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SUPPLY CHAIN RESILIENCE STRATEGIES AND PERFORMANCE OF FOOD AND BEVERAGE MANUFACTURING FIRMS IN KENYA

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ABSTRACT

The main objective of this study was to establish the effect of supply chain resilience on performance of food and beverage manufacturing firms in Kenya. Specifically, the study sought to determine the effect of supply chain visibility on performance of food and beverage manufacturing firms in Kenya, and to find out the effect of supply risk management on performance of food and beverage manufacturing firms in Kenya. Descriptive research design was employed. This study targeted 187 food and beverage manufacturing firms in Kenya, where supply chain managers in these companies were the units of observation. Using a sampling formula by Nassiuma, a sample size of 103 respondents was identified, and the respondents were picked using simple random sampling. This study also used questionnaire to collect data relevant to this study. The questionnaire was pilot tested to assess its validity and reliability. The reliability was assessed using Cronbach's alpha where 0.70 was used as the threshold. Content validity, face validity and construct validity were tested to ensure the questions on the questionnaire were clear, understandable and addressing the thematic areas of the study. Quantitative data collected was analyzed using descriptive statistical techniques which included percentages, mean, and standard deviation. Inferential statistics which include Pearson correlation and the Regression Analysis Model were used to test the relationship between study variables. The significance of the model was tested at 5% level of significance. Data was analysed using Statistical Package for Social Sciences (SPSS) version 25 software. The study results were presented through use of tables and figures. The findings revealed that supply chain visibility had a significant effect on performance of food and beverage manufacturing firms in Kenya ($\beta = 0.249$; $P=0.000<0.05$). Lastly, supply risk management was found to significantly influence performance of food and beverage manufacturing firms in Kenya ($\beta = 0.228$; $P=0.000<0.05$). The study concluded that the declining performance of food and beverage manufacturing firms in Kenya was significantly attributed to ineffective embrace of supply chain resilience strategies including supply chain visibility and supply risk management. It is therefore recommended that there is need for supply chain managers at the food and beverage manufacturing firms in Kenya to spearhead supply chain resilience strategies to ensure the firms are capable of maintaining an effect supply chain process even during disruptions.

Key Words: Supply Chain Resilience, Food and Beverage Manufacturing Firms, Supply Chain Visibility, Supply Risk Management

Background of the Study

Manufacturing industries play a critical role in economic growth and development. Manufacturing provides a significant source of demand for goods and services in other sectors of the economy, however, the sales to other industries are not captured in measures of manufacturing sector GDP but are counted in the broader measure of its gross output. Based on the recent statistics, manufacturing contributes £6.7 trillion to the global economy (Suleiman, 2016). The manufacturing sector employed 12.4 million workers in 2015 or about 8.8 percent of total U.S employed population (Suleiman, 2016). Manufacturing industries generated $2.1 trillion in GDP (12.5 percent of total U.S. gross domestic product) in 2013. In the United Kingdom, manufacturing makes up 10% of GVA and 45% of UK exports and directly employs 2.7 million people (Merozwa, 2019).

Although the best performing firms in most African countries are productive even by international standards, and firms in some sectors are as productive as those in East Asia (Banerjee & Majundar, 2018), the average manufacturing firm in Sub-Saharan Africa is three times less productive than the average firm in the best performing East Asian countries. The average firm in Sub-Saharan Africa produces about US$3,300 of output per worker in 2015 dollars (Ajibike & Arema, 2019). In comparison, the average firm in the successful East Asian exporting economies (China, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam) produces about US$6,500 of output per worker. The results are also consistent with the fact that firms in China are more productive than firms in Vietnam and that the latter, in turn, are more productive than firms in the three African countries they studied (Fafchamps & Quinn, 2018).

Global supply chain (SC) activities have often been disrupted internally and externally due to unpredictable events which include natural disasters, accidents, and intentional disruptions. In a study prepared for a world economic forum, Bhatia et al. (2017) stated that disruptions were unavoidable and the affected companies could lose their share price by as much as 7 per cent. The intensity of supply chain disruptions can be magnified by reconfiguring the functions of the supply chain to mitigate the risks emerging from the dynamic and volatile business environment (Carvalho, Azevedo & Cruz-Machado, 2017). Identifying and quantifying the risks brought by supply chain requires a high complexity risk management approaches that will result in effective responses to disruptions in the market place (Fawcett & Waller, 2018).

Previous studies have also suggested that Supply Chain Resilience (SCRE) is essential for managing the vulnerabilities arising from numerous disruptions and risks (Chowdhury & Quaddus, 2017). The resilience of Supply chain involves the understanding of a reactive capability, post disruption actions. It also involves the proactive efforts to prepare for the unprecedented events or conditions in the organization (KamalAhmadi & Parast, 2016). Supply chain resilience is also defined as the risk mitigation strategy for the supply chain through anticipation, resistance, recovery and responses to the foreseen and unforeseen risks in the supply chain (Christopher & Packs, 2018).

According to Forkmann, Varzandeh, Henneberg, Naude, Mitrega (2016), organizations are becoming increasingly fore warned on disruptions caused by supply chain. Supply chain has is today a key component of the global firms and economies. Firms are therefore developing chain resilience practices to manage the risks facing firms as a result of technology, uncertain global customers and complexity in the supply chain function in so as to remain competitive in the current dynamic marketplace. A resilient supply chain has the capacity to overcome disruptions and continually transform itself to meet the changing needs and expectations of its customers, shareholders and other stakeholders (Jüttner & Maklan, 2017; Chopra & Sodhi, 2018). All firms rely on their suppliers to maintain smooth operations and their customers for continued revenue. Therefore, a resilient firm is truly only as resilient as its supply chain (Welch & Welch 2017).

Fiksel (2016) avers that mitigating supply chain risk using traditional methods of mitigating risk is based on statistical data. Unexpected natural events like natural disasters can therefore challenge risk management strategies based on these traditional methods of mitigating risk. Consequently, managing risk through the traditional methods should be supported by building capacity through implementation of resilience capability practices. Melnyk et, al. (2018) reiterates that the framework of supply chain management (SCM) must be anchored in resilience practices to ensure continuity in the operations of firms and sustainability in the competitive environment.

Statement of the Problem

The manufacturing sector in Kenya is one of the instrumental contributors to the country's economic growth and development. However, despite the sector's potential, its overall performance has been on a decline for the past decade, as evidenced by decline in its contribution to the country's GDP from 11.2% in 2017 to 7.8% in 2022 (KNBS, 2022). Food and beverage manufacturing subsector comprises of more than 30% of Kenya's manufacturing sector and 22% of Kenya Association of Manufacturers' membership (KAM, 2022). This makes food and beverage manufacturing firms integral players in the country's manufacturing sectors. Despite the sub-sector having majority of the firms as per KAM, the contribution of the food and beverage manufacturing firms remains low compared to other sub-sectors such as the building and construction, chemical and allied manufacturing sub-sectors (KNBS, 2022). According to the economy survey by KNBS (2022), food and beverage manufacturing firms contributed to 14% of the overall manufacturing sector's productivity, whereas chemical and allied sub-sector had 19.5%, metal and allied subsector had 22.7% and construction and building sub-sector contributed 24.2% of the sectors productivity. According to the economic survey (2022), while the entire manufacturing industry recorded a 24.7% growth in exports between 2017 and 2021, the food and beverage manufacturing subsector only grew its exports by 11% in the same period. To corroborate on these statistics, Mairura and Muturi (2021) indicated that global supply chain disruptions have been felt across various sectors in Kenya particularly the manufacturing industry including food and beverage manufacturing firms.

Previous literature has portrayed supply chain resilience in the midst of supply chain disruptions as instrumental in enhancing organizational performance. Tukamuhabwa *et al.* (2015) provided a comprehensive literature review of supply chain resilience and its role in firm performance and established that resilience in supply chain through diversified sourcing was integral in enhancing firm performance. A study by Ali *et al.* (2017) on the role of supply chain resilience on organizational performance established a weak relationship between supply chain resilience and firm performance. Closer home, Lugada *et al.* (2022) while addressing supply chain disruptions in Uganda's health sector established that supply chain resilience was a solution to continued disruptions in global supply chain disruptions that affected normal operations. Locally, Nyamete *et al.* (2023) assessed the relationship between supply chain resilience and performance of floricultural sector in Nakuru County, and revealed that supply chain resilience through supply chain flexibility influenced firm performance. The authors however recommended the need to extend the study in other sectors and counties. While the reviewed studies portray the essence of supply chain resilience on firm performance, the studies have conceptualized supply chain resilience differently, while others have focused on varied contexts unlike the current study that focuses on food and beverage manufacturing sub-sector in Kenya. To fill these gaps, therefore, the study assessed the effect of supply chain resilience strategies on performance of food and beverage manufacturing firms in Kenya.

Objectives of the Study

General Objective

The general objective of the study was to assess the relationship between supply chain resilience strategies and performance of food and beverage manufacturing firms in Kenya

Specific Objectives

The study was guided by the following specific objectives;

1. To determine the effect of supply chain visibility on performance of food and beverage manufacturing firms in Kenya
2. To find out the effect of supply risk management on performance of food and beverage manufacturing firms in Kenya

LITERATURE REVIEW

Theoretical Review

General Systems Theory

General systems theory (GST) was outlined by Ludwig von Bertalanffy (1968). Its premise is that complex systems share organizing principles which can be discovered and modeled mathematically. The term came to relate to finding a general theory to explain all systems in all fields of science. Boulding (1956) defines general systems theory as the main body of science that anchors and relate to certain disciplines in a comprehensible manner. An entity can be described by its organization structure and how the various structures relate with one another through information sharing minimizing ambiguity (Ludlow, & Otto, 2018). The systems consist of routine patterns of entities that are linked together bringing out relationships that can express the entire organization (Chikere & Nwoka, 2015). Furthermore, systems theory seeks to understand the organization holistically. Therefore, it follows several steps in order to achieve this (Farace, 1977). This theory puts emphasis on both vertical and horizontal organization orientation to get a more accurate view point of the organization. In the organizational context, communication networks are defined in terms of management roles or casual roles which emerge through interactions.

Whereas closed systems use error-controlled regulation to eliminate external influence, open systems use anticipatory control since it is as a result of interaction with the environment that a system achieves a dynamic stability (Njue, Kyalo, Mulwa, & Mbugua, 2016). System theory is founded upon the principles that the subsystems are; open, focused, interrelated, continuously transforming inputs into outputs, flexible, responds to environment through feedback, brings about the equilibrium to the system and are coherent (Njue et al., 2016). Consistent with this view Ludlow, and Otto (2018) indicate that in open systems there are exchanges of energy, matter, people, and information with the external environment. In closed systems there are no exchanges of information and matter, just exchanges of energy.

General systems theory focuses on the arrangement of and relations between the parts and how they work together as a whole. The way the parts are organized and how they interact with each other, determines the properties of that system. The behavior of the system is independent of the properties of the elements. This often referred to as a holistic approach to understanding phenomena (Chikere & Nwoka, 2015). Every organized enterprise does not exist in a vacuum. It is rather known to depend on its external environment which is a part of a larger system, such as the industry to which it belongs, the economic system and the society (Chikere & Nwoka, 2015). This study will use general systems theory to assess the effect of supply chain visibility on performance of manufacturing firms in Kenya.

Enterprise Risk Management Theory

Enterprise Risk Management Theory, according to Nocco (2006), advocates for the measurement and management of notable risk facing a given entity whole than the management of each risk independently. The primary objective is fundamentally to integrate risk mitigation in the company into a single, comprehensive framework. This theory insists that top management and the other employees ought to be part of risk management process and measuring and reverting to big organizational risks (Hallowell, *et al*, 2018). According to Olson *el at*, 2019), this theory confirms if ten companies implement procedure and rules which govern

appetite of risk, plan of action objectives, well arranged processes, they would enhance capability of managing risks by ascertaining, evaluating, and responding to the risks. This theory emphasis on formation of risk management philosophy that empowers all employees to play part in mitigating risks. Cormican (2019) recommended that ERM activities enhance competitiveness, customer satisfaction and organizational sustainability. Drumll (2018) points out that applications of ERM concept in the construction sector is prudent because it's done to sectors with very high chances of collapsing such as construction sector. This incompetence is brought by not identifying, reduce and hinder risk in the whole organization hence this theory is important to the study.

Enterprise Risk Management (ERM) theory provides a broader framework for managing risks across an organization, including project risk management (Ali *et al*, 2019). In the context of roads construction projects in Kenya, the application of project risk management principles influenced by ERM theory can have a significant impact on project performance. ERM theory promotes a holistic approach to risk management, considering risks at both the organizational and project levels (Alsadi & Norhayatizakuan, 2021). This study will use Enterprise Risk Management Theory to establish the effect of supply chain resilience on performance of manufacturing firms in Kenya.

Conceptual Framework

According to Yin (2019), a conceptual framework refers to a diagrammatical representation showing the relationship between dependent and independent variables. Figure 2.1 below shows the independent variables of supply chain resilience which are supply chain visibility, and supply risk management, and the dependent variable which is performance of food and beverage manufacturing firms.

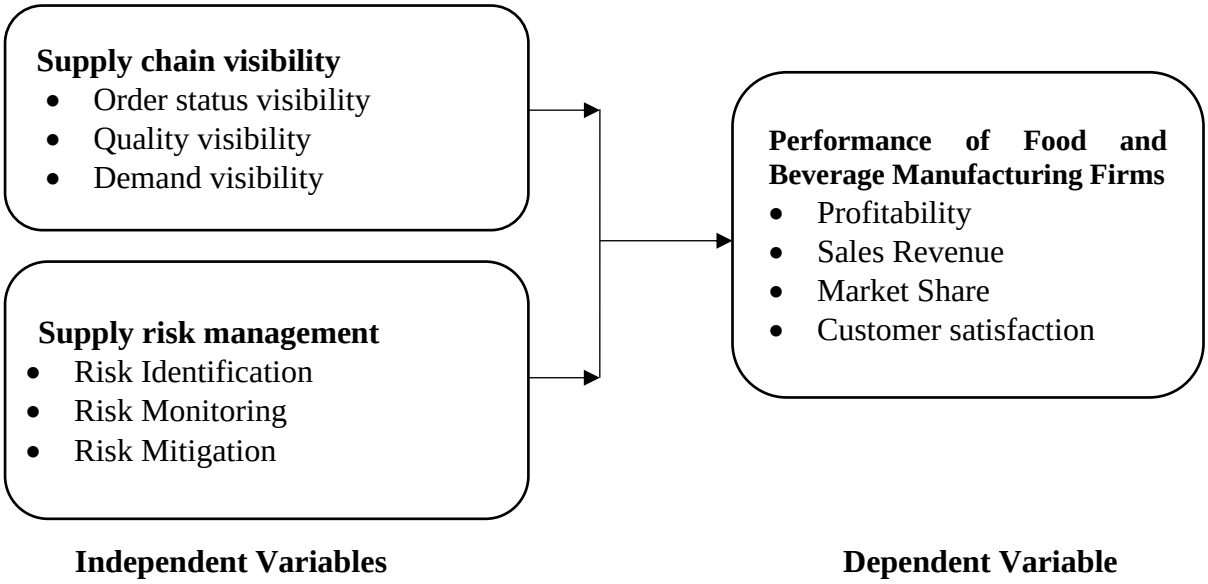

Figure 1: Conceptual Framework

Supply Chain Visibility

Supply chain visibility refers to the ability of a company to track its products, components, or materials as they move through the various stages of production, distribution, and delivery within the supply chain network. It encompasses the transparency and accessibility of real-time information regarding inventory levels, shipment statuses, and other relevant data points across all tiers of suppliers, manufacturers, logistics providers, and customers. In essence, it enables stakeholders to gain insights into the entire supply chain ecosystem, from raw material sourcing

to end-customer delivery, facilitating informed decision-making and proactive risk management (Kyeremeh & Dza, 2018).

The advent of advanced technologies such as Internet of Things, big data analytics, artificial intelligence, and block chain has revolutionized the landscape of supply chain visibility, offering unprecedented capabilities to capture, analyze, and leverage data across the entire supply chain network. By leveraging Internet of Things sensors, RFID tags, and GPS tracking systems, companies can monitor the movement of goods in transit, optimize route planning, and identify potential bottlenecks or disruptions proactively. Meanwhile, big data analytics and artificial intelligence algorithms enable organizations to derive actionable insights from vast volumes of data, facilitating predictive analytics, demand forecasting, and inventory optimization (Asamoah, Bediako & Adu-Poku, 2023).

Supply chain visibility and information sharing with external stakeholders, including suppliers, contract manufacturers, logistics providers, and customers. Collaborative platforms and data-sharing initiatives enable seamless communication and coordination among supply chain partners, fostering transparency, trust, and agility throughout the ecosystem. Through shared visibility, companies can better anticipate demand fluctuations, synchronize production schedules, and coordinate inventory replenishment, thereby reducing stock outs, excess inventory, and supply chain inefficiencies (Mairura & Muturi, 2021).

Recent events such as the COVID-19 pandemic have underscored the critical role of visibility in enabling supply chain resilience and adaptability in the face of unforeseen disruptions. Organizations that invest in robust visibility solutions and establish collaborative relationships with their supply chain partners are better positioned to navigate uncertainties, mitigate risks, and capitalize on emerging opportunities in today's hyper connected global marketplace. Ultimately, supply chain visibility serves as a catalyst for driving operational excellence, customer satisfaction, and sustainable competitive advantage in an increasingly digitalized and interconnected world (Mutwiri, Marendi, Riro & Ratemo, 2019).

Supply Risk Management

Supply risk management refers to the process of identifying, assessing, mitigating, and monitoring risks associated with the supply chain. It involves analysing potential threats and vulnerabilities that could disrupt the flow of goods, materials, or services within the supply chain network and implementing strategies to minimize their impact on business operations (Asikhia, Makinde, Akinlabi & Olawore, 2022). The goal of supply risk management is to enhance the resilience and agility of the supply chain, enabling organizations to proactively respond to uncertainties and safeguard against potential disruptions.

One objectives of supply risk management is to identify and understand the potential risks that could impact the supply chain. These risks can vary widely and may include natural disasters, geopolitical instability, economic fluctuations, supplier failures, quality issues, transportation disruptions, regulatory changes, and cyber security threats, among others. By conducting thorough risk assessments and analyzing historical data, organizations can gain insights into the likelihood and potential impact of various risks on their supply chain operations (Ochieng, 2019).

Developing strategies to mitigate or manage them effectively involves implementing a range of risk mitigation measures tailored to specific risks and vulnerabilities identified within the supply chain. Strategies for risk mitigation may include diversifying the supplier base to reduce dependency on a single source, establishing contingency plans and business continuity measures, implementing redundant sourcing options, stockpiling critical inventory, negotiating

flexible contracts with suppliers, and investing in technology solutions to enhance supply chain visibility and transparency (Adala, Miroga & Manyela, 2022).

Continuous monitoring and evaluation of supply chain risks are essential components of effective supply risk management. Organizations must remain vigilant and responsive to changes in the business environment, such as market dynamics, geopolitical developments, regulatory requirements, and emerging threats. By regularly monitoring supplier performance, financial stability, and other key risk indicators, organizations can identify potential warning signs and take proactive measures to mitigate risks before they escalate into significant disruptions (Mburu, Ngugi & Ogollah, 2018).

Empirical Review

Supply Chain Visibility and Organization Performance

Kyeremeh and Dza (2018) conducted a study on the supply chain management and organization performance: a value creation perspective. The study used correlation and regression analysis. The target population for the study is based on SC practitioners in manufacturing companies within the Kumasi Metropolitan Assembly of Ghana. The study found that value creation influences information and technology management to significantly contribute negatively on supply chain performance. The study concludes that although SCM practices have an impact on supply chain performance, the effect is not much influenced by value creation.

Asamoah, Bediako and Adu-Poku (2023) investigated on the effects of supply chain visibility on supply chain performance in Ghana health service: the case of Kumasi Metro Health Directorate. The study employed both quantitative and qualitative data. The target population comprised all the staff at the Procurement and Supply Chain department of Kumasi Metro Health Directorate. The study found technological constraints, lack of synergy between automated systems and manual operations, inconsistencies in the flow of data between stakeholders, lack of communication between staff and management leading to poor planning of SCV and budget constraint were noted by the respondents as the possible bottlenecks in the implementation of SCV in the Kumasi Metro Health Directorate. The study concluded that most of the staff of the supply chain/procurement has a fair idea of the strategies being used to implement supply chain visibility in Kumasi Metro Health directorate.

Mairura and Muturi (2021) researched on the effect of supply chain resilience strategies on operational performance of manufacturing firms in Nairobi city county, Kenya. The study used a cross-sectional research design methodology that combines quantitative and qualitative methods. The 454 manufacturing companies in Nairobi and its environs would be the study's focus population. The study found out all variables Multi-sourcing, near shoring, product harmonization and Inventory management strategies have positive significance on operational performance of Manufacturing to improve on the Manufacturing firms in Nairobi city county, Kenya. The study concluded that to improve on performance manufacturing firms should focus more on Supply chain Communication, manufacturing companies need to change supply chain resilience, manufacturing firms need to come up with new products or an improved version of the existing products to impact positively on the profits and also to improve the customer base and Inventory management strategy chosen must impact on the profitability and number of customers.

Mutwiri, Marendi, Riro and Ratemo (2019) investigated on the effects of supply chain integration on performance of public health supply chains: a Kenyan perspective. The study used Stratified random sampling technique. The study targeted a population of one hundred and twenty three respondents within the management and supervisory staff of the organization.

The study found that that supplier integration, internal integration and customer integration have a positive and statistically significant effect on organizational performance and that the effect of the overall supply chain integration dimensions have positive and statistically significant effect on organizational performance. The study concluded that greater level of supplier, internal and customer integration complements organization performance.

Arani, Mukulu, Waiganjo and Wambua (2016) conducted a study on the influence of supply chain re-engineering on supply chain resilience in manufacturing firms in Kenya. The study adopted cross-sectional survey design using both quantitative and qualitative approaches. The target population was 613 manufacturing firms in Nairobi and its surroundings, who were members of Kenya Association of Manufacturers. The study found that manufacturing firms in Kenya adopted pro-active strategy of supplier developments such as working closely with their suppliers and that manufacturing firms in Kenya used risk awareness as key criteria for selecting suppliers. The study concluded that supply chain re-engineering had a positive significant linear relationship with the supply chain resilience of manufacturing firms in Kenya using Pearson correlation coefficient

Supply Risk Management and Organization Performance

Asikhia, Makinde, Akinlabi and Olawore (2022) researched on the supply chain risk management and business performance of selected oil and gas marketing companies in Lagos state, Nigeria: moderating role of firms' size. The study adopted a survey research design. The study population study was 1,044 full-time employees of five selected oil and gas marketing companies in the downstream sector of petroleum industry in Nigeria. The study found that firm size significantly moderated the relationship between supply chain risk management strategy and business performance of the selected oil and gas marketing companies in Lagos, Nigeria. The study concluded that supply chain risk management strategy significantly had an effect on business performance of the selected oil and gas marketing companies in Lagos, Nigeria and that firm size significantly moderated the relationship between supply chain risk management strategy and business performance of the selected oil and gas marketing companies in Lagos, Nigeria.

Ochieng (2019) investigated on the effects of supply chain risk management practices on performance of manufacturing firms in Kenya. The study adopted a descriptive survey design. The target population included 494 large manufacturing firms licensed under the Kenya Association of Manufacturers. The study found that an increase in risk management practices leads to an increase in the performance of manufacturing firms and that an improvement in Hedging practices leads to a significant improvement in performance of the manufacturing firms in Kenya. The study concluded that risk identification positively and significantly affects performance of manufacturing firms in Kenya and that hedging practices positively and significantly affect the performance of the manufacturing firms.

Adala, Miroga and Manyela (2022) conducted a study on the effect of supplier risk management practices on supply chain performance of county public referral hospital in western region, Kenya. Descriptive survey design was used in this study. The study targeted 102 respondents. The study found that the county public referral hospitals carried out identification of potential risks in supply chain, carried out on-site investigation of existence of risk and carried out joint training sessions with suppliers. The study also found that supply risk management practices positively and significantly influence supply chain performance of County public referral hospital in Western Region, Kenya. The study concluded that supplier risk management practices significantly determine the supply chain performance of County public referral hospital in Western Region, Kenya.

Mburu, Ngugi and Ogollah (2018) researched on an assessment of effect of risk identification management strategy on supply chain performance in manufacturing companies in Kenya. This study adopted a cross-section survey of descriptive nature. The total population of this study was made up of all manufacturing companies in Kenya. The study found that that companies can only ensure there is adequate cost reduction along supply chain function through use of activities based contracts with clean cost management targets, setting annual savings target and reporting achieved saving monthly and competitive bidding, purchasing from suppliers and delivering to customers economic quantities and majority of the companies build alliances through supply chain systems. The study concluded that order to enhance a smooth performing of supply chain in a company given the changing nature of markets due to increased diversity adequate risk identification and management is inevitable.

Munyoku (2020) investigated on the effects of supply chain risk management on organization performance: case of Andy forwarders services limited. This study employed a descriptive research design using a case study. The target population was employees at Andy forwarders logistics Services Ltd. The study found that there was a direct link between supply chain risk management and organization performance. The study concluded that supply chain risks affect organization performance.

RESEARCH METHODOLOGY

Descriptive research design was employed where data was collected one point in time. Creswell (2017) notes that a descriptive survey seeks to obtain information that describes existing phenomena by asking questions relating to individual perceptions and attitudes. The target population for this study was food and beverage manufacturing firms in Kenya. According to Kenya Association of Manufacturers (KAM, 2022), there are 187 food and beverage manufacturing firms in Kenya that are members of the Association. The food and beverage manufacturing firms were the unit of analysis while the supply chain managers in the firms were the unit of observation. The object from which information is obtained is referred to as a unit of observation (Cooper & Schindler, 2016). The target population for the study therefore was 187 respondents. Sample refers to a part of or fraction of population that is being investigated upon. It can also be defined as a group of individuals who are engaged or participating in a study. The study's sample size was reached at using Nassiuma (2000) sample size determination formula. Using this formula, a representative sample of 103 respondents was obtained. The respondents were picked using a simple random sampling whereby the food and beverage manufacturing companies were randomly selected and the heads of supply chain department from each of the selected companies surveyed. According to Kothari (2019), a random sampling technique gives all the respondents an equal chance to be included in the study, thus is the most appropriate probability sampling method that has minimal bias.

Primary data was used in this study. The study's primary data was obtained using semi-structured questionnaires. The researcher carried out a pilot study to ensure the data collection tool is reliable and valid. The pilot test helped correct some of the challenges encountered before undertaking the final study. The pretesting sample was made of 11 respondents, representing 10% of the sample size. The results from the pilot test were not used in the main study. In addition, the respondents used in the pilot test were excluded from the final study. Inferential and descriptive statistics were employed for analysis of quantitative data with the assistance of Statistical Package for Social Sciences (SPSS version 25). Descriptive statistics such as frequency distribution, mean (measure of dispersion), standard deviation, and percentages were used. Inferential data analysis was conducted by use of Pearson correlation coefficient, and multiple regression analysis.

FINDINGS AND DISCUSSIONS

The study sampled 103 respondents drawn from the food and beverage manufacturing firms in Kenya, who were issued with questionnaires to fill. Out of these, 97 gave out the dully filled questionnaire for analysis. As portrayed on Table 4.1, this was a response rate of 94.2% and a non-response rate of 5.8%. According to Creswell (2018), a response of more than 60% is adequate for representation of the targeted population, and can make conclusions and recommendations regarding the subject matter in a study. To this effect, the 94.2% response rate was considered adequate for analysis.

Descriptive Analysis of the Findings

Descriptive statistics according to Kaur, PStoltzfus, and Yellapu (2018), covers the description of the study findings as observed. They describe what was observed and give the researcher the direction to give inferences and implication of the study findings. Through descriptive statistics the researcher is able to show the extent to which the research findings have answered the research questions (Mishra, Pandey, Singh, Gupta, Sahu, & Keshri, 2019). This sub-section captures the descriptive analysis of the study variables. Descriptive analysis was carried out where the respondents' views of the research questions were reported as they were. The main statistics included in the standard deviation, means and percentages. The analysis is done systematically based on the objectives of the study.

Supply Chain Visibility

The first objective of the study was to establish the influence of supply chain visibility on performance of food and beverage manufacturing firms in Kenya. Supply chain visibility was assessed through order status visibility, quality visibility, and demand visibility. The respondents were asked to indicate their level of agreement or disagreement with key statements on supply chain visibility. A 5-points Likert's scale was used, where 1 = Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree. The findings are as shown in Table 1. As the results portray, majority of the respondents disagreed that their respective organizations had clear visibility into all stages of the supply chain operations (Strongly Disagree = 27.7%; Disagree = 35.5%; Mean = 2.77; Std. Dev. = 1.92). The respondents further disagreed that the customers were able to track and see the status of their orders from the time of ordering to the time of delivery (Strongly Disagree = 42.6%; Disagree = 27.2%; Mean = 2.27; Standard deviation = 1.10).

Majority of the respondents disagreed that their respective organizations had put the appropriate systems to ensure they could track orders placed with suppliers until they deliver as evidenced by a mean of 2.76 and a standard deviation of 1.07. The respondents further disagreed that their respective companies had access to real-time information and data regarding the movement and status of products/materials within the supply chain as shown by a mean of 2.53 and a standard deviation of 1.02, and that they had put appropriate systems to ensure customers were able to assess the quality of their orders even before they were delivered (Mean = 2.39; Standard Deviation = 1.33). It was further established that most of food and beverage manufacturing firms had no systems put in place to assess the quality of materials from the suppliers even before they were delivered (Mean = 2.60; Standard Deviation = 1.32). The respondents (54.3%) indicated that their respective companies had not embraced continuous engagement of customers and suppliers to ensure expected fluctuations in demand are visible as early. Moreover, 52.4% of the respondents disagreed that their respective organizations were well-prepared to identify and respond to disruptions in the supply chain due to the visibility they had put in place (Mean = 2.75; Std. Dev. = 1.27). The findings are an indication that supply chain visibility has not been effectively upheld in most of the surveyed food and beverage manufacturing firms in Kenya. This concurs with the findings by Singagerda et al. (2022) who indicated that as result of ineffective integration of supply chain visibility,

manufacturing companies failed to be agile and adaptive to disruptions in supply chain, a matter that negatively affected their performance.

Table 1: Descriptive Results on Supply Chain Visibility

Statements	SD	D	N	A	SA	Mean	Std. Dev.
1. Our organization has clear visibility into all stages of our supply chain operations.	27.7%	35.5%	8.5%	13.0%	15.3%	2.77	1.92
2. The customers are able to track and see the status of their orders from the time of ordering to the time of delivery	42.6%	27.2%	11.6%	7.2%	11.4%	2.27	1.10
3. We have put the appropriate systems to ensure we can track orders we place with our suppliers until they deliver	24.7%	37.0%	7.4%	9.3%	21.6%	2.76	1.07
4. We have access to real-time information and data regarding the movement and status of products/materials within the supply chain.	32.6%	20.2%	11.6%	17.2%	18.4%	2.58	1.09
5. We have put appropriate systems to ensure customers are able to assess the quality of their orders even before they are delivered	34.4%	24.4%	17.2%	14.4%	9.5%	2.53	1.02
6. There are systems put in place to assess the quality of materials from our suppliers even before they are delivered	34.4%	24.2%	18.1%	14.0%	9.3%	2.39	1.33
7. The organization has put appropriate measures to forecast demand early enough for better planning	39.6%	29.2%	11.6%	10.2%	9.4%	2.18	1.19
8. We have embraced continuous engagement of customers and suppliers to ensure expected fluctuations in demand are visible as early	23.7%	31.6%	15.8%	17.7%	11.2%	2.60	1.32
9. Our organization is well-prepared to identify and respond to disruptions in our supply chain due to the visibility we have into our operations.	21.2%	31.2%	11.6%	23.0%	13.0%	2.75	1.27

Supply Risk Management

The second objective of the study was to establish the influence of supply chain risk management as a parameter of supply chain resilience on performance of food and beverage manufacturing firms in Kenya. Using a 5-points Likert's scale, the respondents were asked to indicate their level of agreement of disagreement with key statements drawn from the specific parameters of supply risk management. The findings are as shown in Table 2. As the findings portray, majority of the respondents (64.9%) disagreed that their respective organizations actively identified and assessed potential risks that may impact their supply chain operations

(Mean = 2.15; Std. Dev. = 1.71). Further, 72.1% of the respondents disagreed that there was proper documentation of identified risks to ensure their effective mitigation. From the findings, 39.0% of the respondents disagreed that their respective companies organization has upheld regular monitoring and evaluation of supply chain risks to effectively identify emerging threats and take timely corrective actions, whereas 36.3% agreed with this statement (Mean = 2.86; standard deviation = 1.22).

The findings further revealed that 61.9% of the respondents disagreed that their respective organizations prioritized proactive measures to mitigate risks and uncertainties in their supply chain, such as supplier failures, natural disasters, and geopolitical events (Mean = 2.54; standard deviation = 1.24). The respondents disagreed that there was a set framework for assessing and evaluating the magnitude of supply chain-related risks on organization's overall performance (SD = 24.4%; D = 29.1%; Mean = 2.62; Std. Dev. = 1.22). Most (77.0%) of the food and beverage manufacturing companies surveyed did not collaborate with suppliers to come up with effective risk management and resilience-building efforts (Mean = 2.39; Standard Deviation = 1.88). This is an indication that food and beverage manufacturing firms were not committed enough to address and mitigate risks in the supply chain processes. According to Waqas et al. (2022), failure by modern organizations to have specific risk management measures to supply chain operations affects the seamless flow of supply chain, owing to the fact that supply chain risks are different from other risks facing an organization thus they require different approaches to mitigate.

From the results, it was further established that most (56.8%) of surveyed food and beverage manufacturing firms did not implement contingency plans and backup strategies to ensure continuity of supply in the event of disruptions (Mean = 2.56; Std. Dev. = 1.27). Further, the respondents disagreed that their respective companies had risk mitigation plan to ensure all the identified risks are effectively mitigated (Strongly Disagree = 43.9%; Disagree = 24.0%; Mean = 2.48; Standard Deviation = 1.43), and that the current supply chain risk management approach embraced in the organizations was adequate for enhancing continued performance (Mean = 2.49; Std. Dev. = 1.44). The findings imply that supply chain risk management had not been effectively integrated in most of the food and beverage manufacturing firms. This would limit the ability of the firms to be resilient, especially at such a time when supply chain is overly getting disrupted globally. The findings concur with those by Um and Han (2021) who established that firms in the manufacturing sector miss the opportunity of being proactive and mitigating supply chain risks due to inability to embrace appropriate and specific measures to manage supply-chain related risks. Further, Pettit et al. (2019) argued that supply chain risks require a more specific approach to mitigate rather than the traditional all-organizational approach that focuses on the entire organization.

Table 2: Descriptive Statistics on Supply Chain Risk Management

Statements	SD	D	N	A	SA	Mean	Std. Dev.
1. Our organization actively identifies and assesses potential risks that may impact our supply chain operations	39.1%	25.8%	15.8%	9.3%	10.0%	2.15	1.71
2. There is proper documentation of identified risks to ensure their effective mitigation	48.1%	24.0%	10.5%	2.1%	15.3%	2.12	1.83
3. The organization has upheld regular monitoring and evaluation of supply chain risks to effectively identify emerging threats and take timely corrective actions	18.1%	20.9%	24.7%	29.3%	7.0%	2.86	1.22
4. We prioritize proactive measures to mitigate risks and uncertainties in our supply chain, such as supplier failures, natural disasters, and geopolitical events.	38.2%	23.7%	7.2%	17.1%	13.7%	2.54	1.24
5. There is a set framework for assessing and evaluating the magnitude of supply chain-related risks on organization's overall performance	24.4%	29.1%	10.9%	18.4%	17.2%	2.62	1.22
6. The organization collaborates with suppliers to come up with effective risk management and resilience-building efforts	45.8%	31.2%	15.8%	2.1%	5.1%	2.39	1.88
7. Our organization implements contingency plans and backup strategies to ensure continuity of supply in the event of disruptions.	34.9%	21.9%	5.3%	17.2%	20.7%	2.56	1.27
8. Our company has a risk mitigation plan to ensure all the identified risks are effectively mitigated	43.9%	24.0%	6.7%	10.0%	15.4%	2.48	1.43
9. The current supply chain risk management approach embraced in our organization is adequate for enhancing continued performance	35.8%	29.5%	6.7%	12.2%	15.8%	2.49	1.44

Performance of Food and Beverage Manufacturing Firms

The study sought to establish the performance of food and beverage manufacturing firms in Kenya. The respondents were asked to indicate their level of agreement of disagreement with key statements on the performance of their respective firms. As the findings on Table 3 portray, majority of the respondents (63.4%) disagreed that their respective organizations had recorded a significant increase in its sale revenues for the past three years (Mean = 2.31; Standard deviation = 1.29). The respondents disagreed that their respective organizations had recorded a significant increase in their profit margins for the past three years (Strongly Disagree = 38.3%; Disagree = 22.4%; Mean = 2.41; Standard deviation = 1.41); and that the company's sales revenue were projected to increase significantly in the next five years (Mean = 2.17; Standard deviation = 1.12). According to Mwangi *et al.* (2021), a well-performing organizations project to have a significant increase in their revenues for a foreseeable future as their current revenues guaranteed continued growth. When projections are showing a decline,

it shows that the organization is not adequately doing well, thus there is limited confidence on positive results ahead (Kyeremeh & Dza, 2018).

Further, 72.7% of the respondents disagreed that their respective company's market share had increased significantly for the past three years (Mean = 2.31). Majority of the respondents disagreed that there was a significant increase in the level of their respective organizations' production in terms of units for the past five years (SD = 31.7%; D = 28.1%; Mean = 2.28; Std. Dev. = 1.31), and that there had been a significant growth in the number of customers in the organization for the past three years (Mean = 2.65; Std. Dev. = 1.37). The findings further portrayed that 58.5% of the respondents disagreed that there were fewer customer complaints recorded at their respective organizations for the past three years (Mean = 2.46; Std. Dev. = 1.50); while 64.2% disagreed that their respective organizations had been able to meet their short-term goals in the past five years. The results are a clear indication that the food and beverage manufacturing firms had been underperforming, and this justifies the study's problem statement. According to the Kenya Association of Manufacturers (KAM), the continued performance of food and beverage manufacturing firms has been facing tremendous challenges in streamlining their processes and operations to align with the dynamics in operating market, thus seeing most of the firms record a decline in performance over the years (KAM, 2023).

Table 3: Level of Agreement with Statements on Firm Performance

Statement	SD	D	N	A	SA	Mean	Std. Dev.
1. Our organization has recorded a significant increase in its sale revenues for the past three years	34.1%	29.3%	14.6%	14.6%	7.3%	2.31	1.29
2. The organization has recorded a significant increase in its profit margins for the past three years	38.3%	22.4%	10.2%	17.1%	12.0%	2.41	1.41
3. The company's sales revenue are projected to increase significantly in the next five years	24.3%	46.1%	17.1%	2.4%	10.1%	2.17	1.12
4. Our company's market share has increased significantly for the past three years	28.8%	43.9%	4.9%	7.1%	15.3%	2.31	1.10
5. There has been a significant increase in the level of our company's production in terms of units for the past five years	31.7%	28.1%	9.5%	14.4%	16.3%	2.28	1.31
6. There has been a significant growth in the number of customers in our organization for the past three years	24.4%	34.6%	4.4%	24.4%	12.2%	2.65	1.37
7. There have been fewer customer complaints recorded at the organization for the past three years	31.2%	27.3%	14.1%	12.2%	15.2%	2.46	1.50
8. The organization has been able to meet its short-term goals in the past five years	18.4%	45.8%	14.0%	12.8%	9.1%	2.39	0.97

Correlation Analysis

A correlation is used to estimate the strength of the linear relationship between two variables representing how closely two variables co-vary ranging from -1 (termed as perfect negative correlation) through 0 (implying no correlation) to +1 (termed as perfect positive correlation). Correlation is measured by correlation coefficient that represents the strength of the putative linear association between the variables in question (Darlington & Hayes, 2017). If the coefficient is a positive, then the variables are directly related meaning that if the value of one variable goes up, the value of the other variable also tends go up as well. On the other hand, if the coefficient is a negative then the variables are inversely related meaning that if the value

of one variable goes up, then value of the other variable goes down (Shrestha, 2020). Correlation in this study was carried out using Pearson Correlation coefficient (r). The findings are as shown in Table 4.10.

As the findings portray, the correlation between supply chain visibility and performance of food and beverage manufacturing firms had a Pearson Correlation coefficient (r) of 0.702 at a significance level of 0.000<0.05. This implies that there is a 70.2% (strong) correlation between supply chain visibility and performance of food and beverage manufacturing firms in Kenya. The findings further revealed that a Pearson correlation of 0.642 was obtained on the correlation between supply chain risks management and performance of food and beverage manufacturing firms. This is an implications that there is a strong (64.2%) correlation between supply chain risks management and performance of food and beverage manufacturing firms in Kenya. The correlation is also statistically significant as shown by a significance value of 0.000<0.05. The findings concur with those by Gotubo (2022) who established that supply chain resilience had a strong correlation with performance of manufacturing enterprises. Further, Dubey *et al.* (2020) established that supply chain visibility had a strong association with organizational performance.

Table 4: Correlation Results

		Firm Performance	Supply Chain Visibility	Supply Risk Management
Firm Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	97		
Supply Chain Visibility	Pearson Correlation	.702**	1	
	Sig. (2-tailed)	.000		
	N	97	97	
Supply Risk management	Pearson Correlation	.642**	.458**	1
	Sig. (2-tailed)	.000	.000	
	N	97	97	97

Regression Analyses

A regression model analysis was carried out to establish the statistical relationship between supply chain resilience and performance of food and beverage manufacturing firms in Kenya. The study adopted a linear multivariate regression model to expound on the relationship between the independent variables and the dependent variable. This enabled the researcher to quantify and ascertain the relationship between independent variables and the dependent variable. The R-Square (R^2) test statistic was computed to determine the strength of the model, while Analysis of Variance (ANOVA) through F-statistic and P-value was used to test the significance of the model. The regression model was as shown below:

Model Summary

The model summary as shown in Table 5 shows a R value (which is the correlation coefficient) of 0.845, implying that there is an overall correlation of 84.5% between supply chain resilience (supply chain visibility and supply risk management) and performance of food and beverage manufacturing firms. R^2 which is the coefficient of determination [explains the extent to which changes in the dependent variable (performance of food and beverage manufacturing firms) is explained by changes in independent variables (supply chain visibility and supply risk management)]. The results revealed that an R-square (R^2) of 0.713 was obtained. This implied that when combined, the independent variables (supply chain visibility, supply chain visibility, supply base rationalization, and supply risk management) led to 71.3% of variation in performance of food and beverage manufacturing firms in Kenya. This implies that when put together, the four aspects of supply chain resilience would be responsible for over 71% of the observed change in performance of food and beverage manufacturing firms in Kenya.

Table 5: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.845[a]	.713	.708	.38020

a. Predictors: (Constant), supply chain visibility, and supply risk management
b. Dependent Variable: Performance of food and beverage manufacturing firms

Analysis of Variance

Additionally, the ANOVA test shown in Table 6 was used to test the significance of the model and the existence of variations among variables within the model. The results revealed that an F-statistic of 83.311 was obtained. This was within the 95% confidence level as shown by a P-value of 0.000 which is less than 0.05. This is an indication that the model is statistically significant to predict the relationship between combined effect of supply chain visibility, and supply risk management and performance of food and beverage manufacturing firms in Kenya.

Table 6: ANOVA Test Results

	Sum of Squares	df	Mean Square	F	Sig.
Regression	59.719	4	14.931	83.311	.000[b]
Residual	16.487	92	.179		
Total	76.209	96			

a. Predictors: (Constant), supply chain visibility, and supply risk management
b. Dependent Variable: Performance of food and beverage manufacturing firms

Regression Coefficients

The regression coefficients revealed that when combined, the four aspects of supply chain resilience (supply chain visibility, and supply risk management) significantly influenced the performance of food and beverage manufacturing firms in Kenya. The results as shown in Table 7 revealed that supply chain visibility had the strongest influence on the performance of food and beverage manufacturing firms in Kenya as evidenced by a Beta coefficient (β) of 0.249. This was followed by supply chain risk management which had a Beta coefficient (β) of 0.228. All the variables had P-values of less than the standard p-value of 0.05, implying that the aspects of supply chain resilience (supply chain visibility, and supply risk management) significantly influenced the performance of food and beverage manufacturing firms in Kenya.

Table 7: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.116	.124		.934	.351
Supply Chain Visibility	.249	.053	.256	4.661	.000
Supply Risk Management	.228	.051	.254	4.445	.000

Conclusions of the Study

The study concludes that supply chain visibility is significantly lacking in food and beverage manufacturing firms in Kenya. The lack of visibility in supply chain operations, customer engagement, and real-time data access has hindered the ability of these firms to efficiently track orders, ensure product quality, and respond to disruptions. This deficiency in supply chain visibility has a negative impact on the overall performance of these firms, as they are less agile and adaptive to changes and challenges within the supply chain.

The study further concludes that supply chain risk management has a significant influence on performance of food and beverage manufacturing firms in Kenya. The results had it that supply chain risk management had inadequately been integrated into the operations of food and beverage manufacturing firms in Kenya. This lack of focus on risk management severely limits the firms' ability to build resilience and maintain continuity during unforeseen events. These shortcomings suggest that many firms in this sector are unprepared to navigate the increasingly complex and volatile global supply chain environment, ultimately compromising their performance and competitiveness.

Recommendations of the Study

The following recommendations have been drawn from the study's findings:

The study recommends that the management of food and beverage manufacturing firms in Kenya should enhance supply chain visibility by investing in advanced tracking technologies and real-time data systems. Improved engagement with customers and suppliers through regular communication and collaborative forecasting is essential. The firms should strengthen their preparedness for supply chain disruptions by developing comprehensive risk management strategies, including contingency planning and the use of predictive analytics, to maintain operational efficiency and responsiveness.

To improve resilience and performance, it is essential for the management team of food and beverage manufacturing firms in Kenya to develop a comprehensive supply chain risk management framework tailored to their supply chain needs, including regular risk identification, assessment, and monitoring. They should prioritize proactive risk mitigation by diversifying suppliers, creating contingency plans, and updating strategies regularly.

Suggestions of Areas for Further Research

This study assessed the effect of supply chain resilience on performance of food and beverage manufacturing firms in Kenya. It is recommended that a similar study expands the scope to focus on other manufacturing sector to establish whether supply chain resilience issues cuts across the entire manufacturing industry. The study focused on supply chain resilience among food and beverage manufacturing firms in Kenya. It is recommended that a different study analyses other aspects apart from the four aspects of supply chain resilience utilized in this study that would be influencing performance of food and beverage manufacturing firms in Kenya. It is also suggested that a similar study focus on a different sector apart from the manufacturing sector to assess how supply chain resilience affects the performance of other diverse sectors in the country.

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