International Journal of
Supply Chain Management
(IJSCM)

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IPRJB
INTERNATIONAL PEER REVIEWED JOURNAL AND BOOK PUBLISHING

International Journal of Supply Chain Management
ISSN 2518-4709 (Online)
Vol.9, Issue 2, No.1, pp 1 - 19, 2024

www.iprjb.org

Supplier Collaboration and Performance of Food and Beverage Manufacturing Firms in Kenya

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Article History

Received 4th February 2024

Received in Revised Form 15thFebruary 2024

Accepted 20th February 2024

How to cite in APA format:

Mulweye, D., Shale, N., Namusonge, E., & Wachiuri, E. (2024). Supplier Collaboration and Performance of Food and Beverage Manufacturing Firms in Kenya. *International Journal of Supply Chain Management*, *9*(2), 1–19. https://doi.org/10.47604/ijscm.2326

Abstract

Purpose: This study sought to evaluate explored the influence of supplier collaboration on the performance of food and beverage manufacturing firms in Kenya and to find out the moderating effect of supply chain technology on the performance of food and beverage manufacturing firms in Kenya.

Methodology: The study used exploratory research design and utilized both qualitative and quantitative data in carrying out the study. This study adopted a census survey sampling which was conducted on 270 food and beverage manufacturing firms in Kenya registered by Kenya Association of Manufacturers (KAM, 2022). The target population for the research was all 270 respondents each from the food and beverage manufacturing firms. Both primary and secondary data was used, the primary data was collected using semi structured questionnaire that was administered by the researcher and research assistants. Samples of the questionnaire were pilot tested to test the reliability and validity before full scale data collection. The data was analyzed using the Statistical Package for Social Sciences (SPSS) version 26 software. Quantitative data was analyzed using descriptive statistics and presented in tables and figures. The inferential analysis was further carried out using structural equation modelling, ANOVA and regression coefficients. The results were then presented using tables, figures, graphs and charts.

Findings: Supplier collaboration significantly influenced performance of food and beverage manufacturing firms in Kenya at both without a moderator and also using the moderating variable, supply chain technology. In the first model without moderator, it recorded a standardized estimate of 0.637 ($p<0.001$), indicating that as supplier collaboration increases performance of food and beverage manufacturing firms also increases. Fit indices on structural equation modelling revealed a marginal fit with a chi-square test of 216.155 with 86 degrees (P-value 0.0561). The structural path for structural equation modelling from supplier collaboration to supply chain performance remains positive and significant standardized estimate of 0.855 and p-value was $0.001<0.05$. Which indicates that the variability of supplier collaboration on the performance of food and beverage manufacturing firms could be explained by 63.7% when no moderator is included and increase to 85.5% when supply chain technology is incorporated thereby indicating a stronger relationship. The other fit indices that gave a satisfactory model fit are RMR=.9019, GFI= .9774, NFI= .9164, RMSEA=.0191 and CFI=.9176 this implies that the model was fit to determine the relationship between supplier collaboration and performance of food and beverage manufacturing firms in Kenya and therein make conclusions and recommendations. ANOVA, regression coefficient ant model summary (R^2) were also used and indicated significance of there use all recording p-value of $0.000<0.05$.

Unique Contribution to Theory, Practice and Policy: While transaction cost theory used in this study was validated by offering cost reduction strategies like outsourcing, accurate order forecasting as increasing the organization bottom line. The study recommends that when creating a supplier collaboration portfolio, companies should pool suppliers with the same activities in one pool but to use technology to mop up suppliers with high asset specificity for components delivering competitive advantage. Meanwhile, suppliers with low asset specificity for suppliers with components which result to less competitive advantage needs to be managed as a separate line of engagement.

Keywords: *Supplier Collaboration, Supply Chain Technology, Supply Chain Performance.*

JEL Codes: O, O1, O14

INTRODUCTION

Food and beverage (F & B) manufacturing firms play a critical role in the Kenyan economy. Nevertheless, in order to achieve production efficiency, F & B manufacturing firms are required to adopt a strategy of supplier collaboration to safeguard their production capacity by ensuring their is steady material inflows. Supplier collaboration is a strategic approach to management of suppliers which involves aligning suppliers and partners around a business strategy to deliver on key goals and drive mutual value in collaboration. The firms may also have to restructure their supply chain by building relationships with trade partners and distributors, (Chowdhury *et al*., 2020). To attain smooth flow of raw materials, food and beverage manufacturing firms need to incorporate aspect of supplier collaboration in their production strategic plannings as they try to boost their production capacity and performance.

The adoption of supplier collaboration accrues the following benefits to both the manufacturer and raw materials suppliers, it improves business performance, customer satisfaction, expands market share and has the potential of boosting revenue streams for the manufacturing firm. Meanwhile, Hailu, (2020) assert that any major supply chain disruption could result to real distress on the entire industry, while Chowdhury *et al*., (2020) suggests that the outbreak of corona virus disease (Covid-19) pandemic in China has created global economic consequences leading to negative supply of stock. According to Nemuel, (2017) supply chain disruptions can result to reduced productivity of manufacturing firms while the firms continue to rely on suppliers for sustained operations and existing customers for continued revenue earnings.

Firms collaborate in order to mitigate risks and enjoy benefits that accrue when they adopt a strategy to enter into and negotiate for prices as they incorporate external linkages. Sustainability is a global issue in today's business, and this fact however is challenging firms to remain careful in order to be competitive (Oláh, Kitukutha, Haddad, Pakurár, Máté & Popp., 2019). According to Patsavellas *et al*., (2021) internet of things and the wireless connectivity has ushered in a new era of economic disruption which manufacturing firms should strive to overcome. When a manufacturing firm adopt a sustainable development strategy, it has to ensure that the technological change gears up the economic, environmental and social development together with inclusiveness and environmental sustainability (Oláh *et al.*, 2019). Supplier collaboration exert better leverage over parts of the firm's supply chain that are resistant to positive change. The long-term survival of firms is largely dependent on the ability of firms to wittingly produce and deliver product that satisfy customers (Akintokunbo & Akpotu., 2020). Increased manufacturing and production by food and beverage manufacturing firms is a key step to address food security problem (Anastasiadis, Apostolidou & Michailidis., 2020). This calls for an efficient and prudent use of resources in food production and sustainability issues (Anastasiadis *et al.*, 2020).

A good supplier collaboration strategy should comprise the following characteristics, able to lower long term costs for the firm, improves productivity and safety, retention of supply partners and finally it drives ethical standards and greater supply chain transparency. Satisfaction of customers largely depends on a wider aspect by how the firm undertake and manages her supplier collaboration as it purpose to remain competitive. However, to continue being competitive is a challenge that requires strategic action and value oriented with the potential of positioning the organization for competitive advantage, (Akintokunbo & Akpotu., 2020).

Proper supplier collaboration strategy may possibly help food and beverage manufacturing to plan and effectively tackle external and internal effects that potentially obstruct production and firm performance. This is due to the growing complexity of contemporary supply chains and the subsequent increased probability of experiencing a disruption (Brandon- Jones, Squire, Autry & Petersen., 2014). As international trade becomes increasingly efficient and companies continue to expand their networks, the need to establish and maintain a detailed understanding of your supply chain becomes more significant. Meanwhile, issues around food security and associated risks are extremely important. Some methods or approaches have been used to identify and assess risks that occur in agri-food supply chain (Septiani, Marimin, Herdiyeni & Haditjaroko., 2016).

Effective performance of food and beverage manufacturing firms should go beyond the firm's established suppliers to try and mitigate against the risk of supply chain break down. Material flow is a supply chain management model of representing transportation of all parts, raw materials and finished products as a flow. To sustain materials flow a company need to apply innovation in its warehouse management (Goksoy *et al*., 2013). The main goal is to achieve an effective and efficient flows of products and services (Brusset & Teller, 2017). Brusset and Teller (2017) they further suggest that steady flow of products strengthen firm capabilities. With the right material flow monitoring tools, manufactures can spot any number of vulnerabilities that could lead to potential disruptions now or in the future or weaknesses that may be at risk in the case of a disruptive event. According to Ivanov and Dolgui, (2019) uncertainty prediction and supply chain processes are always seen as supply chain drivers.

Statement of the Problem

Despite the fundamental importance of food and beverage manufacturing firms in Kenya, it is besieged by an array of formidable challenges, hampering the performance of F & B manufacturing firms and the desired economic development. Kenyan manufacturing sector has persistently contributed a staggering 10% to the county's GDP for over 10 years. However, the percentage is yet to be considered sustainable. According to Kenya National Bureau of Statistics (KNBS, 2023) economic survey, performance of manufacturing sector grew by 2.7% to 10% from 7.3 per cent (7.3%) recorded in 2021. Contribution of manufacturing sector to GDP was 7.8% but Kenya national bureau of statistics (KNBS) project a decelerate in global economy in 2023 due to tightening of monetary policies, high inflation, the ongoing Russia-Ukraine war and lingering effects of COVID-19 pandemic.

Considering the dynamic nature of the food and beverage sector, supply chain capabilities such as supplier collaboration needs to be investigated as a potential contributor to the performance of food and beverage manufacturing firms. Improved supply chain responsiveness (Kim *et al*., 2006), enhanced measurement (Acquaye *et al*., 2014) and design of key metrics (Caridi *et al*., 2013), improved productivity, customer service, and overall firm performance can all be achieved by effectively undertaking supplier collaboration strategy. Execution of a study on Supply chain resilience and internal integration and established that supply mapping has a positive influence on the development of supply chain resilience (Mandal, 2017). It was also found out that American firms with high visibility into their supply chains achieve higher profitability than comparable firms with less visibility (Swift *et al*., 2019).

A number of studies have been conducted mostly in developed countries relating to supplier collaboration strategies and organizational overall performance such as the ones by Somapa *et al.* (2018), Mandal (2017) and Swift *et al.*, (2019). Nonetheless, in developing countries, more specifically in Kenya limited research has been conducted in this area. This study therefore

aims to examine the degree to which supplier collaboration influence the performance of food and beverage manufacturing firms in Kenya.

Objectives of the Study

i. To assess the influence of supplier collaboration on the performance of food and beverage manufacturing firms in Kenya.

ii. To examine the moderating effect of supply chain technology on the performance of food and beverage manufacturing firms in Kenya.

Research Hypothesis

H_{o1}: There is no significant influence between supplier collaboration and performance of food and beverage manufacturing firms in Kenya.

H_{o2}: There is no significance between the moderating effect of supply chain technology and performance of food and beverage manufacturing firms in Kenya.

LITERATURE REVIEW

Transaction Cost Theory

Transaction Cost Theory (TCT) was developed by Ronald Harry and Ronald Frederick Fowler in 1937, by analysis of how producers manage forecasting. TCT refers to the cost of providing for a given good or service through the market rather than having it provided from within the firm (Akbar & Tracogna., (2018). TCT has three features namely, frequency, uncertainty and asset specificity to which firms' use in leveraging their capacity (Akbar *et al*., 2018). The theory (TCT) has the potential to collaborate any form of governance, public or private governance, which limits usefulness of the theory as an instrument of analysis and prediction, (Dagdeviren, & Robertson, 2016). Dagdeviren and Robertson further assert that the assessment and the choice of TCT between public and private governance should be considered by the organization as last resort when all other strategies have failed.

Transaction cost theory (TCT) has successfully been applied to a wide range of organizational phenomena with the theory succeeding both as a primary strategy and for international business by manufacturers, (Cuypers, Hennart, Silverman & Ertug, 2021). Transaction cost theory helps manufacturers to manage lead times with emphasis on highly perishable products, the complicated processing, variable raw materials usage, recipes and unpredictable demand which hence act as a storage cost controller as stock levels kept to optimal levels through accurately forecasting order management and quality of produced products (Borges Lopes *et al*., 2015). TCT was useful to the study in deciding which service to be outsourced by manufacturing organizations, through studying the environment in which the firms were situated. This theory therefore was in line with the outsourcing strategy. The theory emphasizes on the importance of outsourcing as a way of reducing transaction cost and by extension increase the organization's bottom line.

Transaction cost theory (TCT) has received considerable attention over the past decade from researchers in various disciplines of business. Unfortunately, the rich theoretical base of TCT has seen limited application in the operations and supply chain management (Grover & Malhotra., 2003). Both Grover and Malhotra further argued that greater potential exists for application of TCT to manufacturing firms compared to service-oriented organizations. Transaction costs can generally be represented in terms of two major components (Clemons *et al*., 1993): Transaction costs = coordination costs + transactions risk. Co-ordination costs are the cost of exchanging information and incorporating that information into the decision process.

In the case of a manufacturer, supplier span it might include costs of exchanging information on products, price, availability, demand, as well as the costs to exchange design changes rapidly with the supplier. Transaction risk includes the risk that other parties in the transaction will shirk their agreed upon responsibilities.

When creating a supplier portfolio, the company pools suppliers with the same activities into one pool. However, since there is a difference between special technology suppliers, and suppliers providing low asset specificity, one might differentiate between parts that provide a competitive advantage and parts that do not and therefore pool only suppliers with high asset specificity for components delivering a competitive advantage and pool only suppliers with low asset specificity for suppliers providing components that do not lead to a competitive advantage (Lalkaka, 2006). Multiple sourcing can be applied when the component is placed within an unassisted, highly competitive market, mostly not providing any special technology that leads to a competitive advantage (Schwabe, 2013).

Critical Success Factors Theory

Critical success factor (CSF) theory concept was first developed by Daniel in 1961. The concept also best-known as key result areas (KRAs) was popularized by Rockart (1979) by defining critical success factors as the limited number of areas in which results, if satisfactory, will ensure a successful competitive performance of an organization. Rackart, suggests that there are few areas where organization must put things rightfully to enable the business to flourish. He observed that if results for a given business are not adequate, efforts by an organization for the period will be less than desired. Additionally, Rockart concluded that critical success factors (CSF) are areas of activity that should receive constant and careful attention by the firm top management. Critical success factors are performance factors which essentially should receive the attention by management and that identification of critical success factors can help top managers to determine amount of information required, where attention should be focused and guides in developing measures for critical success factors (Rockart, 1979).

There are four types of critical success factors identified by Rockart that businesses need to consider; strategic factors, environmental factors, industrial factor and temporal factors. Anthony *et al.,* (1972) in his works emphasized the need to tailor critical success factors to a company's strategic objectives and its particular managers. Managers undertake planning and control systems that are responsible for reporting those CSFs perceived as relevant for a particular industry or job. However, Rockart limited his approach to management control which was precisely been defined by Anthony as the process of ensuring resources are obtained and used effectively towards attainment of organization corporate goals (Anthony *et al*., 1965).

Conceptual Framework

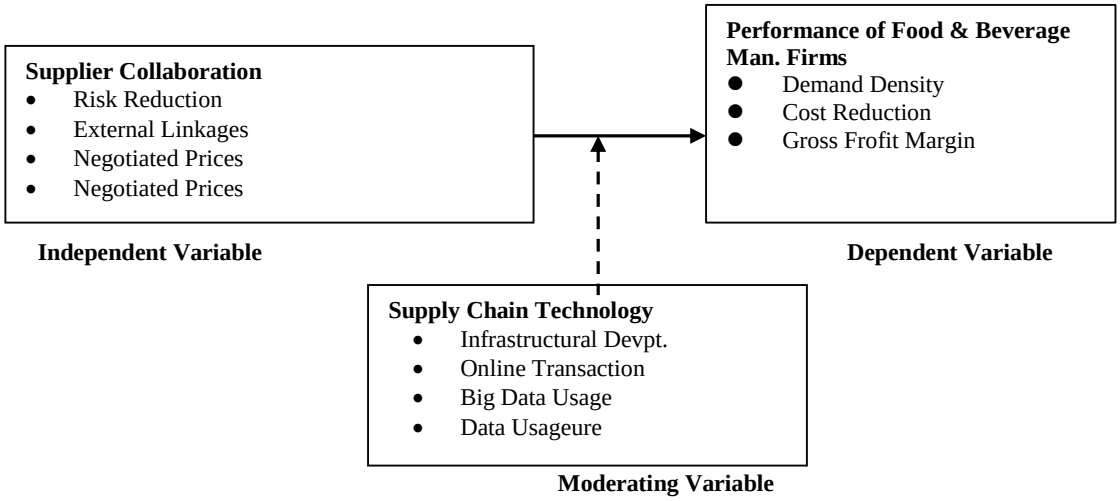

Figure 1: Conceptual Framework

Supplier Collaboration

Supplier collaboration means working with company decision-makers and the suppliers to determine improvements that should be initiated and they must be geared towards being measurable and having a positive financial impact for both organizations. Supply chain collaboration improves timeliness in delivery of goods and services, improves the financial returns to a manufacturing firm, (Muthoni, & Mose, 2020). Collaboration in supply chain relates to how two or more autonomous firms are capable to work effectively (Scholten & Schilder., 2015). To achieve sustainable consumption and production (SCP), stakeholders in the food industry it is necessary that they should coordinate and their views reflected in an optimized manner (Govindan, 2018).

Food and beverage manufacturing firms as a strategic planning of their operations have to undertake and secure collaborative initiatives in order to remain afloat in their industry. According to Grekova*et al*., (2016) environmental collaboration with suppliers can improve the performance of food and beverage processors directly as it induces cost savings. On the other hand, they caution that such collaboration may not likely assist firms seeking to improve environmental sustainability of their internal processes as one of the outcomes of environmental collaboration. Organizations need capable supply chain management strategies for achieving a better performance, (Muthoni & Mose, 2020). Supplier collaboration enables synergies development among partners, facilitate joint planning and also encourage exchange of information, (Scholten & Schilder, 2015). Some of the synergies employed is integration, which may fall in the following ways, the firm collaborates to purchase the raw materials and the supplier to ship them to the factories, they agree on the ways of mitigating the risks of damages, pilferage, securing the products while on transit and also segmenting the orders into batches as away of breaking the bulk.

Manufacturing firms should actively and intensely manage their supply chains to avoid any occurrence of disruption, (Scholten & Schilder, 2015). Part of risk planning is to consider and anticipate situations that supply chain disruptions could or may occur so that the management puts the proper response (Reeves III, 2019). However, food and beverage manufacturing firms should increase their responsiveness since increased disruption to the focal company may have severe effects. Scholten and Schilder (2015) discovered that managers from different industries

gravitated to informal methods to manage risks contrary to using more formal methods. The growing demand in emerging economies has caused some companies to rethink their production and distribution networks, (Chopra & Sodhi, 2014) necessitating the need to undertake supplier collaboration strategies for enhancing improvement in firm performance. An example is Diageo Plc (London) which is abandoning its global supply chain and instead collaborating with regional supply chains with local sourcing and distribution (Chopra & Sodhi, 2014) to manage their distribution networks ostensibly to remain competitive.

Supply Chain Technology

Manufacturing firms have integrated technology in operations where big data management is fundamental. The technological advancement in manufacturing is likely going to provide additional impetus notwithstanding Covid-19 (Free & Hecimovic., 2021). With the growing business environment, use of big data is a growing torrent among manufacturing industries. Insights into big data in-depth can be collected into the production process and compared with other similar production systems to help in identifying key improvement areas, (Subramaniyan, 2015). Big data is also helping companies to manage more responsive supply chains as they can to better comprehend customers and market trends, as they deal with the massive datasets (Wang, Tsai & Ciou., 2020). The latest analytics technology, big data enables companies to gain useful knowledge quickly from massive volumes of structured and unstructured data from multiple sources (Akter & Wamba, 2016). However, adoption of big data analytics help a firm to predict potential customer demands as well as storing inactive data for future use, (Wang *et al***.**, 2020).

Traders are able to track behavior of each user of the product and connect the dots to determine the best effective ways to convert one-time customers into repeat buyers through big data. For supply chain managers, this strategy can help boost visibility and deliver more in-depth insights into the entire supply chain. Big data focuses on three main characteristics, namely the data itself, the analytics of the data and thirdly the presentation of the results of the analytics that allow the creation of business value in relation to new products or services. Big data support firms to leverage and supports sustainable supply chain management outcomes (Bag *et al.*, 2020). Firms competitive capacity can be enhanced if managers establishment work climate through practices that support operational infrastructural and ensure that customers are served promptly (Akintokunbo and Akpotu, 2020).

Manufacturing firms invest in technology to help them manage the voluminous information technologically through big data. Firms need to invest in technology to help in coordinating supplier collaboration where ICT and big data is essential, (Büyüközkan *et al*., 2018). This will support manufacturing firms to leverage dig data analytics supports sustainable supply chain management outcomes, (Bag *et al*., 2020). According to Kumar *et al.*,(2018) firms align their supply chain practice according to the quality of information which leads to improved business performance. Integration of technology in the organization help to maintain information on dynamic aspects of supplier relationships management (Forkmann *et al*., 2016). Likewise, it is imperative for companies to have access to updated, accurate and meaningful data, (Kache and Seuring., 2017).

METHODOLOGY

The study used exploratory research design and utilized both qualitative and quantitative data to help the researcher to have an in-depth examination of variables under study. Census sampling technique was used to collect data from the 270 food and beverage manufacturing firms registered by Kenya association of manufacturers (KAM, 2022) forming the unit of

analysis of the study. Census survey is the appropriate data collection design for population of this size (Saunders *et al.,* 2009; Kothari, 2008). A total of 270 questionnaires were used in the study which was administered one per manufacturing firm by the researcher assisted by the appointed research assistants. The target population for the study were senior managers (respondents) comprising of the logistics, supply chain and operations managers, who deal with the day to day activities and operations at the food and beverage manufacturing firms. Both structured and semi-structured questions were included in the research questionnaire.

A pilot test was conducted on 27 food and beverage manufacturing firms representing 10% of the target population. According to Lancester, Dodd and Williamson, (2004) the sample size for high precision pilot studies should be between 1% and 10%. Structural equation modelling (SEM) and statistical package for social sciences (SPSS) version 26 software was used to analyze the research data. Descriptive statistics was used to analyze quantitative data through percentages, means, standard deviation etc.The pearson correlation coefficient was used to test associations between the independent and dependent variables. Fit indices and ANOVA were used to test the significance of the relationship of independent variable and moderating variable on the dependent variable and the validity. The data was presented in tables and figures as shown and displayed in Table 4, Table 5, Table 6 and Table 7 together with Figure 2.

FINDINGS AND DISCUSSION

Descriptive Statistics of Supplier Collaboration

The objective of the study was to determine the effect of supplier collaboration on the performance of food and beverage manufacturing firms in Kenya. The respondents were asked to indicate the extent to which they agreed with the statements on supplier collaboration on the performance of food and beverage manufacturing firms. A five-point Likert scale where 1= Strongly Agree, [SD], 2= Agree [A], 3= Neutral [N], 4= Disagree [D], 5= Strongly Disagree [SD] was used and the findings are as shown in Table 1.

Analysis of the study parameters showed that supplier collaboration positively influences the performance of food and beverage manufacturing firms. When F & B manufacturing firms embrace the co-development and optimization of raw material demand (controlled costs) had the highest mean score of 2.035 and a standard deviation of 1.3819 with majority of respondents strongly agreeing that costs are controlled through co-development and optimization of raw material demand. The study revealed majority of the manufacturing firms have embraced external linkages to promote operations and that external linkages has improved stock movement and controls within he manufacturing department with a mean of 3.947 and SD=1.2717. From the study, 56.8% of the respondents strongly agreed that the company had employed supplier collaboration to improve agility as it reduces bullwhip effects and reflected a mean of 3.757 and a standard deviation of 1.1061. Accordingly, on negotiated prices two aspects were under consideration one being production capacity and the second aspect being reduction of wastage and non-value addition factors. On negotiated prices the 58.7 % agreed that the company had achieved its best production capacity through negotiated prices by suppliers (Mean=3.660, SD=.9885). The reduction of wastage and non-value adding factors recorded a mean of 3.784 and standard deviation of 1.3467. However, lack of management support pauses a challenge to food and beverage manufacturing firms to implement supplier collaboration (Mean=3.776, SD=1.3104). In this aspect 63.5% strongly agreed that lack of management support had hindered implementation of supplier collaboration in food and beverage manufacturing firms' hence affecting their performance. The study findings, therefore, led to the acceptance of the statement and concluded that there is a positive and

significant relationship between supplier collaboration and performance of food and beverage manufacturing firms.

Table 1: Descriptive Statistics for Supplier Collaboration on the Performance of Food & Beverage Manufacturing

Aspects of Supplier Collaboration	N	Mean	SD
-The company employs supplier collaboration to improve agility and reduced bullwhip effects.	270	3.757	1.1061
-The company has embraced external linkages to promote her operation.	270	3.946	1.2717
-External linkages have improved stock movement and its control within the manufacturing department.	270	2.066	1.3553
-Costs are controlled by embracing co-development and optimization of raw material demand.	270	2.035	1.3819
-The company achieves best possible production capacity through negotiated prices from suppliers.	270	3.660	.9885
-The company has managed to reduce wastage, non-value adding factors and obsolete stock.	270	3.784	1.3467
-Lack of expertise personnel and management support pauses a challenge to the effective implementation of supplier collaboration.	270	3.776	1.3104

Supply Chain Technology

Analysis of the study parameters in the Table 2 revealed that supply chain technology positively influences food and beverage manufacturing firms. Investment in infrastructure by companies had been initiated to manage exchange of knowledge within its cross functional departments has a mean of 2.826 and a standard deviation of 1.2386. on the use of company online platforms to manage operations and transactions was supported by majority of the respondents with a mean of 3.675 ad a standard deviation of 1.0979. However, majority of the respondents also supported the statement that big data and block chains were employed across the supply chain to enhance operations with a mean of 3.772 and a standard deviation of 1.0981. on the aspect of company having streamlined all modes of interaction and communication among other firms and partners had a mean of 3.745 ad a standard deviation of 1.1799. meanwhile, real time data usage as a basis for decision making and production scheduling recorded a mean of 3.726 and a standard deviation of 1.1606. Additionally, on the statement about company achieving supply chain optimization through installed artificial intelligence and machine learning, this had the highest mean of 3.847 and a standard deviation of 1.1908. finally of the aspect about company having adopted a reliable platform to secure her big data and other operational information was largely supported by the respondents and had given a mean of 3.758 and a standard deviation of 1.0596. The study findings, therefore, led to the acceptance of the statement and concluded that there is a positive and significant relationship between supply chain technology and the performance of food and beverage manufacturing firms.

Table 2: SC Technology on Performance of F & B Manufacturing Firms

Aspects of Supply Chain Technology	N	Mean	SD
-The company invested in technology manage the exchange of knowledge within its cross-functional departments.	270	2.826	1.2386
-The company uses online platforms to manage her operations and transactions.	270	3.675	1.0979
-Big-data and block chains are employed across the supply chain to enhance operations.	270	3.772	1.0981
-The company streamlines all modes of interaction and communication among other firms and partners.	270	3.745	1.1799
-Real-time data is used as a basis of decision making and production scheduling.	270	3.726	1.1606
-The company achieves supply chain optimization through installed artificial intelligence and machine learning.	270	3.847	1.1908
-The company has adopted a reliable platform to secure her big data and other operational information.	270	3.758	1.0596

Supply Chain Performance

Analysis of the study parameters on performance of food and beverage manufacturing firms revealed that supply chain performance has positive impacts on manufacturing firms. The respondents majorly supported the statement that efficient performance of food and beverage companies depended on the firm's sales growth and market share, recording a mean of 4.614 and standard deviation of .8481. the second statement which was also positively supported was cost reduction as the key towards efficient performance for food and beverage manufacturing firms with a mean of 3.795 and a standard deviation of 1.1000. the third aspect was about continuity of the firm being influenced by increased profit margins realized by a manufacturing firm and used to expand and sustain operations, this was supported by majority resulting to the highest mean of 4.799 and standard deviation of 1.8521. Regarding mass production and its ability to help a firm to reduce operational costs through discounted prices and credit supply from suppliers, respondents strongly agreed with the statement thereby recording a mean of 2.757 and standard deviation of 1.4777. The other statement was on expanded market share stimulating production capacity within food and beverage manufacturing firms, respondents strongly agreed with the statement with a mean of 3.722 and a standard deviation of 1.0115. finally regarding the statement on firms expansion strategy largely relying on firm's sales growth and profit margins recorded in a particular financial period has a mean of 3.722 and a standard deviation of 1.0115. The study findings, therefore, led to the acceptance of the statement and concluded that there is a positive and significant relationship between time lead production management and performance of food and beverage manufacturing.

Table 3: Supply Chain Performance

Aspects of Supply Chain Performance	N	Mean	SD
-Efficient performance of food and beverage companies depends on the firm's sales growth and market share.	270	4.614	.8481
-Cost reduction is key towards efficient performance for food and beverage manufacturing firms.	270	3.795	1.1000
-For a company to enhance its production capacity there must be a business continuity plans in place.	270	3.618	.9945
-Continuity of the firm is influenced by increased profit margins realized by a manufacturing firm and used to expand and sustain operations.	270	3.807	1.4686
-Mass production helps a firm to reduce operational costs through discounted prices and credit supply from suppliers.	270	4.799	1.8521
-Expanded market share stimulates production capacity within food and beverage manufacturing firms.	270	2.757	1.4777
-Firm expansion strategy largely relies on firm's sales growth and profits margins.	270	3.722	1.0115

Data Processing and Analysis using Structural Equation Modeling

The data was analyzed using both descriptive measures and exploratory factor analysis to identify and also validate the items contributing to every component of the study. Structural equation modeling (SEM), Lavaan 20 and Amos software were used in the study. SEM has been used as the basis for data analysis. Table 4 presents the results of two structural equation models (SEMs) exploring the relationship between Supplier Collaboration (SC) and Performance of Food and Beverage Manufacturing Firms (SCP) , with and without the inclusion of a moderator (supply chain technology). The standardized estimates, un-standardized estimates, standard errors (S.E.), critical ratios (C.R.), and p-values are reported, along with various fit indices for each model in Table 4.

In the first model, which does not include the supply chain technology (SCT) moderator, the structural path from SC to SCP shows a significant positive relationship, with a standardized estimate of 0.637 ($p < 0.001$), indicating that as Supply Chain Collaborator increases, Performance of Food and Beverage Manufacturing Firms (SCP) also increases. The fit indices for this model reveal a marginal fit as indicated by a chi-square test of 216.155 with 86 degrees of freedom (DF) and a p-value of 0.0561. The ratio of chi-square to degrees of freedom (CMIN/DF) is 2.513, suggesting a slightly higher than desirable fit. However, other fit indices, including the Root Mean Square Residual (RMR) and various goodness-of-fit indices (GFI, AGFI, NFI, IFI, TLI, CFI), are generally satisfactory, with values exceeding 0.90 which is the omnibus cut-off point as recommended by goodness -of-fit statistic (GFI). however, values closer to 1.0 indicating good fit. Individuals with larger sample sizes may choose to report Normal-fit index (NFI) indices which favour larger sample sizes (Stone, 2021).

In the second model, which incorporates the moderator SCT, the structural paths are more complex. The direct path from SC to SCP remains positive and significant (standardized estimate = 0.855, $p < 0.001$), indicating a strong relationship. Additionally, there are two paths involving the interaction of SC and SCT. The interaction term SC * SCT has a positive and significant relationship with SCP (standardized estimate = 0.482, $p < 0.001$), suggesting a moderating effect. However, the direct path from SCT to SCP is not statistically significant (standardized estimate = -0.104, $p = 0.141$). The overall fit of this model is improved compared

to the first, with a chi-square test of 172.226, 100 degrees of freedom, and a p-value of 0.0601. The CMIN/DF ratio is 1.722, indicating a relatively good fit. The fit indices, including RMR and various goodness-of-fit indices, continue to show a satisfactory model fit.

In conclusion, the results suggest that the inclusion of the moderator supply chain technology (SCT) refines the understanding of the relationship between SC and SCP. The first model, despite some marginal fit issues, provides initial insights into the positive association between SC and SCP. The second model further illustrate this relationship by highlighting the moderating effect of SCT on the SC-SCP association.

These findings contribute sheds more information and understanding of the dynamics within

Table 4: Model Fitted and Goodness Fit between Supplier Collaboration (SC) and performance of Food and Beverage Manufacturing Firms (SCP) without and with Moderator (SCT)

			Std Estimates	UnStd Estimates	S.E.	C.R.	P
Model 1 Supply chain Collaborator (SC) with Performance of Food and Beverage Manufacturing Firms (SCP) with no moderator(SCT)							
SCP	<---	SC	.637	.424	.040	10.685	***
Fit indices for model without Moderator				**CMIN**	**DF**	**P**	**CMIN/DF**
		Default model		216.155	86	.0561	2.513
				RMR	**GFI**	**AGFI**	**PGFI**
		Default model		.9019	.9343	.9545	.9438
				NFI	**IFI**	**TLI**	**CFI**
		Default model		.9164	.9077	.9252	.9176
				RMSEA	**LO 90**	**HI 90**	**PCLOSE**
		Default model		.0191	.0179	.0193	.000
Model 2 Supply chain Collaborator (SC) with Performance of Food and Beverage Manufacturing Firms (SCP) with Moderator(SCT)							
SCP	<---	SC	.855	.598	.053	11.209	***
SCP	<---	SC*SCT	.482	.227	.029	7.940	***
SCP	<---	SCT	-.104	-.072	.049	-1.473	.141
Fit indices for model with a Moderator				**CMIN**	**DF**	**P**	**CMIN/DF**
		Default model		172.226	100	.0601	1.722
				RMR	**GFI**	**AGFI**	**PGFI**
		Default model		.9319	.97743	.9651	.9562
				NFI	**IFI**	**TLI**	**CFI**
		Default model		.938	.952	.922	.951
				RMSEA	**LO 90**	**HI 90**	**PCLOSE**
		Default model		.0174	.0163	.0184	.000

the supply chain context. Um and Kim (2019) indicate that supply chain collaboration leads better firm performance together with transaction cost advantage.

International Journal of Supply Chain Management
ISSN 2518-4709 (Online)
Vol.9, Issue 2, No.1, pp 1 - 19, 2024

www.iprjb.org

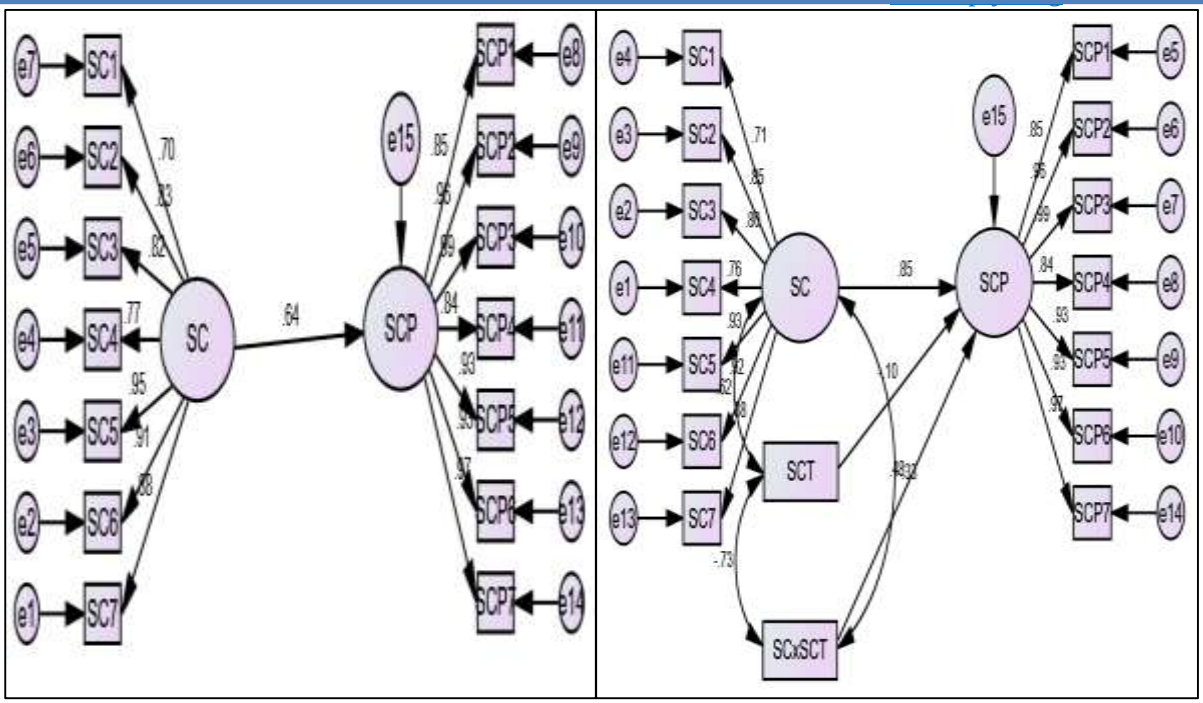

Figure 2: Structural Equation Model on Supplier Collaboration (SC) and Performance of Food and Beverage Manufacturing Firms (SCP) without and with a Moderator (SCT)

Test of Hypothesis

The study sought to test for the hypothesis in order to ascertain the effect of supplier collaboration on the performance of food and beverage manufacturing firms in Kenya.

H_{01}: There is no significant influence between supplier collaboration and performance of food and beverage manufacturing firms in Kenya.

The study objective was to determine how supplier collaboration affect the performance of food and beverage manufacturing firms in Kenya. The purpose was to statistically determine how supplier collaboration (independent variable) affects the performance of food and beverages manufacturing firms in Kenya (dependent variable). the regression coefficient , model summary and the ANOVA test were used to accomplish this. This made it possible for the researcher to decide whether to accept or reject the null hypothesis or not. The model equation used for the study variable was of the form;

$$\mathbf{Y= \beta_0 + \beta_1 X_1.}$$

Model Summary on Supplier Collaboration

The model summary results provided in Table 5 shows R value of 0.492 and R^2 of 0.242, indicating that upto 24.2% of the model could account for the variability of supplier collaboration on the performance of food and beverage manufacturing firms in Kenya. This suggests that the model was suitable to ascertain the correlation between the two variables and drawing of findings and suggestions on the result.

Table 5: Model Summary on Supplier Collaboration

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.492[a]	.242	.239	.76581

a. Predictors: (Constant), supplier Collaboration, Supply Chain Technology

b. Dependent Variable: Performance of Food and Beverage Man. Firms

Analysis of Variance (ANOVA) Test on Supplier Collaboration

Table 6 displays the ANOVA results. The findings indicated that the model was significant since the F - calculated for the variance was 79.973, which is higher than the F-critical value and he mean was 46.902. the model was therefore significant as further demonstrated by P-value (0.000<0.05).

Table 6: Supplier Collaboration

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.902	1	46.902	79.973	.000[b]
	Residual	147.203	251	.586		
	Total	**194.105**	**252**			

a. Dependent Variable: Performance of Food and Beverage Man. Firms

b. Predictors: (Constant), Supplier Collaboration, Supply Chain Technology

Table 7: Coefficient for Supplier Collaboration

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.180	.063		12.705	.000
	SC_SCT	.490	.010	.492	38.943	.000

a. Dependent Variable: Performance of Food and Beverage Man. Firms
b. Dependent Variable: Supplier Collaboration, Supply Chain Technology

As shown in Table 7 the un-standardized coefficient for the variable was .490 and the p-value is 0.000. the new model now becomes $\mathbf{Y=1.180 + 0.490X_1 + \varepsilon}$ this implying that at a significant level of 0.000, supplier collaboration will impact the performance of food and beverage manufacturing firms by up to 49.0%. The findings also indicate that t-statistics (38.943) is higher that the t-critical (12.705) an indicator that supplier Collaboration significantly influences performance of food and beverage manufacturing firms.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

In conclusion, in a changing and challenging environment, food and beverage manufacturers have to venture into advancement of their supply chains beyond normal and traditional operations. However, without a strategic focus on supply chain mapping in an organization, Supplier Collaboration operations could rapidly decline and can even worsen thereby putting

quality, costs, availability and lives in danger. From a managerial perspective, it becomes necessary to understand and try effectively manage all the supply chain disruptions that influence the performance of business and organizational continuity. Manufacturing firms needs to realize the importance of the supply chain resilience capabilities which are crucial and to be secured during period of supply chain disruptions. The implementation of supply chain mapping strategies with clear focus on goods, information and money flow, supply base consolidation in necessary to ensure there is continuity of businesses.

Recommendations

Transaction cost theory needs to be applied to manufacturing firms due to its greater potential on enhancing operational performance. The study recommends that Food and beverage manufacturing firms in Kenya should observe and develop capabilities to adapt in their operations to manage business dynamics such as risk reduction, collaborative linkages with external stakeholders and endeavour to secure best negotiated prices for the organization. Collaboration is often characterized by risk reduction, external linkages and negotiated prices. Specifically, a manufacturing firm can have the liberty of entering into business partnerships with raw material suppliers ostensibly to reduce risks of raw material shortage by securing supplies from firms they have entered and partnered with. External linkages cushion manufacturing firms from two types off risks; recurrent and disruptive risks. Companies should cluster their products and raw materials by segmenting those that can be put under secured supplier collaboration as it aims to improve performance and sustainability. The study further recommends that Kenyan government and Kenya Association of Manufacturers to enforce policies which encourage the manufacturing sector organizations to embrace supplier collaboration and technology in their operations as a way of enhancing their operations.

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Table 9: Research Sample Size

S/No.	Location	No of Firms	No of Respondents
1.	Athi River	7	7
2.	Eldoret	7	7
3.	Kakamega	3	3
4.	Kericho	3	3
5.	Kisumu	10	10
6.	Meru	4	4
7.	Mombasa	35	35
8.	Murang'a	4	4
9.	Nairobi	132	132
10.	Naivasha	3	3
11.	Nakuru	8	8
12.	Nyeri	3	3
13.	Ruiru	6	6
14.	Thika	22	22
15.	Other towns	23	23
	Total	**270**	**270**

Table 10: Case Processing Summary

Valid Active Cases	**259**
Active Cases of with Missing Values	0
Supplementary Cases	11
Total	**270**
Cases Used in Analysis	**259**

Table 11: Food and Beverage Company Type

Company type/ Food & Beverage Sector					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Edible oils	5	1.93	1.93	1.93
	Salt	9	3.47	3.47	5.40
	Baked Products & other Processed Cereals	68	26.25	26.25	31.65
	Food Snacks	40	15.44	15.44	47.09
	Diary & Dairy Products	54	20.85	20.85	67.94
	Meat and Fish Products	32	12.36	12.36	80.30
	Alcoholic Beverages	22	8.49	8.49	88.79
	Non- Alcoholic Beverages	29	11.21	11.21	100
	Total	**259**	**100.0**	**100.0**	