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Moderating Effect of Supply Chain Pillars on the Relationship between Supply Chain Integration and Retail Outlet Performance: An Analysis of Selected Supermarkets in Kenya

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Abstract:
In the recent past, the retail sector landscape in Kenya has witnessed considerable supply chain disruptions and even closure of some of the giant local and international retail chains. The main purpose of the study was to establish the moderating effect of supply chain Pillars on the relationship between supply chain integration and retail outlet performance. The study adopted a cross-sectional survey design with a target population of 2654 staff drawn from Naivas, Quickmart, Chandarana, and Carrefour supermarkets across the four cities in Kenya. The study used closed-ended structured questionnaires to collect primary data. The data was analyzed using logistic regression. The study was conducted between the years 2022 and 2024. The study reported a significant moderating effect of supply chain pillars on the relationship between supply chain integration and retail outlet performance (Est. = 0.986022; p≤0.01). Supply Chain Incentive Alignment (SCIA), with an estimate of 1.3888321 (p≤0.01), had the highest contribution to increasing retail outlet performance, followed by Supply Chain Decision Synchronization (SCDS) with an estimate of 1.290342 (p≤0.01) and lastly, Supply Chain Information Sharing (SCIS) with an estimate of 0.874501 (p≤0.05). The study concluded that the efforts invested in supply chain integration practices, including information sharing, decision synchronization, and incentive alignment, are crucial for improving service delivery, customer satisfaction, and profitability in retail outlets.

Keywords: Moderating effect, supply chain integration, supply chain pillars, retail outlet performance

1. Introduction

1.1. Background of the Study

Globally, Retail outlets are currently grappling with several performance challenges that significantly affect their operations and profitability. One major challenge is the ongoing shift in consumer shopping habits. As consumers increasingly expect personalized and seamless shopping experiences across multiple channels, retail outlets must integrate their online and offline presences (Draup, 2023). This demand for omni-channel experiences requires substantial investment in technology and data analytics to effectively track and respond to consumer behaviors. High inflation rates and economic volatility present another significant challenge. Inflation squeezes profit margins as retailers struggle to balance pricing strategies with consumer expectations. Many consumers are turning to finance plans and promotional offers to manage their budgets, which forces retailers to adopt more sophisticated inventory management and personalized marketing strategies to maintain profitability (Draup, 2023). Supply chain disruptions continue to be a persistent issue. The global supply chain has been plagued by variations and inefficiencies, leading to out-of-stock items and increased operational costs. Retailers must enhance supply chain transparency and resilience by leveraging data analytics and technology to streamline operations and improve inventory management. Companies like Walmart have successfully managed supply chain costs, thereby maintaining competitive pricing and customer satisfaction (Deloitte, 2023).

In Kenya, Supermarket chains are currently bearing the brunt of the supply chain disruptions as demonstrated by the collapse of the then giant local supermarkets like Nakumatt, Uchumi and Tuskys, with foreign supermarkets like Game

Store and Carrefour opting to exit the industry if the situation continues (Kenya Daily Business Report, 2021). Uchumi was the oldest local supermarket in Kenya, followed by Nakumatt and Tuskys, having entered the Kenyan market in 1975, 1987 and 1990, respectively (Mwangi, 2018). In 2017, Nakumatt was the largest retail chain in Kenya, with 65 branches, followed by Tuskys and Uchumi, with 36 and 31 branches, respectively (Mwangi, 2018). Even though Nakumatt was the market leader, it was struggling to maintain its share of the market as foreign chains like Choppies from Botswana, Shoprite and Game from South Africa, and Carrefour from France entered the market, offering relatively cheap products compared to local retail chains (Kariuki, 2018)

As of September 2020, the total number of supermarket outlets dropped from 314 to 189, with big retailers such as Nakumatt, Tuskys and Uchumi being the losers (Daily Business Report, 2020). The financial constraints due to mounting rental arrears and suppliers' debts led Nakumatt, once Kenya's largest supermarket chain, to lead from behind with the closure of all its 65 branches. Naivas and Quickmart capitalized on the weakness to expand their market share. However, due to rapid entrance and stiff competition from foreign retailers, Tuskys and Uchumi were already struggling to maintain their market shares (Daily Business Report, 2020). By March 2021, both Uchumi and Tuskys had closed all their branches and exited the market. The Kenya Association of Manufacturers (KAM) reported that the retailers faced debt payment challenges and were not able to pay for fast-moving consumer goods (FMCG) within 30 days from the invoice date, as was the policy. They were also unable to pay for other goods within 45 days from the invoice date as required (Kenya Daily Business Report, 2021). Changing customer demand, stiff competition, political uncertainty, unreliable suppliers and rising cost of living are some of the major challenges faced by this sector (Chesula & Iravo, 2016; and Lagat, 2011).

South African giant chain Shoprite entered the Kenyan retail industry in 2018 and, by September 2020, had closed all of its four branches, citing underperformance of its supermarkets due to stiff competition. Choppies (from Botswana) entered the industry in 2015 by acquiring the already struggling Ukwala supermarket that had 12 branches by then and, by 2020, had exited the Kenyan market (Daily Business Report 14th December 2020). Game Store (from South Africa) entered the Kenyan market in 2015, and December 2022 marked the end of its seven-year struggle in the market, adding to the growing list of local and foreign retailers that have left the industry in recent years (Daily Business Report 23rd November 2022). According to a report by Cytonn in 2020, the performance of the retail sector was likely to be constrained due to COVID-19, which led to the increased growing number of consumers buying goods online, forcing a consumer shift toward e-commerce, thus affecting the demand for physical retail space.

1.2. Statement of the Problem

The retail industry is considered the key player in the supply chain network of manufactured goods. The formal sectors, comprising the supermarkets, which are at the end of the supply chain, are the link between the manufacturers and the final consumers. Supermarkets allow for one-stop shopping by offering a variety of products and ensuring constant stock replenishment for the continuation of their services to the end consumers. However, over the years, the industry has experienced drop-outs of some of the giant supermarkets, causing anxiety among stakeholders. These firms, before completely exiting the industry, experienced operational challenges that impacted their service delivery in terms of stock levels and product varieties. The supermarkets also experienced financial losses and were not able to pay their suppliers and employees (Kenya Daily Business Report, 2021).

The retail landscape in Kenya is currently dominated by Naivas Supermarket, followed by Quickmart, Chandarana, Carrefour, and others (Soko Directory, 2022). However, the supermarkets continue to face challenges of low-profit margins, lack of product variety, suppliers' uncertainty, frequent stock-outs, consumer complexity, high operational costs and increasing competition, particularly from the rise of online shopping, which adds layers of uncertainty to traditional brick-and-mortar retail (Draup, 2023). Stakeholders are, therefore, closely monitoring the surviving supermarkets, eager to see how they navigate the challenging landscape to remain relevant, competitive, and profitable. A number of past studies explored the effect of supply chain integration on organizational performance. However, none of them looked at the moderating effect on the relationship. More so, most of the studies were conducted in the manufacturing sector and in different geographical spaces, creating a gap for similar studies to be conducted in Kenya and other sectors like the retail industry. This study aimed to establish the moderating effect of supply chain pillars on the relationship between supply chain integration and the performance of retail outlets in Kenya.

1.3. Objective of the Study

Establish the moderating effect of Supply Chain Pillars on the relationship between Supply Chain Integration and Retail Outlet Performance in Kenya.

1.4. Research Hypothesis

H01: There is no statistically significant moderating effect of supply chain Pillars on the relationship between Supply chain integration and Retail outlet performance in Kenya.

1.5. Significance of the Study

The study hopes to provide empirical evidence on the moderating effect of the supply chain pillars on the performance of retail chains in general. In so doing, the study hopes to enrich the body of knowledge on supply chain integration and retail outlet performance. A successful retailing sector is central to the economic well-being of the citizens as it provides the critical link between production and consumption and, hence, is central to efficient resource allocation in

an economy. The study thus provides useful ingredients for policy direction in allocating a country's scarce resources for enhanced development and wealth creation.

1.6. Limitations of the Study

The main limitation of the study was the lack of clearly documented performance data, hence necessitating the use of Likert scale scores to generate primary data from the respondents.

1.7. Assumptions of the Study

The study assumed that respondents would be open and honest to give true and relevant information that would enable the researcher to draw accurate conclusions. This study also assumed that there existed a close relationship between supermarkets in Kenya and their first-tier suppliers and customers.

2. Literature Review

2.1. Theoretical Review

The main theories underpinning this study are the competitive advantage theory and the network perspective theory.

2.1.1. Competitive Advantage Theory

The theory of competitive advantage was first proposed by Michael Porter in 1985 as a reaction to the classical theories of comparative advantage that focused on nations as the basis of trade. Porter's theory focuses on firms and forms the broader theory of the firm. The theory argues that competitive advantage occurs when a firm develops attributes that allow it to outperform its competitors. These attributes included access to natural resources, skilled personnel, and strong relationships with business partners. In the context of retail chains, the application of competitive advantage is crucial. These supermarkets strive to optimize costs, increase profit margins, enhance product variety, and ensure timely stock replenishment through firm-specific advantages, which are derived by converting country advantage through managerial competencies into firm-specific advantages. By closely aligning and coordinating with supply chain partners, supermarkets are able to enhance efficient information sharing, joint decision-making, and sharing of costs and benefits.

2.1.2. Network Perspective Theory

Network Perspective Theory, attributed to Jacob Moreno in the 1930s, marks a significant advancement in understanding social dynamics through the creation of sociograms, which visually map interpersonal relationships (Scott & Carrington, 2011). Moreno's pioneering work laid the foundation for analyzing how social actors, referred to as nodes, interact through various forms of ties or edges. These nodes can represent individuals, groups, or organizations, and the connections between them can encompass a wide range of interactions, including communication, collaboration, and influence. By examining the structure and quality of these relationships, organizations can gain insights into the flow of information and resources, the formation of social capital, and the mechanisms of influence and support within their workforce (Wasserman & Faust, 1994). Retail outlets are a chain of actors; if each actor performs its function efficiently, then the connecting nodes provide synergy as opposed to acting as hindrances. The integration of the entire team of players in the supply chain is, therefore, critical for the success of all these supply chain pillars.

In the context of modern organizations, this theory is particularly relevant given the increasing complexity of organizational structures and the importance of collaborative work environments. By applying Network Perspective Theory, organizations can also better manage their external relationships with stakeholders, including customers, suppliers, and partners. Understanding the broader network in which the organization operates can provide strategic advantages, such as identifying new opportunities for collaboration and innovation or anticipating market trends and shifts (Kilduff & Tsai, 2003).

2.2. Conceptual Review

2.2.1. Supply Chain Integration

Supply chain integration has three independent variables: internal integration, supplier integration and customer integration (Tutuncu & Kucukusta, 2007). In the recent past, scholars have adopted dimensions such as internal integration and external (customers and suppliers) integration to contribute to the relationship between SCI and firms' performance (Stevens & Johnson, 2016). Internal integration relates to cross-functional collaboration with the aim of having full visibility of information, products and processes in order to meet customer and organizational goals (Flynn, Huo & Zhao, 2010; Zhao, Kumar, Harrison & Yen., 2011). On the other hand, external integration relates to both upstream and downstream processes of the organization with the aim of enhancing visibility from one end of the supply chain to the other end within the supply chain network, including customer and supplier integration (Flynn et al., 2010). Supplier integration involves collaboration, coordination and information-sharing activities between the firm and its suppliers with the aim of synchronizing the firm and vendors' processes (Narasimhan, Swink & Viswanathan, 2010; Schoenherr & Swink, 2012). Customer integration involves sharing strategic data and collaborating and coordinating processes between the firm and customers, with the main aim of improving insights into market expectations and opportunities (Schoenherr & Swink, 2012).

2.2.2. Supply Chain Pillars

According to Holcomb and Hitt (2007), supply chain pillars refer to the foundational elements that support and enhance the efficiency and effectiveness of supply chain operations. Two critical pillars of modern supply chains are supply chain visibility and supply chain flexibility (Sodhi & Tang, 2012). These pillars play a crucial role in ensuring that supply chains can respond effectively to market demands, disruptions, and other challenges. Supply chain visibility refers to the ability to track and monitor all components, processes, and entities within the supply chain in real time (Sodhi & Tang, 2012). This includes the movement of goods, the status of orders, inventory levels, and the performance of supply chain partners. High visibility allows companies to make informed decisions, anticipate potential issues, and improve overall efficiency. Key aspects of supply chain visibility include real-time data access, end-to-end transparency, and predictive analytics (Holcomb & Hitt, 2007; Christopher, 2016; Sodhi & Tang, 2012).

On the other hand, supply chain flexibility is the ability of a supply chain to adapt to changes and disruptions without significant performance degradation (Stevenson & Spring, 2007). This includes the capability to manage fluctuations in demand, supply shortages, and other unexpected events. Flexibility is crucial for maintaining resilience and competitiveness in dynamic market conditions (Stevenson & Spring, 2007). One strategy for gaining and keeping a competitive advantage in a dynamic environment where customers demand more variety, better quality, and service, including both reliability and faster delivery, is to create a flexible organization (Grigore, 2007). The relationship between supply chain integration and retail performance is complex and can be influenced by various factors. Two critical pillars of supply chain management that may moderate this relationship are supply chain flexibility and supply chain visibility (Christopher, 2011). This study adopted visibility and flexibility as the dimensions for measuring SCP.

2.2.3. Retail Outlet Performance

Performance can be measured in terms of productivity, efficiency or effectiveness (Scotti, 2004). Performance is a set of metrics used to quantify the efficiency and effectiveness of supply chain processes and relationships (Maestrini, Luzzini, Maccarrone & Caniato, 2017). Total supply chain performance measures are customer satisfaction, supply chain response time, reduction in inventory cost and asset utilization (Simatupang & Sridharan, 2005).

2.3. Empirical Review

2.3.1. Supply Chain Integration and Performance

Yunus and Tadisina (2016) conducted a study in 2014 with the intention of evaluating the impact of supply chain integration on the performance of manufacturing firms in Indonesia. SCI dimensions adopted were internal integration, customer integration and supplier integration. Operational performance was measured by the level of productivity, competitive advantage and profitability. From the findings, there was a positive relationship between SCI and firms' performance. However, according to Etikan and Musa Alkassim (2016), purposive sampling is associated with data bias as the technique is prone to researcher bias due to subjective assumptions and may not be generalized beyond the actual research subjects. The current study sought to establish the effect of SCDS on retail outlet performance in Kenya by adopting proportionate stratified random sampling, which, according to Kothari (2004), allows the researcher to obtain a sample size that best represents the entire population under study.

In a study whose main aim was to establish the influence of supply chain integration on the supply chain performance of small and medium enterprises in South Africa, Pfanelo (2017) reported that SCI had a positive influence on the supply chain performance of SMEs in South Africa. Even though the research found a positive correlation between SCI and performance, the dimensions for measuring performance were limited to order fill rate and order delivery rate. According to Kopper and Parry (2002), limited measurement indicators can lead to underreporting or overreporting of the findings and, hence, inaccurate conclusions. The findings of this study may not reflect the real situation in the market, creating a gap for similar studies with possibly adequate performance measurements to ascertain the results. The current study sought to increase the metrics for performance measurement by adopting profitability (cost reduction, sales volume and Net profit margin) and service delivery (stock-out reductions, inventory turnover and product variety enhancement) while establishing the effect of SCIS on retail outlet performance in Kenya.

Uwamahoro (2018) conducted a study that sought to establish the effect of supply chain Integration on the performance of manufacturing firms in Rwanda. Data was analyzed using Pearson's correlation and structural equation modeling (SEM). The findings showed that internal integration and customer integration were more strongly correlated with performance than supplier integration.

Hamiza and Isoh (2019) did research that sought to determine the relationship between supply chain integration and Small business units in Uganda. Primary data was gathered through questionnaires. Descriptive and Structural Equation Modelling was used to analyze data. From the findings, internal integration management had a stronger positive relationship with SME performance than information technology, innovation and creativity. The current study sought to establish the moderating effect of supply chain pillars on the relationship between supply chain integration and retail outlet performance in Kenya, using logistic regression as the analytical model.

2.3.2. Supply Chain Pillars and Performance

Siagian, Tarigan, Hisada and Jie (2021) conducted a study that sought to establish the mediating effect of supply chain flexibility on the relationship between SCI and the performance of manufacturing firms in Indonesia. Data was analyzed by Partial Least Square (PLS) techniques. From the results, Supply Chain Flexibility positively mediated the

relationship between SCI and performance. The current study seeks to focus on Retail Sector while establishing the moderating effect of Supply Chain Flexibility on relationship between SCI and Performance.

Saqib and Zhang (2021) conducted a study that sought to establish the moderating effect of supply chain visibility on the relationship between sustainable practices and the sustainable performance of manufacturing firms in Pakistan. Structured questionnaires were used to gather data, which was then analyzed by Structural Equation Modelling (SEM) techniques. The findings showed that supply chain visibility positively moderated the relationship between sustainable practices and sustainable performance. The current study sought to establish the moderating effect of supply chain visibility with reference to the Retail sector and compare results.

Haruna (2017) conducted research that sought to determine the moderating effect of supply chain flexibility on the relationship between SCI and Business performance of companies in Ghana. A structured questionnaire was used to gather data that was analyzed by descriptive statistics and structural equation modelling. From the findings, SCI positively correlates with a firm's performance, and supply chain flexibility positively moderates the relationship between SCI and performance. The current study sought to establish the moderating effect of supply chain flexibility and visibility on the relationship between SCI and Retail Outlet performance using a Logistic regression model as opposed to structural equation modeling since it is simpler to understand and interpret, with coefficients that can be directly translated into odds ratios and can easily incorporate multiple independent variables and interaction terms (Smith, 2020)
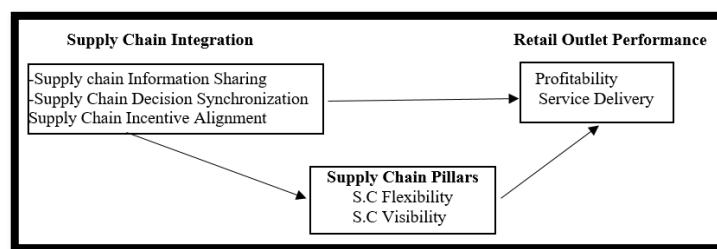

Figure 1: Conceptual Framework
Source: Researcher's Own Conceptualization (2023)

Supply Chain Integration was measured by the extent to which accurate and reliable information was being shared among supply chain parties, the extent to which supply chain parties were able to make and implement decisions jointly and the extent to which supply chain parties were able to share risks and benefits that come along with integration. SCP was measured by the extent to which there existed flexibility and visibility within the supply chain. Profitability was measured by the extent to which operating costs were reduced, the extent to which there existed an increase in the sales volume and the extent to which there existed an increase in the net profit margin. Service delivery was measured by the extent to which stock-outs were reduced, the rate at which new stock was ordered and the availability of product variety.

3. Research Methodology

3.1. Research Philosophy

This study adopted the philosophy of positivism, which originated in the natural sciences and focuses on the scientific testing of hypotheses and finding logical or mathematical proof derived from statistical analysis (Collis & Hussey, 2014; Saunders, Lewis & Thornhill, 2016). In positivism, the researcher maintains independence with a limited role in data collection and interpretation, emphasizing objectivity. Positivism typically employs large samples to produce precise, objective, and quantitative data, focusing on quantifiable observations that lead to statistical analysis (Easterby-Smith, Thorpe & Jackson, 2012). This Philosophy is highly applicable to this study due to its emphasis on scientific rigor, objectivity, and the use of large, quantitative datasets. It enables the researcher to test hypotheses systematically, produce generalizable and replicable findings, and derive objective conclusions that contribute to the theoretical and practical understanding of supply chain management (Collis & Hussey, 2014; Saunders et al., 2016; Easterby-Smith et al., 2012).

3.2. Research Design

The study adopted a cross-sectional research design, which is particularly suitable for collecting data from a large population at a specific point in time, thus providing a comprehensive snapshot of retail outlets' performance in Kenya (Bryman, 2016; Creswell & Creswell, 2018). By employing this design, the study sought to compare performance metrics across different supermarkets, identifying existing patterns and trends that are essential for understanding the current landscape of the retail sector. This facilitates the examination of relationships between variables such as supply chain integration and retail outlet performance (Fowler, 2013).

3.3. Area of Study

The study was conducted in four major cities in Kenya: Nairobi, Mombasa, Kisumu, and Nakuru. These cities were selected due to their diverse and dynamic market environments, which provide a comprehensive representation of the country's retail landscape (Kenya National Bureau of Statistics, 2019; World Bank, 2020). The supermarkets focused on in this study were Naivas, Quickmart, Chandarana, and Carrefour. These supermarkets were chosen due to their extensive

market presence and branch networks across Kenya, ensuring a representative sample of the retail sector (Retail Trade Association of Kenya, 2020).

3.4. Target Population of the Study

The target population of the study was 2654 staff drawn from Naivas, Quickmart, Chandarana and Carrefour supermarkets across Nairobi, Nakuru, Mombasa and Kisumu.

The target population is shown in table 1 below.

City/HQ	Section	No. of Staff				
		NAIVAS	QUICKMART	CHANDARANA	CARREFOUR	TOTAL
Nairobi	Branch Managers	46	19	16	12	93
	Section Heads	460	190	160	120	930
	Line Attendants	460	190	160	120	930
Nakuru	Branch Managers	4	3	1	0	8
	Section Heads	40	30	10	0	80
	Line Attendants	40	30	10	0	80
Kisumu	Branch Managers	3	1	1	2	7
	Section Heads	30	10	10	20	70
	Line Attendants	30	10	10	20	70
Mombasa	Branch Managers	5	5	3	2	15
	Section Heads	50	50	30	20	150
	Line Attendants	50	50	30	20	150
HQs	Finance Department	15	11	7	8	41
	Procurement Department	12	8	5	5	30
Total		1245	607	453	349	2654

Table 1: Target Population
Source: HR Department, Naivas, Quickmart, Chandarana, and Carrfour Supermarket (2022)

A sample of 347 was arrived at using the Yamane (1967), as shown below:

$$n= \frac{N}{[1 + (Ne^2)]} \quad \text{.....................................Eq.1}$$

Where:
n = is the sample size
N = is the population
e = is the error term (0.05 on the basis of 95% confidence level)
Therefore,　　　　　　　　　　　n = 2654 / [1 + 2654(0.05)^2]
n = 2654/7.635
　　n = 347

City/HQ	Section	No. of Staff				
		NAIVAS	QUICKMART	CHANDARANA	CARREFOUR	TOTAL
Nairobi	Branch Managers	6	2	2	2	12
	Section Heads	60	25	21	16	122
	Line Attendants	60	25	21	16	122
Nakuru	Branch Managers	1	0	0	0	1
	Section Heads	5	4	1	0	10
	Line Attendants	5	4	1	0	10
Kisumu	Branch Managers	1	0	0	0	1
	Section Heads	4	1	1	3	9
	Line Attendants	4	1	1	3	9
Mombasa	Branch Managers	1	1	0	0	2
	Section Heads	7	7	4	2	20
	Line Attendants	7	7	4	2	20
HQs	Finance Department	2	1	1	1	5
	Procurement Department	2	1	1	0	4
Total		163	79	59	46	347

Table 2: Sample Frame
Source: Researcher's Own Conceptualization (2022)

3.5. Pilot Testing

This study used Khetia's supermarkets in Kisumu for piloting. Khetia's is one of the largest retail Chains in Kenya, with 13 outlets across Kitale, Bungoma, Kisumu, Kakamega, and Nairobi. Validity and reliability tests were conducted to

determine the feasibility of the instruments and improve on the areas of weakness in an attempt to better the research instruments.

3.6. Validity Test

Content and construct validity were determined by the specialists' agreement on the relevance of the items. The specialists evaluated each item in the questionnaire to determine its relevance to the research objectives. The items were rated on a scale of 1-4 such that 1 = *not relevant*, 2 = *somehow relevant*, 3 = *relevant* and 4 = *very relevant.* The content validity index (CVI) was calculated as K/N, where K is the number of items marked 3 or 4, and N is the total number of items assessed (Polit & Beck, 2006). The rated finding was used to calculate content validity index (CVI) using the formula:

$CVI = \frac{K}{N}$ .... Eq.2 (a)

Where:

K = Total number of items in the questionnaire declared valid by both experts.

N = Total number of items in the questionnaire

The computed CVI was checked against the minimum acceptable index, which is 0.70, as recommended by Amin (2005). The results were as presented in Eq. 2 (b)

Thus:

$CVI = \frac{26}{30}$ = 0.87

Twenty-six (26) out of Thirty (30) items were rated acceptable; thus, a content validity index of 0.87 was obtained. The computed CVI was checked against the minimum acceptable index, which is 0.70, as recommended by Lawshe (1975) and Amin (2005). According to Lawshe (1975) and Amin (2005), a content validity index threshold of 0.7 and thus the overall CVI of 0.87 were acceptable.

3.7. Reliability Test

For the reliability test, the study considered the consistency of results across different parts of the questionnaire by adopting a split-half reliability coefficient test. The questions in the questionnaire were divided into odd items represented by 'x' and even items represented by 'y' and the scores from both halves correlated. The computed Reliability Coefficient of the instrument was checked against the least acceptable index of 0.70, as recommended by Nunnally and Bernstein (1994). Usually, the internal consistency of a measurement scale is assessed using Cronbach's coefficient alpha (Cronbach, 1951) and the Flanagan Formula shown in Eq. 3.3

$$R_t = 2[1 - \frac{\delta_1{}^2 + \delta_2{}^2}{\delta_t{}^2}]$$ Eq.3

Where:

R_t = Reliability Coefficient of the Test

δ_1 = Standard Deviation (S.D.) of Scores of 1st Half

δ_2 = Standard Deviation (S.D.) of Scores of 2nd Half

δ_t = Standard Deviation (S.D.) of Scores of Whole Tests

To ascertain the results, the KMO Test was used to obtain the respective Cronbach's alpha reliability coefficients as coefficients of internal consistency by checking on the inter-item reliability coefficients. Cronbach's Alpha of 0.811 was found to be above the minimum accepted value of 0.7.

3.8. Data Analysis

The logistic regression model was chosen for its ability to assess the strength of the relationship between the dependent variable and several predictor variables, as well as the importance of each predictor (Gujarati, 2003). This method is robust for modeling the probability of a certain class or event, such as success/failure or yes/no outcomes, based on one or more predictor variables (Gujarati, 2003). Logistic regression is advantageous because it does not assume a linear relationship between the dependent and independent variables, can handle interactions between variables, and provides odds ratios, which are intuitive for interpreting the effects of predictors (Gujarati, 2003). The following general theoretical model for a logistic regression with three independent variables, X_1, X_2, and X_3, and a dependent variable, Y, was adopted:

logit(P/(1-P)) = P(Y=1) = β_0 +$\beta_1 X_1$ +$\beta_2 X_2$ +$\beta_3 X_3$ ....Eq. 4

Where:

P(Y=1) is the probability that the dependent variable Y equals 1 (the event of interest).

β_0 is the intercept term.

β_1, β_2 and β_3 are the coefficients for the independent variables X_1, X_2 and X_3, respectively.

4. Data Analysis, Presentation and Discussion

4.1. Response Rate

The assessment of the response rate involved an analysis of the number of questionnaires received, categorizing them into fully filled, not returned, and returned but incomplete. The subsequent calculation of the return rate is presented in table 3 for clarity and reference.

Sample Size	Number	Percentage
Questionnaires Returned (Fully Filled)	305	87.90
Questionnaires Returned (Not Fully Filled)	18	5.19
Questionnaires Not Returned	24	6.91
Total	347	100.00

Table 3: Response Rate
Source: Survey Data (2023)

During the survey at Supermarkets under study, a total of 347 questionnaires were distributed to target respondents. Twenty-four (24) questionnaires were not returned and were subsequently excluded from the analysis. Additionally, 18 questionnaires were returned partially filled and were also excluded from the final dataset. However, a substantial 305 questionnaires were returned fully filled, resulting in an impressive 87.9 per cent response rate.

4.2. Logistic Regression Analysis

To establish the moderating effect of supply chain pillars on the relationship between supply chain integration and retail outlet performance, the study established the effect of supply chain integration on retail outlet performance (reduced model) first before the moderated model (full model). This helped clearly show the shifts in estimates and p-values for accurate conclusions.

4.3. Effect of Supply Chain Integration on Retail Outlet Performance

The study assessed the individual significant predictors for further analysis. The predictor variables of focus were SCIS_CD_Q211, SCDS_EF_Q311, SCIA_GH_Q421, SCIA_GH_Q431, and SCIA_GH_Q441. The results are summarized in table 4.

Term	Estimate	Std. Error	Statistic	p-value
SCIS_CD_Q211	1.094452	0.442713	2.472148	0.01343
SCDS_EF_Q311	1.290606	0.411819	3.133916	0.001725
SCIA_GH_Q421	0.329965	0.326971	1.009157	0.312899
SCIA_GH_Q431	1.379325	0.414177	3.330283	0.000868
SCIA_GH_Q441	-0.37577	0.345544	-1.08747	0.276828

Table 4: Logit Regression Summary Expressed by Denoting Main Effects Only Model
Evaluated at 95% Confidence Level for the Significant Predictors between SCI and
Retail Outlet Performance
Source: Author's Computation from Research Data (2024)

The logit summary results presented in table 4 for the joint model without moderating effects highlight several important relationships between Supply Chain Integration (SCI) variables and Retail Outlet Performance in Kenya. In this model, SCIS CD Q211, SCDS EF Q311, and SCIA GH Q431 have p-values of 0.01343, 0.001725, and 0.000868, respectively, indicating a strong positive effect on retail outlet performance. On the other hand, SCIA GH Q421 and SCIA GH Q441 have p-values greater than 0.05, indicating no significant effect.

This means that under the joint model, SCIS CD Q211, SCDS EF Q311, and SCIA GH Q431 significantly affect the retail outlet's performance, while SCIA GH Q421 and SCIA GH Q441 become insignificant.

$$\log\left(\frac{p}{1-p}\right) = 1.094452 * SCIS\_CD\_Q211 + 1.290606 * SCDS\_EF\_Q311 + 1.379325 * SCIA\_GH\_Q431$$

(Eq.5)

Predictor	Odds Ratio	2.50%	97.50%
SCIS_CD_Q211	2.9875	1.3181	7.6766
SCDS_EF_Q311	3.635	1.7018	8.7199
SCIA_GH_Q421	1.3909	0.7403	2.6839
SCIA_GH_Q431	3.9722	1.8399	9.4715
SCIA_GH_Q441	0.6868	0.3489	1.362

Table 5: Displaying the Associated Odds Ratio and Their Corresponding 95%
Confidence Interval for the Consolidated Objectives Model Considered
Reduced Model (Model 1) and Retail Outlet Performance
Source: Author's Computation from Research Data (2024)

The results from table 5 provide a detailed analysis of the factors influencing retail outlet performance in Kenya, with specific emphasis on the odds ratios and their corresponding confidence intervals.

The odds ratio for SCIS_CD_Q211 is 2.9875, with a 95% confidence interval ranging from 1.3181 to 7.6766. This indicates that a one-unit increase in SCIS_CD_Q211 is associated with a 198.75% increase in the likelihood of improved retail outlet performance. The confidence interval does not include 1, making this effect statistically significant and suggesting a strong positive relationship between SCIS_CD_Q211 and retail outlet performance. The odds ratio for SCDS_EF_Q311 is 3.635, with a confidence interval from 1.7018 to 8.7199. This suggests that a one-unit increase in SCDS_EF_Q311 is associated with a 263.5% increase in the likelihood of improved performance. The statistically significant confidence interval (excluding 1) confirms a robust positive association between SCDS_EF_Q311 and retail outlet performance. The odds ratio for SCIA_GH_Q431 is 3.9722, with a confidence interval ranging from 1.8399 to 9.4715. This shows a significant 297.22% increase in the likelihood of improved performance for each one-unit increase in SCIA_GH_Q431. The statistically significant confidence interval (excluding 1) suggests a strong positive relationship between SCIA_GH_Q431 and retail outlet performance.

In summary, the predictors SCIS_CD_Q211, SCDS_EF_Q311, and SCIA_GH_Q431 have significant positive effects on the likelihood of improved retail outlet performance in Kenya. Conversely, SCIA_GH_Q421 and SCIA_GH_Q441 do not show significant effects within this model. This analysis underscores the critical factors that enhance retail outlet performance in Kenya, particularly those related to specific elements of Supply Chain Integration.

4.4. Moderating Effect of Supply Chain Pillars on the Relationship between Supply Chain Integration and Retail Outlet Performance

Logistic Regression Analysis was conducted to determine the moderating effect of Supply Chain pillars on the relationship between Supply Chain Integration and Retail Outlet Performance in Kenya. The study assessed the individual significant predictors in table 6 for further analysis. Again, a binary logistic regression was deployed to establish a potential relationship that might exist. The predictor variables of focus were SCIS_CD_Q211, SCDS_EF_Q311, SCIA_GH_Q4211, SCIA_GH_Q431, SCIA_GH_Q441, and SCP_IJ_Q561. Only one of the six moderating factors survived across the objectives and is considered a potential moderator in the model. Effects on the service delivery and/or profitability-related attributes of Retail Outlet Performance were evaluated. The results are summarized in table 6.

Term	Estimate	Std. Error	Statistic	p-value
SCIS_CD_Q211	0.874501	0.452073	1.934423	0.053061
SCDS_EF_Q311	1.290342	0.416	3.101787	0.001924
SCP_IJ_Q561	0.986022	0.35813	2.753253	0.005901
SCIA_GH_Q421	0.260054	0.332609	0.781862	0.434295
SCIA_GH_Q431	1.388321	0.418551	3.316973	0.00091
SCIA_GH_Q441	-0.40578	0.352574	-1.1509	0.249775

Table 6: Logistic Regression Summary Expressed by Models I Denoting
Main Effects Only Model and the Model with Moderation Evaluated at 95%
Confidence Level for the Significant Predictors
Source: Author's Computation from Research Data (2024)

The logistic regression analysis presented in table 6 provides valuable insights into the factors influencing retail outlet performance in Kenya, with a specific focus on the moderating effects of Supply Chain Pillars (SCP). The analysis highlights significant predictors, evaluated at a 95% confidence level, focusing on both the main effects and the effects with moderation for SCIS_CD_Q211, SCDS_EF_Q311, SCP_IJ_Q561, SCIA_GH_Q421, SCIA_GH_Q431, and SCIA_GH_Q441.

In this model, SCDS EF Q311, SCP IJ Q561 and SCIA GH Q431 have p-values of 0.001924, 0.005901 and 0.00091, respectively, indicating a strong positive effect on retail outlet performance. On the other hand, SCIS_CD_Q211, SCIA GH Q421 and SCIA GH Q441 have p-values greater than 0.05, indicating no significant effect. This means that under the moderated joint model, SCDS EF Q311 and SCIA GH Q431 significantly affect the retail outlet's performance, while SCIS CD Q211, SCIA GH Q421 and SCIA GH Q441 become insignificant. The interaction term SCP IJ Q561 has a p-value of 0.005901 with an estimate of 0.986022, indicating a significant moderating effect on the relationship between the predictors and performance.

$$\log\left(\frac{p}{1-p}\right) = 1.290342 * SCDS\_EF\_Q311 + 0.986022 * SCP\_IJ\_Q561 + 1.388321 * SCIA\_GH\_Q431 \text{ (Eq. 6)}$$

Considering the results given, the finding reveals several key insights into the factors influencing retail outlet performance in Kenya under the moderation of Supply Chain Pillars (SCP). The significant positive effects of SCDS_EF_Q311 and SCP_IJ_Q561 underscore the importance of effective supply chain decision synchronization and strong partnerships. These practices enhance coordination, resource utilization, and overall supply chain efficiency, leading to improved performance. The strong positive effect of SCIA_GH_Q431 highlights the critical role of incentive alignment in driving performance. Aligning incentives ensures that all stakeholders are motivated to work towards common goals, enhancing commitment and effort towards achieving better performance outcomes. The moderation by SCP indicates that these positive effects are amplified when integrated into a comprehensive supply chain strategy. The marginal significance

of SCIS_CD_Q211 suggests that while supply chain information sharing might positively impact performance, its effect may not be as strong or consistent under moderation. Further research with larger sample sizes or different methodologies could provide more conclusive evidence. The lack of significance for SCIA_GH_Q421 and SCIA_GH_Q441 indicates that not all aspects of incentive alignment have a uniform impact on performance. It is essential to identify which specific incentive practices are most effective and to tailor them to the specific needs and context of the retail outlets.

Overall, the findings emphasize the importance of focusing on key supply chain practices such as decision synchronization, strong partnerships, and effective incentive alignment to achieve significant performance gains. Retail outlets in Kenya, operating in a competitive and rapidly growing market, can benefit from adopting these practices to enhance their operational efficiency and maintain a competitive edge. The moderation by SCP suggests that integrating these practices within a broader supply chain strategy can further amplify their positive effects.

Predictor	Odds Ratio	2.50%	97.50%
SCIS_CD_Q211	2.3977	1.0329	6.2466
SCDS_EF_Q311	3.634	1.6858	8.78
SCP_IJ_Q561	2.6806	1.366	5.6195
SCIA_GH_Q421	1.297	0.6816	2.5271
SCIA_GH_Q431	4.0081	1.8391	9.631
SCIA_GH_Q441	0.6665	0.3336	1.3388

Table 7: Displaying the Associated Odds Ratio and Their Corresponding 95% Confidence Interval for the Consolidated Objectives Model Considered both for Reduced Model (Model 1) and Full Model (Model 2) with Moderating Factors
Source: Author's Computation from Research Data (2024)

The results from table 7 provide a comprehensive view of the factors influencing retail outlet performance in Kenya, focusing on the combined objectives of the study and the moderation by Supply Chain Pillars (SCP). The significant positive effect of SCIS_CD_Q211, with an odds ratio of 2.3977 and a confidence interval of [1.0329, 6.2466], underscores the importance of supply chain information sharing.

The strong positive effect of SCDS_EF_Q311, with an odds ratio of 3.634 and a confidence interval of [1.6858, 8.78], highlights the crucial role of supply chain decision synchronization. This significant effect indicates that a one-unit increase in SCDS_EF_Q311 increases the odds of improved performance by approximately 263.4%. Effective decision synchronization can streamline operations, reduce inefficiencies, and improve overall supply chain coordination, leading to better performance outcomes.

SCP_IJ_Q561 also shows a significant positive effect, with an odds ratio of 2.6806 and a confidence interval of [1.366, 5.6195]. This suggests that a one-unit increase in SCP_IJ_Q561 increases the odds of improved performance by approximately 168.06%. This finding underscores the importance of supply chain pillars in boosting retail outlet performance. Supply chain pillars can foster collaboration, enhance resource sharing, and align objectives across the supply chain, leading to improved efficiency and performance. This finding is consistent with the study by Siagian, Tarigan, Hiasada and Jie (2021), who established a positive mediating effect of Supply Chain Flexibility on the relationship between SCI and manufacturing firms' Performance in Indonesia. Decision synchronization ensures that all parts of the supply chain are working towards the same goals and timelines, reducing delays and enhancing efficiency.

The positive effect of SCIA_GH_Q431, with an odds ratio of 4.0081 and a confidence interval of [1.8391, 9.631], emphasizes the significant role of incentive alignment in driving performance. A one-unit increase in SCIA_GH_Q431 increases the odds of improved performance by approximately 300.81%. Aligning incentives ensures that all stakeholders are motivated to work towards common goals, enhancing commitment and effort towards achieving better performance outcomes. This finding is in line with Igwe et al. (2016), who reported that incentive alignment positively influenced the performance of brewery firms in Nigeria. Incentive alignment can lead to increased motivation and engagement among employees, ensuring that their efforts are aligned with organizational goals.

Conversely, SCIA_GH_Q421 has an odds ratio of 1.297 and a confidence interval of [0.6816, 2.5271], and SCIA_GH_Q441 has an odds ratio of 0.6665 and a confidence interval of [0.3336, 1.3388]. Both of these results indicate non-significant effects, with confidence intervals that include 1. This suggests that these specific aspects of incentive alignment may not have a substantial impact on performance or may not be as critical as other factors. The non-significant effect of SCIA_GH_Q421 suggests that while this aspect of incentive alignment might have some positive impact, it is not strong enough to be considered statistically significant. The negative, non-significant effect of SCIA_GH_Q441 suggests that this particular incentive alignment practice might not significantly impact performance and could potentially have a detrimental effect if not managed properly.

Overall, the findings emphasize the importance of focusing on key supply chain practices such as information sharing, decision synchronization, strong partnerships, and effective incentive alignment to achieve significant performance gains. Retail outlets in Kenya, operating in a competitive and rapidly growing market, can benefit from adopting these practices to enhance their operational efficiency and maintain a competitive edge. The moderation by SCP suggests that integrating these practices within a broader supply chain strategy can further amplify their positive effects, contributing to sustained performance improvements in the retail sector. By leveraging these key supply chain integration

practices, retail outlets can improve their responsiveness, reduce operational costs, and enhance customer satisfaction, ultimately leading to better overall performance in Kenya's highly competitive retail environment.

4.5. Comparative Analysis Before and After Moderation with Supply Chain Pillars (SCPs)

The study compared the effects of various predictors on retail outlet performance in Kenya before and after the moderation with Supply Chain Pillars (SCP). The comparison highlighted significant shifts in predictor estimates, standard errors, statistics, and p-values, indicating the influence of SCP on these relationships.

Before moderation, SCIS_CD_Q211 had an estimate of 1.094452, a standard error of 0.442713, a statistic of 2.472148, and a p-value of 0.01343. This showed a significant positive effect on retail outlet performance. However, after moderation, the estimate decreased to 0.874501, the standard error slightly increased to 0.452073, the statistic decreased to 1.934423, and the p-value increased to 0.053061, losing its statistical significance. This indicates that while supply chain information sharing (SCIS) might positively impact performance, its effect is not as strong or consistent when SCP is considered.

SCDS_EF_Q311 showed a slight decrease in estimate from 1.290606 to 1.290342 after moderation, with an increase in the standard error from 0.411819 to 0.416. The statistic decreased from 3.133916 to 3.101787, and the p-value slightly increased from 0.001725 to 0.001924, but it remained statistically significant. This strong positive effect underscores the critical role of supply chain decision synchronization (SCDS) in enhancing retail outlet performance when SCP is considered.

SCIA_GH_Q421 had an insignificant decrease in estimate from 0.329965 to 0.260054 after moderation, with an increase in the standard error from 0.326971 to 0.332609. The statistic increased from 1.009157 to 0.781862, and the p-value increased from 0.312899 to 0.43429, becoming even more statistically insignificant. This suggests that the supply chain pillar (SCP) does not play a vital role in boosting retail outlet performance.

SCIA_GH_Q421 experienced a significant reduction in effect after moderation, with its estimate decreasing from 1.379325 to 0.260054, the standard error decreasing from 0.414177 to 0.332609, the statistic decreasing from 3.330283 to 0.781862, and the p-value increasing from 0.000868 to 0.434295, losing statistical significance. This implies that the specific aspect of incentive alignment represented by SCIA_GH_Q421 may not have a substantial impact on retail outlet performance when SCP is considered.

SCIA_GH_Q431 showed a dramatic positive shift after moderation, with the estimate increasing significantly from 1.379325 to 1.388321, the standard error increasing from 0. 414177 to 0.418551, the statistic increasing from 3.330283 to 3.316973, and the p-value decreasing significantly from 0.000868 to 0.00091, maintaining its high significance. This indicates that SCIA_GH_Q431 maintains its significance, however, with a marginal increase in p-value.

SCIA_GH_Q441 shifted from a negative to a further negative estimate, decreasing from -0.37577 to -0.40578 after moderation. The standard error slightly increased from 0.345544 to 0.352574, the statistic decreased further from -1.08747 to -1.1509, and the p-value decreased marginally from 0.276828 to 0.249775, maintaining statistical insignificance. This suggests that the SCIA_GH_Q441 becomes more insignificant under moderation.

The reduced significance of SCIS_CD_Q211 after considering SCP suggests that while information sharing is crucial, its isolated impact may be limited in the complex retail landscape of Kenya. This indicates that retailers must integrate SCIS with other supply chain practices to realize significant performance improvements. The strong positive effect of SCDS_EF_Q311, even after moderation, underscores the importance of coordinated decision-making in enhancing performance. In the Kenyan context, where retail businesses face diverse challenges, such as fluctuating demand and supply chain disruptions, synchronized decision-making can lead to better alignment of operations and improved resilience. The varied impacts of different SCIA aspects indicate that not all incentive alignment practices are equally effective. The strong positive shift in SCIA_GH_Q431 suggests that certain incentive practices, when properly aligned with broader supply chain strategies, can significantly enhance performance.

5. Conclusions

The study concluded that Supply Chain Pillars have a statistically significant moderating effect on this relationship between Supply Chain Integration and Retail Outlet Performance. Specifically, the integration of supply chain pillars significantly enhances the positive effects of Supply Chain Information Sharing (SCIS), Supply Chain Decision Synchronization (SCDS), and Supply Chain Incentive Alignment (SCIA) on retail outlet performance. The study further concludes that by adopting a comprehensive supply chain integration strategy that includes effective Information Sharing, Decision Synchronization, and Incentive Alignment, retail outlets can amplify the benefits of individual supply chain integration practices, leading to sustained performance improvements.

6. Recommendations

The study thus recommends that supply chain managers should always ensure that the supply chain pillars are well managed for subsequent supply chain visibility and supply chain flexibility, which result in effective contributions to improved retail outlet performance. This would eventually improve service delivery for customers, provide value for money to retail outlets, and eventually improve retail outlet profitability. They should also integrate supply chain pillars into a comprehensive supply chain strategy to enhance the overall impact of individual practices. Retail outlets should build strong partnerships, establish clear roles and responsibilities, and align objectives across the supply chain. Regular assessments of these partnerships and strategic adjustments will help maintain alignment and drive sustained performance improvements.

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