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The Moderating Role of Information Sharing on The Relationship Between Supply Chain Resilience and Firm Performance; Empirical Evidence From Kenya's Manufacturing Sector

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Abstract

The purpose of this paper is to explore whether information sharing moderates the relationship between supply chain resilience and firm performance in the context of manufacturing firms in Kenya. The relationships within the proposed model were examined using structural equation modeling. Data was gathered through a self-administered questionnaire directed at supply chain managers in manufacturing firms across Kenya. Of the 290 questionnaires distributed, 235 responses were received, with 229 complete questionnaires utilized for statistical analysis. The findings indicate that supply chain agility exerts a positive yet insignificant influence on firm performance, while collaboration demonstrates a positive and significant impact on performance. Furthermore, the moderating effect of information sharing on the relationship between supply chain agility and firm performance was deemed insignificant; however, it does moderate the relationship between supply chain collaboration and firm performance. It is strongly advised that managers and decision-makers in manufacturing companies seeking to improve their performance by fostering supply chain resilience should implement information sharing practices with their supply chain partners. This study highlights earlier findings and offers further evidence that the implementation of information sharing by manufacturing companies can enhance their supply chain resilience, thereby improving firm performance in the context of the challenges encountered by supply chains in developing nations.

Keywords: Supply chain resilience, Supply chain agility, Supply chain collaboration, Information sharing, Firm size and firm performance

1. Introduction

The operating environment for manufacturing firms has recently become increasingly susceptible to various risks and challenges, including natural disasters and human-induced threats (Bai & Sarkis, 2021). Disruptions in commercial supply chains can lead to substantial economic consequences, thereby necessitating an urgent focus on managing risks and vulnerabilities associated with these supply chains. In the contemporary economy, supply chains are essential (Delgado & Mills, 2020). The trend of globalization has resulted in the offshoring of certain manufacturing practices, further emphasizing the importance of supply chains (Sarkar, Ullah, & Sarkar, 2022). As supply chains grow more vulnerable to disruptions, the need for resilience becomes paramount. Recent events, such as the COVID-19 pandemic, have highlighted the fragility of the global supply chain network, particularly due to international border closures and the shutdown of critical facilities. During such crises, the primary challenge lies in ensuring the provision of essential services to society, including food, transportation, and communication services (Sarkar et al., 2022). Additionally, the ongoing Russian invasion of Ukraine in 2022 has contributed to a slowdown in global supply chains and shipments, resulting in widespread shortages and altering consumer behavior. These developments present significant threats to the seamless operation of businesses; therefore, it is imperative for firms to invest in strategies that enhance supply chain resilience.

The manufacturing sector plays a crucial role in the economic advancement of Kenya, significantly contributing to national output, exports, and employment opportunities. Its primary objective is to enhance wealth by refining products and marketing them effectively (Bag et al., 2023). It is essential for all manufacturing enterprises to manage the flow of materials from suppliers, through value-generating processes, and into distribution channels for customers. Traditionally, the manufacturing sector has experienced stagnation, maintaining around 10 percent of GDP, with a decline to 7.7 percent in 2018. Nevertheless, both the government and private entities, regardless of size, recognize the importance of the manufacturing sector in transforming Kenya into an industrialized and competitive economy (Bag et al., 2023). This renewed focus has led to the development of initiatives and policies, such as the Big Four Agenda, aimed at increasing the manufacturing sector's contribution to overall GDP to 15 percent by 2022. Additionally, the resilience of supply chains has emerged as a strategically significant concern, with companies utilizing it as a means to address potential disruptions in their supply chains.

In recent times, the operational business landscape has experienced significant volatility, prompting companies to invest in robust supply chain networks. Supply Chain Resilience can be defined as "the adaptive capability of the supply chain to prepare for unexpected events, respond to disruptions, and recover from them by maintaining continuity of operations at the desired level of connectedness and control over structure and function" (Ponomarov and Holcomb, 2009; Al-Hakimi et al., 2022). This resilience reflects a supply chain's ability to manage the impacts of unforeseen risks and disturbances, allowing it to return to its original state or even enhance its performance (Christopher and Peck, 2004; Al-Hakimi et al., 2022). Although the notion of supply chain resilience is not novel, organizations are increasingly recognizing it as a strategy to address vulnerabilities within their supply chains, enabling them to effectively prepare, adapt, and respond to unexpected events. Furthermore, it facilitates prompt actions to recover from such disruptions (Piprani et al., 2020; Masoud Kamalahmadi and Parast, 2016a; Saenz and Revilla, 2014).

The notion of resilience encompasses multiple dimensions and draws from various disciplines. Different interpretations of resilience exist, with Davidson et al. (2016) characterizing it as the capability of a supply chain to 'rebound' following a disruption. Consequently, resilience is understood as a system's capacity to recuperate after facing a disruption (Brandon-Jones et al., 2014; Asamoah et al., 2020) and to 'bounce-forward,' which refers to a system's ability to adapt and transform in response to disruptions while ensuring the continuity of operations effectively (Davidson et al., 2016; Ambulkar et al., 2015; Asamoah et al., 2020). This viewpoint posits that resilience comprises two essential yet complementary elements: the capacity for resistance and the capacity for recovery. The resistance aspect pertains to a system's ability to mitigate the effects of a disruption by avoiding it altogether, whereas recovery capacity relates to a system's ability to restore functionality after a disruption has taken place. This conceptual framework implies that resilient supply chains are capable of sustaining value delivery to customers during disruptions by swiftly responding to and recovering from such events (Asamoah et al., 2020).

Prior research has recognized the beneficial impact of supply chain resilience on supply chain performance across both developed and developing regions (Hamidu et al., 2024). Despite the findings of previous studies, the potential for supply chain disruptions necessitates a deeper examination of the connection between supply chain resilience and performance. There is a scarcity of studies addressing this issue. The extent to which a positive correlation between supply chain resilience and performance exists remains largely unexplored, with the notable exception of Chowdhury et al. (2019), which focused solely on a developed country context. Therefore, this study seeks to address this gap, particularly within the manufacturing sector of developing nations, with a specific emphasis on Kenya.

2. Literature and Hypotheses Development

2.1. Supply Chain Agility

Supply chain agility is widely acknowledged as a vital factor influencing the competitiveness of firms at a strategic level. Empirical studies have demonstrated that organizations with agile supply chains exhibit superior performance in addressing unexpected events. Agility is recognized as a fundamental attribute of an exemplary supply chain (Tse et al., 2016). It has emerged as one of the most pressing concerns in modern supply chain management (Gligor and Holcomb, 2012a). The Agility Forum defines "agility" as an organization's capacity to flourish in a constantly evolving and unpredictable business landscape. In essence, an agile organization has structured its systems, processes, and products to respond to changes within a timely manner. Agile supply chains are capable of not only adapting to routine changes but also effectively managing significant market shifts that may arise unexpectedly (Bidhandi & Valmohammadi, 2016). Consequently, agility is perceived as an essential attribute for organizations facing future competitive challenges and for achieving a competitive edge (Giachetti et al., 2003; Yusuf et al., 1999; Bidhandi & Valmohammadi, 2016). The agility of the supply chain empowers firms to establish competitive positions, thereby allowing them to respond more swiftly and effectively to market fluctuations and other uncertainties.

The significant disruption of supply chain systems within organizations highlights the critical importance of agility in enhancing supply chain resilience. Supply Chain Agility enables firms to swiftly and efficiently recover from dynamic changes in a cost-effective manner, transforming challenges into new business opportunities (Wieland and Marcus Wallenburg, 2013; Agrawal & Jain 2021). Research conducted by Christopher and Lee (2004) indicates that agility is among the most effective strategies for achieving supply chain resilience, with firms exhibiting higher levels of agility being able to recover more rapidly from unpredictable market conditions. Wieland and Marcus Wallenburg (2013), as referenced by Agrawal and Jain (2021), categorize agility as a reactive strategy, in contrast to robustness, which is viewed as a proactive resilience strategy. They further demonstrate that agility not only enhances resilience but also adds value for end customers within the supply chain.

2.2. Supply Chain Collaboration

Supply chain collaboration involves the close cooperation of two or more independent organizations to effectively implement suitable supply chain strategies aimed at achieving a shared objective (Scholten and Schilder, 2015; Agrawal & Jain, 2021). The degree and nature of the interactions among various organizational members for mutual benefit are referred to as collaboration (Cotta and Salvador, 2020b; Sawalha, 2015). It is characterized as a long-term partnership process in which supply chain partners with aligned goals work in concert to realize collective benefits that surpass what each firm could attain independently (Cao et al., 2010; Jimenez-Jimenez et al., 2019). Supply chain resilience encompasses multiple dimensions that significantly influence the acquisition, sharing, and development of new knowledge, including information sharing, collaborative communication, and joint knowledge creation (Cao et al., 2010; Jimenez-Jimenez et al., 2019). Furthermore, supply chain collaboration is frequently described as the cooperative effort of two or more companies to generate a competitive edge and enhanced profits that would not be possible through solitary actions. It can also be viewed as a relationship among independent firms marked by transparency and trust, wherein risks, rewards, and costs are equitably distributed among the involved parties (Soosay & Hyland, 2015).

Prior research has established a positive correlation between collaboration and the resilience of supply chains (Juttner and Maklan, 2011; Pettit et al., 2013; Agrawal & Jain, 2021). Scholten and Schilder (2015) highlighted that collaborative relationships among firms within a supply chain enhance resilience, identifying three key practices: supply chain intelligence, collaborative planning, and information sharing. Chauhan et al. (2022) define supply chain collaboration as any interaction or activity through which actors or organizations achieve mutually beneficial outcomes by cooperating, thereby enhancing supply chain performance and maximizing benefits for its members. Supply chain collaboration can enhance performance by redesigning workflows and facilitating resource sharing among supply chain participants (Arshinder et al., 2011). Traditionally, the strategy of supply chain collaboration involved companies working together for mutual benefits, transitioning from a focus on negotiating the lowest prices to a new paradigm centered on integrated solutions that prioritize the collective goal of serving end customers. This shift leads to economies of scale and ultimately reduces costs, thereby increasing revenue (Simatupang & Sridharan, 2008). Collaboration has increasingly become a vital component of the corporate landscape, as the philosophy of supply chain management broadens the scope of partnerships from bilateral to multi-firm networks, facilitating the collaborative management of supply chain flows and yielding significant advantages (Rajeb et al., 2021). According to Panayides and Venus Lun (2009), the effectiveness of collaboration hinges on the willingness of firms and managers to foster a trusted environment and cultivate strong relationships with their exchange partners, necessitating that supply chain partners demonstrate trustworthiness to ensure successful outcomes.

2.3. Information Sharing

The act of sharing information can enhance managers' understanding of the business landscape and bolster their absorptive capacity. A more profound comprehension of a common context, coupled with increased transparency, is anticipated to positively impact inter-organizational dynamics and facilitate shared learning (Jimenez-Jimenez et al., 2019). Information sharing is a vital mechanism for supply chain integration (Lotfi et al., 2013; Rejeb et al., 2023). The effectiveness of multi-party supply chains relies on reciprocal information exchanges among participants, which convey strategic and tactical insights regarding inventory levels, sales forecasts, and marketing strategies (Hofstede, 2003; Rejeb et al., 2023). It is widely acknowledged that information sharing serves as a primary instrument for cost reduction and the enhancement of supply chain performance. The flow of information and transparency are essential components for the success of any supply chain. Furthermore, information sharing is deemed one of the most significant strategies for ensuring supply chain resilience (Soni et al., 2014; Baah et al., 2021; Agrawal & Jain, 2021). Empirical evidence suggests that the failure to disseminate critical information among supply chain partners results in increased vulnerability and exacerbates the bullwhip effect throughout the supply chain (Yang and Fan, 2016). Numerous advantages arise from information sharing within supply chain networks, with a primary benefit being the mitigation of risks associated with disruptions. It is recommended that communication between supply chain partners occurs both prior to and following disruptions to foster resilience within the supply chain (Faisal, 2010; Agrawal & Jain, 2021). According to Li et al. (2017), organizations are likely to attain a greater level of resilience and diminish uncertainty when they engage in information sharing across various levels of the supply chain.

2.4. Firm Performance

The operational definition of supply chain performance refers to a collection of activities that are primarily focused on the customer, with the objective of ensuring product availability through timely delivery (Wu, Yue, Jin, & Yen, 2016). Performance is evaluated based on customer satisfaction, which can only be achieved when products are delivered on the promised date and time. The concept encompasses three dimensions: process-based approaches (integrated processes from suppliers to end customers), perspective-based approaches (such as balanced scorecard models and supply chain operations reference models), and hierarchical-based approaches (strategic, tactical, and operational levels). Additionally, techniques for measuring supply chain performance include the analytic hierarchy process, data envelopment analysis, and simulation (Reddy, Rao & Krishnanand, 2019; Aityassine, et al., 2022). As noted by Ul-Hameed et al. (2019), prior researchers have identified several key metrics for firm performance, including customer satisfaction, improved process transparency, reduced errors in supply chain operations, elimination of work redundancies, and minimized administrative costs.

2.5. Underpinning Theories

This research is grounded in two theoretical frameworks: dynamic capability theory and resource dependency theory.

2.5.1. Dynamic Capability Theory

The theory of dynamic capabilities has been widely acknowledged as an influential framework for examining the connections between dynamic capabilities and performance outcomes. This research incorporates this theory, as supply chain resilience is commonly viewed as a significant manifestation of dynamic capabilities (Song, M., & Liao, Y. 2019). Teece et al. (1997) characterized dynamic capabilities as a firm's capacity to integrate, develop, and reconfigure both internal and external competencies in response to rapidly evolving environments. There are two perspectives regarding the relationship between dynamic capabilities and performance: the direct perspective and the indirect perspective. The direct perspective posits a straightforward relationship between dynamic capabilities and performance. According to Teece et al. (1997), firms frequently leverage dynamic capabilities to reconstruct and realign their internal and external competencies to adapt to changing conditions, thereby establishing a source of sustained competitive advantage. Conversely, the indirect perspective suggests that dynamic capabilities may not directly enhance firm performance. Previous research, with information sharing as a moderating factor, has indicated that long-term competitive advantage is rooted in a firm's ability to utilize information sharing more effectively and promptly to renew and improve ordinary capabilities, which subsequently influences the firm's performance.

2.5.2. Resource Dependency Theory

Resource dependency theory (RDT) posits that organizations within a supply chain are interdependent, and that their collaboration can enhance both productivity and environmental outcomes (Sarkis et al., 2011). According to RDT, variations in organizational performance can be attributed to strategic resources, including core competencies (Prahalad and Hamel, 1990), dynamic capabilities (Teece et al., 1997), and absorptive capacity (Cohen and Levinthal, 1990). Firms that effectively combine their resources in innovative manners may achieve a competitive advantage over their peers by excelling in multiple core competencies and capabilities. Barney (1991) suggests that investments in relationship-specific assets provide partner firms with a competitive advantage due to their rarity, value, non-substitutability, and durability. The causal ambiguity and the deep integration of relational assets make it challenging for competitors to replicate the partnerships formed within the supply chain (Jap, 2001).

Therefore, I propose an argument that;

H_{01}: Supply chain agility has no significant effect on firm performance.

H_{02}: Supply chain collaboration has no significant effect on firm performance.

H_{03a}: Information sharing does not moderate the relationship between Supply chain agility and firm performance.

H_{03b}: Information sharing does not moderate the relationship between Supply chain collaboration and firm performance.

2.6. Conceptual Framework Model

The study focused on investigating the moderating effect of information sharing on the relationship between supply chain resilience and firm performance as depicted in Figure 1 below.

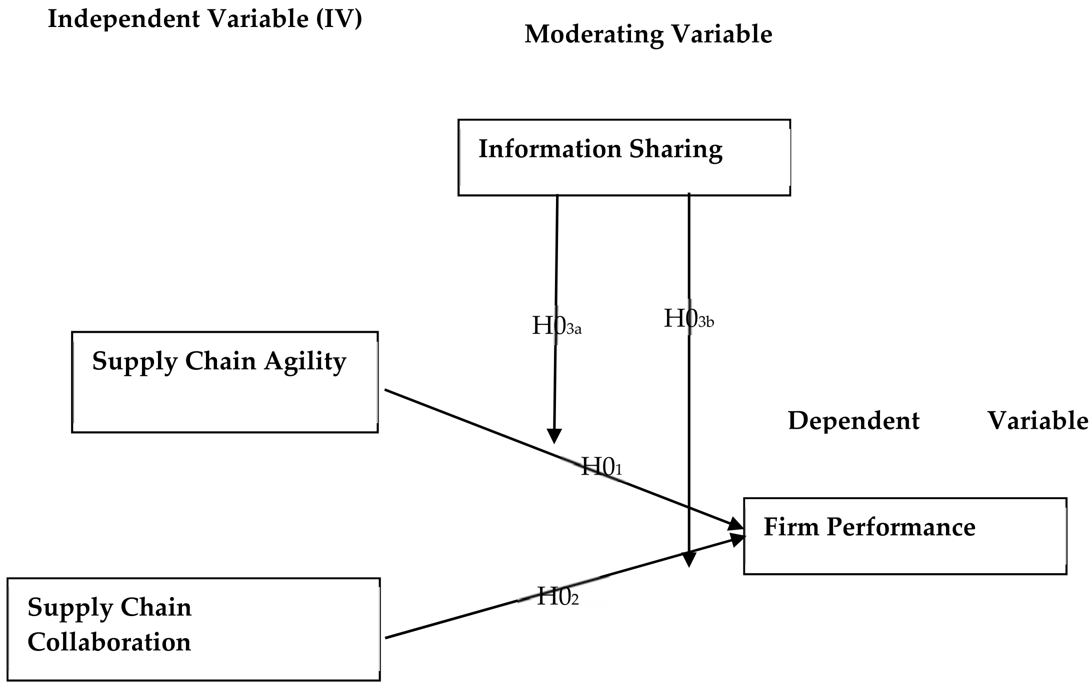

Figure 1. Conceptual Framework Model

3. Research Methodology

3.1. Sample and Data Collection

The researcher conducted an evaluation of the model using a cross-sectional sample of manufacturing firms in Kenya. This environment is characterized by frequent disruptions, rendering it an optimal context for examining practices related to organizational resilience. Customized survey questionnaires were distributed both online and offline to a target group of 290 manufacturing firms in Kenya, resulting in 235 completed responses, which corresponds to a response rate of 81%. This response rate is typical within the domain of operations and supply chain management (Cotta & Salvador, 2020). However, after data cleaning, 9 cases were excluded, leading to a total of 229 questionnaires utilized for the analysis.

3.2. Reliability and Validity

The evaluation of reliability is essential for assessing the extent of internal consistency among the measurement items of a variable, as well as its error-free status at any given moment (Kline, 2015; Manish Mohan Baral et al., 2022). As presented in Table 1, the Cronbach's alpha values for all constructs are displayed. This statistic serves as an indicator of data reliability (Hair et al., 2012; Manish Mohan Baral et al., 2022). According to Nunnally (1978), these values should exceed 0.70. The reliability analysis indicated that firm performance (0.911), supply chain agility (0.715), supply chain collaboration (0.730), and information sharing (0.755) all demonstrated sufficient reliability, making them suitable for subsequent analysis.

Table 1. Reliability Analysis

Reliability Statistics

Variable	Cronbach's Alpha	N of Items
SCA	.715	5
SCC	.730	6
IS	.755	7
FP	.911	8

For test of validity, principal components factor analysis was employed to analyze the unrotated factor solution and identify the number of factors required to explain the variance in the main variables (Jarvis, MacKenzie, & Podsakoff, 2003). The principal components factor analysis yielded a KMO test statistic of 0.768. As noted by Kaiser (1974), KMO values exceeding 0.5 are considered statistically adequate. In this instance, the KMO value of 0.768 suggests that the sampling was adequate. In addition to the KMO test, Bartlett's test of sphericity was found to be highly significant, with a statistic of 2666.591 at 276 degrees of freedom and $P<0.05$. The P value generated by Bartlett's Test of Sphericity was 0.000, indicating a significant correlation among the constructs within the dataset. These findings support the continuation of further statistical analysis. The factor analysis identified three components, each with Eigen values greater than 1, signifying that each factor accounts for more variance than an individual variable. The cumulative percentage of variance explained by these three factors is 69.13 percent.

Table 2. KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.768
Bartlett's Test of Sphericity	Approx. Chi-Square	2666.591
	df	276
	Sig.	.000
Total Variance Explained		69.13%

3.3. Construct Measurement

The variables employed in this research were assessed through scales adapted from prior studies, with slight modifications made to suit the specific context of the current investigation. Participants were requested to evaluate each of the primary constructs on multi-item scales utilizing a five-point Likert scale (1 indicating strong disagreement and 5 indicating strong agreement) concerning supply chain resilience, information sharing, and firm performance. In this analysis, the dependent variable is identified as firm performance, which encompasses both financial and non-financial advantages, procedural efficiency, effectiveness, and the capacity to implement various metrics for assessing procurement activities. In alignment with previous research, this variable was quantified using the retained items following factor analysis on a five-point Likert scale. Supply chain resilience is divided into two components: supply chain agility and supply chain collaboration. The moderator, information sharing, was evaluated using items that were retained after factor analysis on a five-point Likert scale.

3.4. Model Specification

In order to evaluate the hypotheses, the research employed a hierarchical multiple regression model as outlined by Baron and Kenny (1986). For the analysis, three distinct regression models were formulated. The equations utilized in this process are as follows.

Model 1. Testing the effect of control variable firm size on firm performance.

$$FP = \beta_0 + \beta_1 Emp_{it} + \varepsilon_{it} \quad (1)$$

Model 2. Testing the effect of the predictor variable supply chain agility and supply chain collaboration on firm performance.

$$FP = \beta_0 + \beta_1 C_{it} + \beta_2 SCA_{it} + \beta_3 SCC_{it} + \varepsilon_{it} \quad (2)$$

Model 3. Testing the effect of the moderating information sharing on firm performance.

$$FP = \beta_0 + \beta_1 C_{it} + \beta_2 SCA_{it} + \beta_3 SCC_{it} + \beta_4 IS_{it} + \varepsilon_{it} \ldots\ldots \quad (3)$$

Model 4. Testing the moderating effect of information sharing on firm performance

$$FP = \beta_0 + \beta_1 C_{it} + \beta_2 ES_{it} + \beta_3 EO_{it} + \beta_4 X1 + \varepsilon_{it} \ldots\ldots \quad (4)$$

Where;
PP = firm performance
β1… β4= slope representing degree of change in independent variable by one unit variable.
C= Control Variables (No. of Employees)
SCA= Supply Chain Agility
SCC = Supply Chain Collaboration
EO= Moderator (Information sharing)
ε = error term

4. Results and Discussion

4.1. Demographic Information

The demographics of the respondents are shown in Table 3 below.

Table 3. Demographic Information

		Frequency	Percent
Gender	Male	108	47.8
	Female	118	52.2
	Total	**226**	**100.0**
Designation	Executive	21	9.3
	Senior Manager	30	13.3
	Manager	64	28.3
	Supervisor	111	49.1
	Total	**226**	**100.0**
Level of Education	Bachelor Degree	180	79.6
	Masters Degree	40	17.7
	Diploma	6	2.7
	Total	**226**	**100.0**
Work Experience	Below 5 Years	76	33.6
	1-5 Years	7	3.1
	6-10 Years	85	37.6
	11-15 Years	46	20.4

	16 and above Years	12	5.3
	Total	**226**	**100.0**
Number of Employee	Less than 300	135	59.7
	300-2000	69	30.5
	Above 2000	22	9.7
	Total	**226**	**100.0**

The data presented in Table 3 indicates that a significant portion of the respondents, specifically 118 (52.2%), were female, while 108 (47.8%) were male. In terms of job designation, the findings reveal that the largest group of respondents were supervisors, totaling 111 (49.1%), followed by managers at 64 (28.3%), senior managers at 30 (13.3%), and executives at 21 (9.3%). Furthermore, the majority of respondents, 180 (79.6%), held a bachelor's degree, while 40 (17.7%) possessed a master's degree, and 6 (2.7%) had a diploma. Concerning tenure, the study found that most respondents, 85 (37.6%), had been employed for less than 5 years, followed by those with 16 years or more of experience, totaling 12 (5.3%). A small number, 7 (3.1%), had worked for a duration of 1 to 5 years. Regarding the size of the organization, the majority of respondents, 135 (59.7%), reported having fewer than 300 employees, followed by 69 (30%) who indicated a workforce between 2000 and 3000 employees. Only 22 (9.7%) of respondents stated that their organization had more than 2000 employees.

4.2. Descriptive Statistic, Correlation Analysis and Multicollinearity Test

Table 4 presents the summary statistics for the variables under consideration, indicating that information sharing (IS) has the highest mean value of 4.34 (SD = 0.76). This is closely followed by supply chain agility (SCA) with a mean of 4.33 (SD = 0.77), while supply chain collaboration (SCC) shows a mean of 4.31 (SD = 0.74), and financial performance (FP) has a mean of 4.21 (SD = 0.73). The relationships among these variables were evaluated through Pearson's correlation analysis (Bougie & Sekaran, 2019). The results illustrated in Table 2 indicate that the variables demonstrate a positive correlation. Furthermore, the correlation results confirm that all variables are positively and significantly associated with firm performance.

Table 4. Descriptive Statistic Correlation Analysis

	Mean	SD	FP	SCC	IS	I/VIF	VIF
FP	4.21	0.73	1			0.678	1.475
SCA	4.33	0.77	.186**	1		0.525	1.906
SCC	4.31	0.74	.378**	.517**	1	0.525	1.904
IS	4.34	0.76	.242**	.516**	.658**	0.678	1.475

4.3. Regression Analyses

The data illustrated in Table 5 demonstrates the influence of control variables, specifically the number of employees, on the dependent variable, which is firm performance. The results reveal that the number of employees (β = 0.013, p = 0.833) has an insignificant impact on firm performance. Furthermore, this model accounts for 0.00% of the total variance in firm performance, as indicated by an R^2 value of 0.000, despite a significant F statistic of 0.045 with a p-value of 0.833.

Table 5. Coefficient Results for Control Variables

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.279	.022		12.673	.000
	No. Of Employees	.003	.013	.014	.211	.833
Model Summary						
R			014			
R^2 Change			.000			
Std. Error of the Estimate			.13424			
Model Fit						
F change			.045			
Sig.			.833			

Source: Field Data

4.4. Test for Direct Effect

The initial hypothesis of the study posited that supply chain resilience does not significantly influence firm performance. To evaluate this assertion, a regression analysis was conducted with supply chain agility as the independent variable and firm performance as the dependent variable, while controlling for the number of employees. The results indicated that the number of employees (β = 0.019, p = .133, >0.05) was not a significant factor in this model. The model accounted for 65.6% of the total variance in firm performance, as evidenced by an R^2 value of 0.152, with a significant F statistic of 13.255 (p = .000). Additionally, the analysis of the independent variables, supply chain agility and supply chain collaboration, as presented in the table, demonstrated a negative and insignificant relationship between supply chain agility and firm performance (β = -0.025, p = 0.742, >0.05), suggesting that supply chain agility does not enhance firm performance. Consequently, the null hypothesis is not rejected, leading to the conclusion that supply chain agility has no significant impact on firm performance. Conversely, supply chain collaboration was found to have a positive and significant effect (β = 0.434, p = 0.000, <0.05), indicating that supply chain collaboration contributes to improved firm performance. Therefore, the null hypothesis asserting that supply chain collaboration does not significantly affect firm performance is rejected, concluding that supply chain collaboration does indeed influence firm performance.

Table 6. Coefficient Results for Direct Effect

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
2	(Constant)	.167	.027		6.094	.000
	No. of Employees	.019	.013	.096	1.508	.133
	SCA	-.025	.075	-.024	-.330	.742
	SCC	.434	.079	.410	5.532	.000
Model Summary						
R		.390				
R^2 Change		.152				
Std. Error of the Estimate		.12419				
Model Fit						
	F change	13.255				
Sig.		.000				

Source: Field Data (2024)

4.5. Testing for Moderating Effect of Information Sharing

The moderating effect was evaluated through a sequence of hierarchical blocks. Initially, in model 1, the control variable was assessed. Subsequently, model 2 examined the independent variables of supply chain agility and supply chain collaboration. In model 3, the moderator, information sharing, was included to determine its contribution to the model. Following this, the interaction between the moderator and the independent variable was calculated. Finally, model 4 involved a hierarchical assessment of the interaction terms between the moderator and the independent variable.

The introduction of the moderator into the model indicates that the number of employees does not significantly affect firm performance (β = 0.019, p = 0.135). Furthermore, the analysis reveals that supply chain agility (β = -0.024, p = 0.758) does not have a meaningful impact on firm performance within this framework. The findings yield an R2 value of 0.390, with no change in R2 (0.000), and a statistically significant F value of 9.897 (p = 0.000). This implies that information sharing contributed 0% to the variance in firm performance. This study proposes, empirically tests, and enhances the firm performance model to illustrate how organizations leverage supply chain resilience through the inclusion of information sharing.

Table 7. Moderating Effect of Information Sharing

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	.167	.028		6.034	.000
	No. of Employees	.019	.013	.096	1.500	.135
	SCA	-.024	.078	-.023	-.309	.758
	SCC	.436	.092	.411	4.742	.000
	IS	-.002	.085	-.002	-.028	.978
Model Summary						
R			0.390			
R^2 Change			0.000			
Std. Error of the Estimate			0.12447			
Model Fit						
F change			9.897			
Sig.			.000			

4.6. Test for Interaction Term

The findings concerning the interactions of information sharing on the relationship between supply chain resilience and firm performance are detailed in Model 4. This model also presents the initial interactions of information sharing with supply chain agility and firm performance. It reveals an R^2 value of 0.154, with a change in R^2 of 0.002, and an F statistic of 0.460, p = 0.000, indicating that the first interaction accounts for 0.2% of the variance in firm performance. The analysis of the control variable in this model shows that firm size, as measured by the number of employees (β = 0.021, p = 0.114), is statistically insignificant.

Furthermore, the results of the first interaction between supply chain agility and information sharing (X1) were also found to be insignificant (β = -0.005, p = 0.955). Given that the p-value exceeds 0.05, we do not reject hypothesis H01a, which posits that there is no significant moderating effect of information sharing on the relationship between supply chain agility and firm performance in manufacturing firms. Consequently, it is concluded that information sharing does not moderate this relationship. Model 5 presents the outcomes of the second interaction between supply chain collaboration and information sharing concerning firm performance. This model indicates an R^2 of 0.217, with a change in R^2 of 0.063, and an F statistic of 17.742, p = 0.000, suggesting that this interaction explains 6.3% of the variance in firm performance. The analysis of the control variable in this model (β = 0.039, p = 0.0) was found to be significant. Additionally, the results of the second interaction between supply chain collaboration and information sharing were significant (β = -2.480, p = 0.000). Since the p-value for this interaction is less than 0.05, we reject hypothesis H01b, which asserts that there is no significant moderating effect of information sharing on the relationship between supply chain collaboration and firm performance in manufacturing firms.

Table 8. Regression Analysis Results of Interaction Effect

	Model 1 β (p)	Model 2 β (p)	Model 3 β (p)	Model 4 β (p)	Model 5 β (p)
(Constant)	.279 (0.000)	.167 (0.000)	.167 (0.000)	0.160 (0.000)	0.161 (0.104)
Control Variable					
Number of Employees	.003 (0.833)	.019 (0.133)	.019 (0.135)	0.021 (0.114)	0.039 (0.004)
Main Effect					
Supply Chain Agility		-0.025 (0.742)	-0.024 (0.758)	-0.005 (.0955)	014 (0.864)
Supply Chain Collaboration		.434** (0.000)	.436** (0.000)	.441** (0.000)	.909** (0.000)
Moderator					
Information sharing			-0.002 (0.978)	0.081 (0.589)	0.422** (0.011)
Interaction term					
X1				-.293 (0.498)	.306 (0.488)
X2					-2.480** (0.000)
Model Summary					
R	.014	.390	.390	.392	.466
R Square	0.000	0.152	0.152	0.154	0.217
Adjusted R Square	-0.004	0.14	0.137	0.134	0.196
Std. Error of the Estimate	0.1342	0.1242	0.1245	0.1246	0.1201
Change Statistics					
R Square Change	0.000	0.152	0.000	0.002	0.063
F Change	0.045	19.857	0.001	0.46	17.742
df1	1	2	1	1	1
df2	224	222	221	220	219
S. F Change	0.833	0.000	0.978	0.498	0.000

Mod Graphs facilitate a clearer understanding of the intricate interactions present within the model. Consequently, the findings depicted in Figure 2 can be represented using Mod Graphs to demonstrate the impact of information sharing on the relationship between supply chain resilience and firm performance.

Figure 2 illustrates that firms exhibiting low levels of information sharing tend to perform better than those with high levels of information sharing. Nevertheless, as supply chain agility rises, there is a decline in firm performance across both categories, with a more pronounced decrease observed in firms that engage in high levels of information sharing.

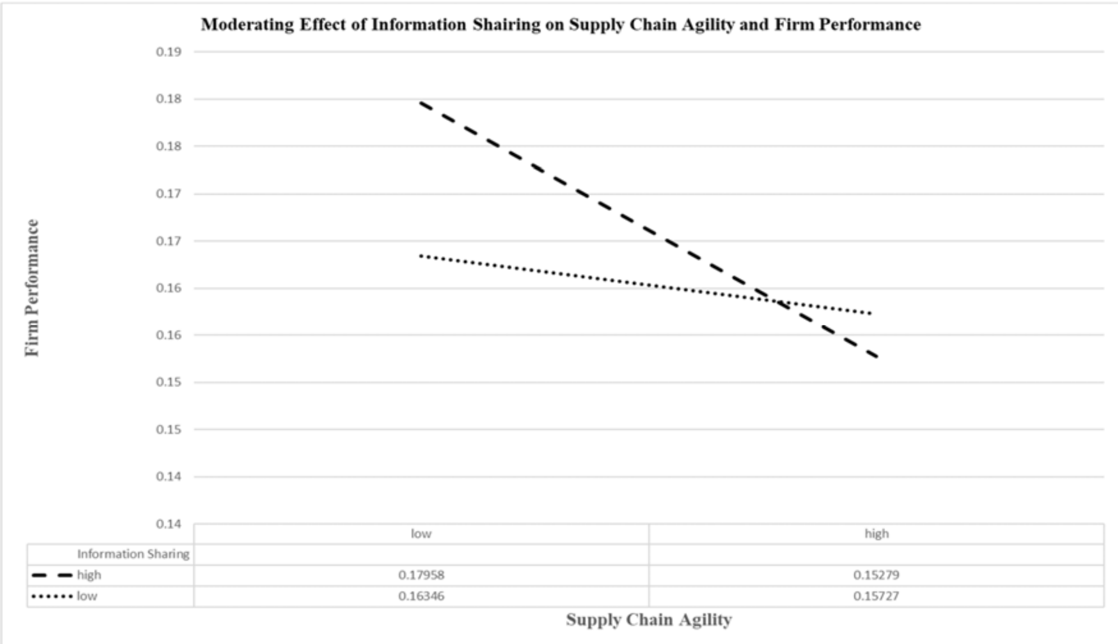

Figure 2. Moderating Effect of Information sharing on the Relationship Between Supply Chain Agility and Firm Performance

The relationship described above suggests a buffering moderation effect, as evidenced by the results from model 2, which demonstrate the direct impact of the independent variable, supply chain agility, on the dependent variable, firm performance. This effect diminishes in model 4 upon the introduction of the moderator. Specifically, the buffering moderation shifts from $\beta = -0.025$, $p = 0.758$, which is significant in model 2, to $\beta = -0.005$, $p = 0.955$ in model 4, indicating insignificance.

Figure 2 illustrates that firms exhibiting low levels of information sharing tend to perform poorly compared to those with high levels of information sharing. Nevertheless, as supply chain collaboration intensifies, there is a decline in firm performance across both categories, with a more pronounced decrease observed among firms that engage in high levels of information sharing.

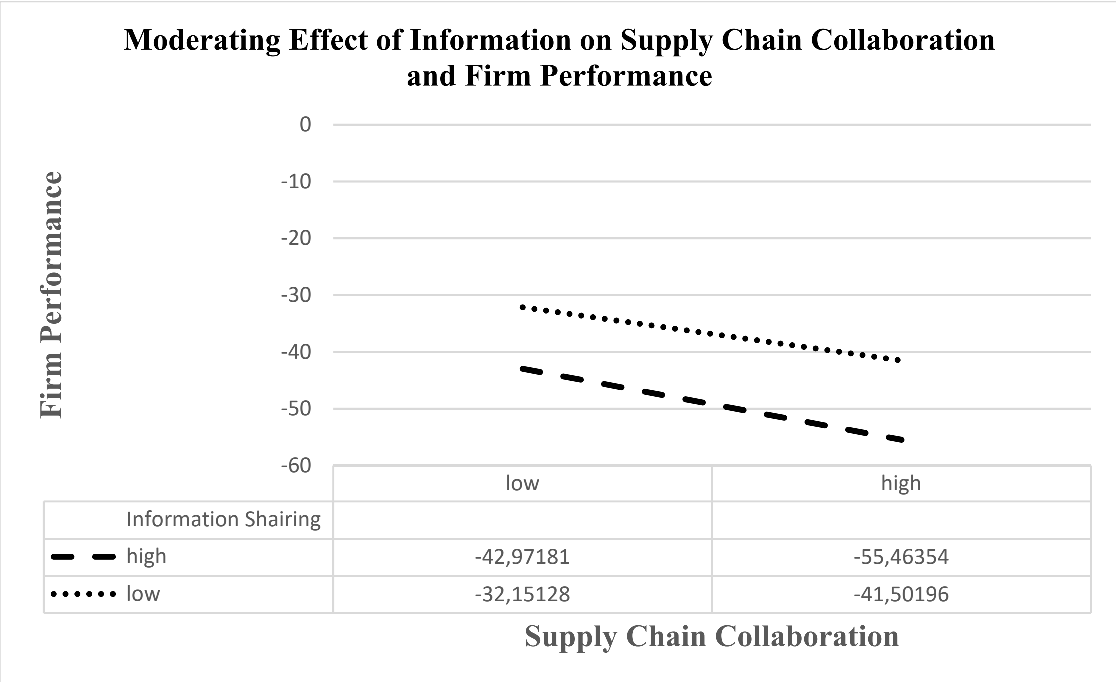

Figure 3. Moderating Effect of Information sharing on the Relationship between Supply Chain Collaboration and Firm performance

The relationship described above suggests the presence of buffering moderation. Specifically, the results from model 2, which demonstrate the direct impact of the independent variable, supply chain agility, on the dependent variable, firm performance, exhibit a decline in model 4 upon the introduction of the moderator. This buffering moderation is evidenced by a change from β = -0.025, p = 0.000, which is significant in model 2, to β = -0.005, p = 0.000 in model 4, indicating insignificance.

4.7. Structural Equation Modelling

Structural Equation Modelling (SEM) was employed to evaluate the proposed model of the research. In this investigation, the alpha level for all significance tests was established at .05, a standard threshold for rejecting the null hypothesis in various domains of behavioral science (Cohen, 1988). The path coefficient and regression coefficient estimates reflecting the moderating influence of information sharing on the relationship between supply chain resilience and firm performance, as derived from the structural model illustrated in Figure 4, are presented in Table 8 and Table 9.

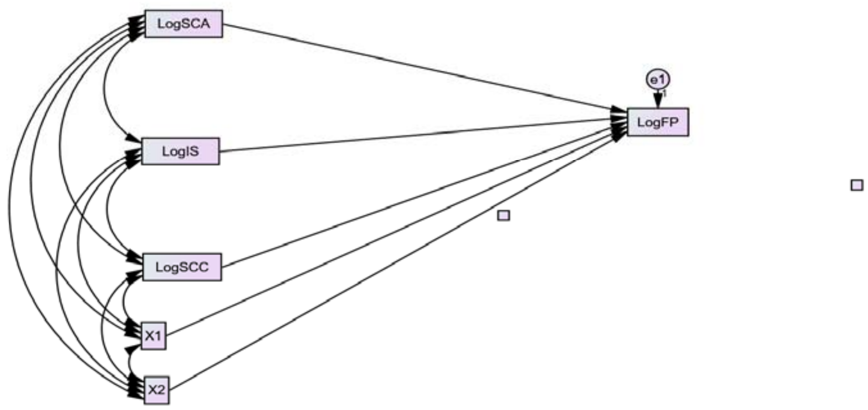

Figure 4. Path Diagram

The regression weights presented in Table 9 reveal that supply chain agility exerted a positive yet statistically insignificant influence on firm performance (β = 0.021; t = 0.262; p > 0.05). Consequently, the data corroborate the hypothesis that supply chain agility does not impact firm performance. Additionally, the regression weights indicate that supply chain visibility also had a positive but insignificant effect on firm performance (β = 0.279; t = 1.757; p > 0.05), thereby supporting the hypothesis that supply chain visibility does not influence firm performance. In contrast, the regression weights for the hypothesis regarding supply chain collaboration indicate a significant effect on firm performance (β = 0.758; t = 5.675; p < 0.05), which contradicts the initial assumption that supply chain collaboration has no significant impact on firm performance.

The research aimed to determine the moderating role of information sharing in the relationship between supply chain resilience and organizational performance. The regression analysis for the first interaction effect, X1, revealed a positive but statistically insignificant effect (β = 0.021; t = 0.262; p > 0.05). Consequently, the hypothesis suggesting that information sharing does not moderate the relationship between supply chain agility and organizational performance was corroborated by the findings. In contrast, the regression analysis for the second interaction effect, X2, demonstrated a negative and statistically significant effect ($\beta = -1.910$; $t = -3.415$; $p < 0.05$). Thus, the hypothesis that information sharing does not moderate the relationship between supply chain collaboration and organizational performance was not supported by the findings.

Table 9. Regression Weights

			Estimate	S.E.	C.R.	P
LogFP	<---	LogSCA	.021	.080	.262	.793
LogFP	<---	LogIS	.279	.159	1.757	.079
LogFP	<---	LogSCC	.758	.134	5.675	***
LogFP	<---	X2	-1.910	.559	-3.415	***
LogFP	<---	X1	.352	.443	.794	.427

5. Conclusion

The primary objective of this study was to examine the moderating role of information sharing on the relationship between supply chain resilience on Kenya's manufacturing sector. The findings established that a positive and significant relationship between supply chain collaboration and firm performance, whereas supply chain agility does not significantly influence firm performance. The results align with findings by previous scholars who emphasized the role of supply chain collaboration as a primary driver of operational efficiency (Huo, 2012; Zhang et al., 2017). However, it contrasts with empirical studies linking supply chain agility to firm performance (Lee, 2004; Sweeney et al., 2018), this divergence can be attributed to unique contextual challenges faced by manufacturing firms in Kenya.

On whether information sharing moderates the relationship between supply chain resilience and performance, it was established that it does not moderate the relationship between supply chain agility and performance. On collaboration, the relation is negative. This suggest the need to control sharing of information among supply chain partners, as it could complicate collaborative efforts, this concept calls for reevaluation of conventional perspectives on the importance of information sharing in enhancing supply chain relationships (Sweeney et al., 2018). This empirical study contributes to the existing literature by highlighting these complexities, particularly in developing economies that has been experiencing supply chain challenges compared to developed countries.

In light of these findings, it is of essence for Kenya's manufacturing firms to prioritize supply chain collaboration as they manage the aspect of information sharing among supply chain partners. This will go a long way in bolstering supply chain network resilience and improve firms' overall performance in the context of frequent disruptions. Future research should focus on whether different dimensions of information sharing can influence performance in the context of other sectors and industries. This approach will enrich supply chain strategies associated with network resilience.

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