Krause, D. R. (2006). The Supply Base and Its Complexity: Implications for Transaction Costs, Risks, Responsiveness, and Innovation. *Journal of Operations Management, 24,* 637-652. https://doi.org/10.1016/j.jom.2005.07.002

Cohen, M. A., & Kunreuther, H. (2007). Operations Risk Management: Overview of Paul Kleindorfer's Contributions. *Production and Operations Management, 16,* 525-541. https://doi.org/10.1111/j.1937-5956.2007.tb00278.x

Daft, R. L. (2006). *Organization Theory and Design* (9th ed.). Thomson South-Western.

Dong, M. C., Huang, Q., & Liu, Z. (2022). Adjusting Supply Chain Involvement in Countries with Politician Turnover: A Contingency Framework. *Journal of Operations Management, 68,* 824-854. https://doi.org/10.1002/joom.1213

Eisenhardt, K. M. (1989). Agency Theory: An Assessment and Review. *The Academy of Management Review, 14,* 57-74. https://doi.org/10.2307/258191

Giannakis, M., & Papadopoulos, T. (2016). Supply Chain Sustainability: A Risk Management Approach. *International Journal of Production Economics, 171,* 455-470. https://doi.org/10.1016/j.ijpe.2015.06.032

Haffar, M., & Searcy, C. (2018). Target-Setting for Ecological Resilience: Lessons from Sustainability Performance Management. *Journal of Cleaner Production, 198,* 1482-1494.

Hajmohammad, S., & Vachon, S. (2016). Mitigation, Avoidance, or Acceptance? Managing Supplier Sustainability Risk. *Journal of Supply Chain Management, 52,* 48-65. https://doi.org/10.1111/jscm.12099

Heck, R. H., Thomas, S. L., & Tabata, L. N. (2013). *Multilevel and Longitudinal Modeling with IBM SPSS.* Routledge.

Huo, B., Qi, Y., Wang, Z., & Zhao, X. (2014). The Impact of Supply Chain Integration on Firm Performance: The Moderating Role of Competitive Strategy. *Supply Chain Management: An International Journal, 19,* 369-384. https://doi.org/10.1108/scm-03-2013-0096

Iddrisu, A. (2022). Business Continuity Management and Firm Resilience: Evidence from Emerging Markets. *International Journal of Business and Management, 17,* 101-112.

Ivanov, D., & Dolgui, A. (2020). Viability of Intertwined Supply Networks: Extending the Supply Chain Resilience Angles towards Survivability. A Position Paper Motivated by COVID-19 Outbreak. *International Journal of Production Research, 58,* 2904-2915. https://doi.org/10.1080/00207543.2020.1750727

Ivanov, D., Dolgui, A., & Sokolov, B. (2019). The Impact of Digital Technology and Industry 4.0 on the Ripple Effect and Supply Chain Risk Analytics. *International Journal of Production Research, 57,* 829-846. https://doi.org/10.1080/00207543.2018.1488086

Kanike, S. (2023). Open Systems Perspective on Supply Chain Resilience: Lessons from Global Disruptions. *Journal of Supply Chain Strategy, 12,* 55-70.

Lopes, J. M., Gomes, S., & Mané, L. (2022). Developing Knowledge of Supply Chain Resilience in Less-Developed Countries in the Pandemic Age. *Logistics, 6,* Article No. 3. https://doi.org/10.3390/logistics6010003

Lu, G., Koufteros, X., Talluri, S., & Hult, G. T. M. (2019). Deployment of Supply Chain Security Practices: Antecedents and Consequences. *Decision Sciences, 50,* 459-497. https://doi.org/10.1111/deci.12336

Manuj, I., & Mentzer, J. T. (2008a). Global Supply Chain Risk Management. *Journal of Business Logistics, 29,* 133-155. https://doi.org/10.1002/j.2158-1592.2008.tb00072.x

Manuj, I., & Mentzer, J. T. (2008b). Global Supply Chain Risk Management Strategies. *International Journal of Physical Distribution & Logistics Management, 38,* 192-223. https://doi.org/10.1108/09600030810866986

Mishra, S., Raut, R. D., Narkhede, B. E., Gardas, B. B., & Priyadarshinee, P. (2018). To Investigate the Critical Risk Criteria of Business Continuity Management by Using Analytical Hierarchy Process. *International Journal of Management Concepts and Philosophy, 11,* Article No. 94. https://doi.org/10.1504/ijmcp.2018.090415

Nezlek, J. B. (2012). Multilevel Modeling Analyses of Diary-Style Data. In M. R. Mehl, & T. S. Conner (Eds.), *Handbook of Research Methods for Studying Daily Life* (pp. 357-383). Guilford Press.

Okuna, P. A. (2014). *Business Continuity Management System at Kenya Bureau of Standards*. University of Nairobi Digital Repository.

Panigrahi, S. S., Bahinipati, B., & Jain, V. (2019). Sustainable Supply Chain Management: A Review of Literature and Implications for Future Research. *Management of Environmental Quality: An International Journal, 30,* 1001-1049. https://doi.org/10.1108/meq-01-2018-0003

Pereira, C. R., Gómez Paredes, F. J., & Lago da Silva, A. (2019). Practices to Achieve Resilience in Supply Chains: A Perspective from Brazilian Chains. https://repositorio.uca.edu.sv/entities/publication/e9779fa6-4c59-4775-ad56-32483d5b81c2

Perrow, C. (1984). *Normal Accidents: Living with High-Risk Technologies*. Basic Books.

Prataviera, L. B., Perotti, S., Melacini, M., & Moretti, E. (2020). Postponement Strategies for Global Downstream Supply Chains: A Conceptual Framework. *Journal of Business Logistics, 41,* 94-110. https://doi.org/10.1111/jbl.12250

Rijpma, J. A. (2003). Complexity, Tight-Coupling and Reliability: Connecting Normal Accidents Theory and High Reliability Theory. *Journal of Contingencies and Crisis Management, 5,* 15-23. https://doi.org/10.1111/1468-5973.00033

Sakura, S. (2018). Effect of Business Continuity Management Practices on Organizational Performance among Security Firms in Nairobi County, Kenya. *Information and Knowledge Management, 8,* 50-58.

Scott, W. R., & Davis, G. F. (2015). *Organizations and Organizing: Rational, Natural and Open Systems Perspectives* (2nd ed.). Routledge.

Shah, R., & Wiese, A. (2021). Application of Normal Accident Theory in Supply Chain Management: Toward Building Resilience. *Supply Chain Forum: An International Journal, 22,* 197-209.

Tang, O., & Musa, S. N. (2011). Identifying Risk Issues and Research Advancements in Supply Chain Risk Management. *International Journal of Production Economics, 133,* 25-34. https://doi.org/10.1016/j.ijpe.2010.06.013

Tarafdar, M., & Qrunfleh, S. (2017). Agile Supply Chain Strategy and Supply Chain Performance: Complementary Roles of Supply Chain Practices and Information Systems Capability for Agility. *International Journal of Production Research, 55,* 925-938. https://doi.org/10.1080/00207543.2016.1203079

Thompson, J. D. (1967). *Organizations in Action: Social Science Bases of Administrative Theory*. McGraw-Hill.

Tukamuhabwa, B., Stevenson, M., & Busby, J. (2017). Supply Chain Resilience in a Developing Country Context: A Case Study on the Interconnectedness of Threats, Strategies and Outcomes. *Supply Chain Management: An International Journal, 22,* 486-505. https://doi.org/10.1108/scm-02-2017-0059

Um, J., & Han, N. (2021). Understanding the Relationships between Global Supply Chain Risk and Supply Chain Resilience: The Role of Mitigating Strategies. *Supply Chain Management: An International Journal, 26,* 240-255. https://doi.org/10.1108/scm-06-2020-0248

Wiengarten, F., Pagell, M., Ahmed, M. U., & Gimenez, C. (2016). Supply Chain Environmental Investments in Dynamic Environments: The Impact of Supply Chain Configurations and Governance. *International Journal of Production Economics, 171,* 317-326.

Wu, Q., Liao, K., Deng, X., & Marsillac, E. (2020). Achieving Automotive Suppliers' Mass Customization through Modularity: Vital Antecedents and the Valuable Role and Responsibility of Information Sharing. *Journal of Manufacturing Technology Manage-*

ment, 31, 306-329. https://doi.org/10.1108/jmtm-12-2018-0459

Yang, B., & Yang, Y. (2010). Postponement in Supply Chain Risk Management: A Complexity Perspective. *International Journal of Production Research, 48,* 1901-1912. https://doi.org/10.1080/00207540902791850