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Effect of Supply Chain Resilience on Performance of Manufacturing Firms in Mombasa County

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ABSTRACT

Supply chain resilience (SCR) is a crucial factor influencing the performance of manufacturing firms, especially in regions prone to economic and logistical disruptions. This study examines the effect of SCR on the performance of manufacturing firms in Mombasa County, Kenya. It employs a theoretical foundation comprising the information processing theory, dynamic capability view, resource orchestration theory, and strategic choice theory to evaluate key SCR indicators, namely risk management, collaboration, agility, and diversification. A descriptive research design was adopted, targeting 100 manufacturing firms, with data collected from 80 supply chain managers. The study utilized both primary and secondary data, analyzed through SPSS and multiple linear regression models, to establish the impact of SCR on organizational performance. Findings indicate that risk management significantly reduces production costs and enhances customization capabilities. Collaboration fosters efficiency, enabling firms to meet customer demands and improve supply chain synchronization. Agility aids in timely adaptation to disruptions, while diversification strengthens supply chain flexibility and mitigates supply risks. The study concludes that SCR positively affects profitability, competitiveness, and customer satisfaction, recommending that manufacturing firms adopt strategic SCR frameworks to enhance operational efficiency. Future research should explore the role of technology and policy frameworks in advancing SCR strategies.

INTRODUCTION

Background of the Study

Global business models have been impacted by the COVID-19 pandemic (World Economic Forum, 2021). In reaction to the COVID-19 epidemic in 2020, a number of nations locked their borders and cities, making it more difficult for people and goods to travel by land, sea, or air. Corporate offices and factories were forced to temporarily close due to a labor shortage, which interrupts 86% of global supply chains (SCs) (Van Hoek, 2020). SC resilience, also known as SCRES, is an essential sustainability strategy because of these disruptions (Ivanov, 2021). Mackay *et al.* (2020) distinguish resilience and adaptability as reactive adaptive capacities and proactive absorptive capacities, respectively. Robustness can resist or prevent changes, whereas flexibility enables adjusting SC activities and responding to changes. Regarding the influence of SCRES on performance, some studies have shown that SC agility, robustness, and collaboration all have a favorable effect on a firm's business success (Chan *et al.*, 2017; Pradabwong *et al.*, 2017).

According to Chowdhury and Quaddus (2017), SCRES is defined as "the characteristics of a well-designed SC network with proactive and reactive capabilities, which enables the SC members to reduce the probability of disruptive events (or to reduce their impact)" in order to help the organization move toward a stronger and more sustainable state. A robust system should be able to sustain interruption given the system's uncertainty and unpredictability (Asokan *et al.*, 2017). According to Mackay *et al.* (2020), resilience is a result of robustness; resilience is the absorptive ability that a robust SC uses to prevent visible performance loss in the event of a disruption. This capacity consists of two dimensions: resistance and avoidance. Supply chain (SC) disruptions are often brought on by risks associated with trade policy uncertainty, extreme weather, cybercrime, and conflict. Global value chains are negatively impacted by these disturbances, which have an impact on all participating industries. For instance, 90% of the US and European auto sectors were forced to halt production in 2020; also, the cost of international freight increased by 330% yearly; and global trade fell by 8% (BCG, 2021).

Building SCR is difficult and frequently fraught with problems. According to Gartner's data from 2022, only 21% of SC firms think their networks are extremely resilient (Gartner, 2022).

Organizations are gradually aiming to realign their lean SC networks to support their risk tolerance by creating upstream and downstream network design techniques. Resilient SCs must engage with both internal and external partners to respond to disruptions and even rebuild the SC network in order to achieve full recovery. However, to maintain SC dynamic continuity through balanced resilience, one must make a trade-off between avoiding profit erosion from overinvestment and building up enough capacities to counteract susceptibility to overexposure to risks.

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Global Perspective on Supply Chain Resilience and Performance

The global supply chain corporate is increasingly becoming composite due to the demand of resources compared to the locale vulnerability thus difficulty of service provision. Exterior factors like pandemics and natural calamities similarly influence the supply chain service provision adversely obliging intervention from various sectors to ensure business operations continue efficiently. An example is the recent worldwide COVID-19 outbreak that brought undesirable implications to the economic and social pillars, noted by the prompt drop in global GDP. In order to mitigate the effects of these economic disruptions, thorough interposition along with outstanding risk management strategies is necessary. The ability of the company to quickly identify, evaluate, address, and investigate the risk factors determines how well different businesses function in the end. This COVID19 outbreak posed environmental uncertainties, representing a serious danger to corporate survival and long-term development. Gaining a greater understanding of how to achieve firm performance sustainability while minimizing the negative effects of supply chain interruption on company performance is important.

A resilient supply chain can overcome obstacles to satisfy the changing demands of consumers and shareholders, among other industry stakeholders. Disruptions are inevitable. As a result, being able to foresee supply chain interruptions is crucial for any organization. Distribution networks are associated with a number of risks, which fall into two groups: disruption risks and operational risks (Feng & Yang, 2020). Operational risks are inescapable uncertainties that include fluctuating supplier behavior, erratic client demand, and unclear cost structures. Disruption risks are significant interruptions caused by man-made or natural disasters like hurricanes, tornadoes, earthquakes, terrorist attacks, or financial crises like currency fluctuations or strikes.

According to Negri *et al.* (2021), supply chain resilience is best defined as an organization's ability to anticipate and plan for future ambiguities, adjust to diverse risk variables, and recover from numerous internal and external blows. According to Negri *et al.* (2021), uncertainty in future prediction of supply chain resilience imposes adequate research on viable measures to counter the havoc that has often led to adverse effects on supply chain entities like insolvency. Such catastrophes include poor weather conditions, inaccessibility of certain regions, prolonged power outages, bankruptcy, and disappointments from financing subcontractors, outbreak of pandemics, fire incidences, and internet crimes.

As stated by the International Monetary Fund (IMF), the COVID-19 epidemic had a rapid and significant impact on Chinese enterprises and their supply networks. The Chinese economy experienced a loss in 2020, as a result the country's 1.2% GDP growth, decreased to 4.9% from the previous year. This Black Swan Event has created a number of uncertainties that have negatively affected the global supply chain, including increased supply chain unpredictability, workforce shortages, cost increases, and cash flow issues (Gustafsson & Verma, 2020). The Financial Times reported that the shortage of Chinese parts impacted global commerce and industry, causing supply chain disruption for American and European automakers in a matter of weeks. Thus, it is essential to understand ways to mitigate the negative effects of supply chain disruption on business performance.

A Nikkei survey conducted in March and April of 2021 determined that over 80% of Japanese manufacturers started to diversify their supply chains. This is due to the COVID-19 pandemic exposing the risks of highly efficient industrial methods (Nikkei, 2021). Similarly, in an attempt to build a more reliable future, 59% of Hong Kong's corporate decision-makers diversified their businesses between 2018 and 2020 (HSBC, 2020). Having a backup plan for suppliers and customers in case of unforeseen situations allows a company to stabilize supply and demand since diversification increases operational flexibility.

Supply chain resilience refers to a company's capacity to bounce back from setbacks while continuing to fulfill customer needs and perform its core operations. Supply chain agents and policymakers should work together to create a collaborative plan to become resilient, supported by the supply chain's strategic review, which could assist in reducing the chance of unanticipated events (Vanpoucke & Ellis, 2019).

It is imperative to acknowledge that the establishment of resilience necessitates costs and resources, and it may pose difficulties for companies in terms of profit-sharing. It can be challenging to assess the kind and severity of disruptions that these companies have been able to avert attributable to their supply chain resilience skills, according to Pettit *et al.* (2019). SCR is made up of several interconnected parts, one of which is risk management, which is the process of recognizing, assessing, and minimizing risks in the supply chain, including disruptions in suppliers, natural disasters, unpredictable geopolitical events, and changes in demand. Agility is the capacity to quickly adapt distribution, sourcing, and production plans in reaction to unforeseen circumstances or shifting market dynamics. Collaboration includes building solid connections, promoting visibility throughout the supply network, and facilitating efficient coordination and information exchange amongst supply chain participants. Businesses can handle risks and supply chain disruptions more effectively by diversifying their supplier chains. Diversification of the supplier base, for example, can spare companies from having to halt production due to disruptions in the supply. Grant and Stolt (2020) define supply chain resilience as including risk resistance, recovery, management, and the development of solutions for extreme supply network events.

Regional Perspective on Supply Chain Resilience and Performance

Africa's developing countries are particularly prone to

political instability, including post-election violence and rebel activity, as well as bribery, inadequate transit systems, corruption, and other unethical business practices. A few years ago, Uganda experienced a severe crisis in its supply chains for gasoline and raw materials, which caused production and delivery of several goods and services disrupted. Among various supply chain risks, epidemic breakouts are particularly notable because of their long duration, rapid spread, high degree of unpredictability, and simultaneous interruptions to supply, demand, and logistical infrastructure (Ivanov, 2020). The adaptability and robustness of agile supply networks distinguish them. According to Abdelilah *et al.* (2018), flexibility is the capacity for adaptation and versatility, whereas agility is the emphasis on the pace at which a system needs to adjust. As such, flexibility is a necessary precondition and component of agility. Supply chains are crucial in reducing the damage caused by disasters because they facilitate the delivery of supplies to customers in need and guarantee the efficient operation of recovery (Banikoi *et al.*, 2018).

Two important SCR techniques are agility and robustness. Two dimensions are believed to make up SCR, according to Macdonald *et al.* (2018): vulnerability and capability. The capability dimension includes frequently mentioned elements including prediction, flexibility, responsiveness, recovery, and learning capacity. Manufacturing businesses must therefore modify their processes to be flexible both inside and outside the company in order to participate in this global market system while retaining their standing in the current markets (Hasan *et al.*, 2018).

According to Han, (2021), adaptive resilience established via cooperation, visibility, velocity, and flexibility helps lessen the effect of unanticipated risks in the supply chain. These risks encompass those connected to leadership, labor, the environment, safety, and quality (Parast *et al.*, 2019). Ivanov and Dolgui (2019) contend that complex networks are more prone to massive disruptions, which could upset supply chain structures and have an impact on the structural dynamics of the chain. They encourage better communication and transparency throughout the supply chain in order to reduce the resulting impacts of uncertainty. The modification of SC is necessary, and network-wide stakeholders must be engaged. Instilling a culture of risk reduction inside a company and using lean and agile SC are also crucial (Grant & Stolt, 2020).

Local Perspective on Supply Chain Resilience and Performance

In Kenya, the situation is not different; threats to SC included global pandemics, supply chain disruptions, and technological innovation. Mombasa County encompasses a wide array of network organizations that entail supply chain management, ranging from manufacturing, procurement, clearance and forwarding, wholesale and retail organizations, microfinance, among others. In particular, the Kenyan government views manufacturing companies as a crucial pillar of its growth plan. Kenya Vision 2030 states that one of the pillars of economic development is the manufacturing sector (Government of Kenya, 2018). The sector, which makes up 20% of Kenya's GDP, is expected to be essential to the nation's economic expansion (KAM, 2015). Presently, 13% of all occupations are directly associated with the manufacturing industry, employing 280,300 people. An additional 1.6 million people, or 20% of the labor force, work in the industry's unorganized sector (KAM, 2015).

According to Goldbeck, Angeloudis, and Ochieng (2020), in order to maintain control of their network, these companies need formulate and execute effective plans. Manufacturing firms constantly need to scrutinize and manage the looming risks in supply chain management by augmenting resilience performances. A more robust supply chain, according to Goldbeck, Angeloudis, and Ochieng (2020), encourages purposefulness while lowering financial risks and possible conflicts of interest. Kenya's manufacturing sector is mostly agro-based and is distinguished by low levels of employment, export volume, value addition, and capacity utilization, in part because of its limited connections to other industries. Ninety-five percent of Kenya's manufactured goods are basic things including food, beverages, building materials, and basic chemicals; just five percent of manufactured goods, such pharmaceuticals, are produced through skill-intensive operations.

Statement of the Problem

Certain features of the supply chain such as compliance, flexibility, collaboration, robustness and customer appreciation are essential for the operations of many firms. This pattern suggests that the majority of successful companies manage compliance to various external circumstances with the primary objective of satisfying customers, and they employ high levels of supply chain resilience to help lower risk factors (Dubey *et al.*, 2021). Previous researches highlighted that agility; system integration, collaborative processes, and information sharing have a positive impact in reducing risks, according to a case study conducted in Malaysia. On the other hand, Awwad (2018) on Toyota`s theory of resilience, investigated on enablers of SCR in Toyota where the research addressed stakeholder collaboration as a major influence. Ungerer's (2021) investigation into Covid19, which also measured the effect of lockdown on businesses, brought attention to the necessity of examining the relationship between SCR and firm performance. Moreover, Delloite's (2021) investigation focused on resilience techniques employed by Kenyan organizations. Consequently, prior studies have assumed that the resilience of the supply chain, or its ability to survive disruptions, positively impacts performance outcomes.

However, a number of factors, including technological advancement, financial risk, political unrest, increasing regulatory pressure, labor strikes, acts of terrorism, drought incidents, and the influx of counterfeit goods, pose a threat to Kenya's manufacturing sector's supply

chain (Transparency International, 2020). The COVID-19 pandemic has had a profound impact on trade, banking, health, education, enterprises, and society more than other worldwide upheavals in the past century. It should come as no surprise, then, that only 2% of the companies surveyed by Ernst and Young LLP (2020) claimed to be completely prepared for the pandemic. A total of 57% were affected by serious disruptions, and 72% of them indicated a negative impact (17% indicating a very negative impact and 55% largely negative). Similarly, Transparency International (2020) contends that some supply chain risks, including as political unrest, including rebel activity and violence following elections, bribery, corruption, and other unethical corporate practices, are more likely to affect developing nations. Therefore, there hasn't been much knowledge about the financial and strategic benefits of having a resilient supply chain that is, the ability to acquire and manage resources and use them to minimize disruptions to operations. Since managers are not well-versed in the financial advantages of supply chain resilience in the face of varied degrees of disruption, it was unfortunate that this information was missing from the literature. This gap is validated by Ngera *et al.* (2018) research on impact of supply chain resilience on hospital performance in Kenya, with a particular emphasis on the country's pharmaceutical and medical equipment industries. Therefore, this research will seek to address the question; what is the effect of supply chain resilience on performance of manufacturing firms in Mombasa County in Kenya?

LITERATURE REVIEW

Introduction

This section clearly described additional scholarly materials that provided insight regarding this study, particularly various variables and their implications on general organizational performance. Theoretical frameworks that relate to supply chain resilience and how it influences the outcomes of different organizations are well were described in this section. A conceptual framework linking SCR and organizational performance was explored along with a review of empirical research investigations.

Theoretical Framework

This section reviewed theories that addressed how supply chain resilience affects organizational performance in relation to the following specific objectives: risk management, agility, collaboration, and the assessment of diversification's impact on manufacturing firms' performance. The study examined supply chain resilience using a number of theoretical frameworks, including information processing, dynamic capabilities perspective, resource orchestration, and strategic decision theory.

Strategic Choice Theory

Child (1997) asserts that the primary goal of strategic choice theory is risk control. The goal of developing and improving strategic choice theory (SCT) was to highlight the significance of managerial choice and to highlight the shortcomings of deterministic organizational orientations (Child, 1972). SCT holds that top management decisions have a greater impact on an organization than environmental factors do. According to the theory, a company's management team's decisions either can directly or indirectly influence how effectively the institution performs. The relationship between occurrences and organizational actions is taken into account by strategic choice theory. An entity's success or failure may be attributed, for example, to particular organizational preferences that make it easier to identify, analyze, and provide long-term compliance to the numerous uncertainties and risks in supply chain enterprises. Strategic choice theory's interactive approach is crucial to risk management because it illustrates the connection between environmental interaction and organizational performance as well as risk management.
However, the theory essentially views organizations as adaptive, flexible, and learning rather than determined by their environment. This idea focuses on how managers in organizations can incorporate agility in their decision-making to achieve the stated objectives. Strategic choice theory emphasizes elements that an organization can control more than resource-based theory. According to Scholten *et al.* (2020), there is a reasonable impact of supply chain executive choices and actions on the overall performance of a firm. Making strategic decisions is crucial to the implementation of an integrated risk management plan. You can use this model to see how decision-making, risk management, and overall performance are interconnected in manufacturing firms.
According to these theories, organizations ought to major on the resources within their reach to help in providing utmost services and achieving excellent customer satisfaction. An integrated risk management strategy needs to incorporate strategic choice theory, which helps a corporation understand how decision-making, risk management, and overall performance are all interlinked. The theory adds on to state that managers, through their decision-making and implementation of organizational policy changes, contribute significantly to the advancement of organizational performance.

Information Processing Theory

When Information Processing Theory (IPT) was initially proposed in the 1970s, intra-organizational design issues were the main focus of its application. It has since been expanded to include the inter organizational environment in order to clarify the dynamic interaction that exists between suppliers and buyers. IPT further contends that intra-organizational activities and the business environment are inherently characterized by uncertainty. In an open system, firms must constantly manage supply chain risks, including shifting consumer demand, unpredictable rivals, and uncontrollable disruptions from natural disasters or other catastrophic

events (Wang *et al.*, 2020). The ability of an organization to absorb information more efficiently can help reduce environmental unpredictability and improve overall organizational performance (Wang *et al.*, 2020). Supply chain resilience, as defined by the organizational information processing theory, is a processing mechanism that provides a stabilizing mechanism during disruptions. With this information processing theory focusing on collaboration that will ensure proper channels of communication between partners.

Information processing is therefore strategically crucial for firms to create robust supply networks. An increasing number firms are forming cooperative partnerships in light of the diverse range of markets, intense competition, and shortened product life cycles. Collaboration is a type of relationship between individuals in which all parties agree to pool resources and make decisions as a group to solve issues, accomplish shared objectives, fulfill social responsibilities, and maximize rewards. Through IPT, organizations can work together, which may result in increased customer satisfaction, agility, visibility, and quality of service as well as shorter cycle times. According to Wei *et al.* (2019), collaboration in supply chain can boost a company's performance and provide it a long-term competitive edge in a competitive market. In order to attain sustainability objectives from an economic, social, and environmental standpoint, supply chain collaboration has become a crucial strategic consideration for firms.

IPT states that a company can function at peak efficiency, especially in the event of a "Black Swan Event" such as COVID-19, if the information processing needs related to the disruption match the firm's information processing capability. The ability to effectively integrate and evaluate data is a crucial component of decision-making and the execution of strategies (Schippers & Rus, 2020). An essential facilitator of an organization's performance with regard to SCR is IPT. IPT makes the assumption that a firm is an information processing system with the primary goal of lowering environmental uncertainty through enhanced environmental information collection and processing capabilities.

Dynamic Capability View Theory

Supply chain resilience is viewed by Yu *et al.* (2019) as a dynamic skill that boosts a firm's competitive advantage by allowing the supply chain to effectively respond to, adapt to, and recover from disruptions. Teece *et al.* (1997) suggest that dynamic capacity theory which deals with adjusting to a market environment that is changing and evolving quickly was inspired by the resource-based view (RBV). In the event of unforeseen disruptions, dynamic capacity theory offers adaptability and agility, particularly for global firms with GSC structures (Chatterjee & Chaudhuri, 2021). The resilience of supply chains is strengthened when operations or business practices must adapt quickly in reaction to disruptions, as demonstrated by Ramos *et al.* (2021).

The use of SCR not only reflects the universality and specificity of essential elements that characterize dynamic capabilities, but it can also assist organizations in establishing knowledge creation procedures in a dynamic environment. This is the fundamental dimension of dynamic capabilities. The research of SCR is more applicable because of the features of dynamic capability theory. Wong *et al.* (2020) define SCR as the dynamic capacity to respond quickly to unanticipated events and recover quickly by preserving continuity of operations.

Teece (2017) defines dynamic capability (DC) as the ability to recognize opportunities and threats in the external environment, to adapt to these possibilities and threats, as well as the various resources and competencies needed to deal with them, and to ultimately take advantage of those opportunities. Actually, resilience capacity affects an organization's ability to adapt to environmental change in two main ways. First, the capacity for resilience enables businesses to develop a variety of standard operating procedures to manage complexity and unpredictability. Second, resilience capacity drives an organization to think more critically about its environment, which increases its ability to determine the kind and scope of the change. Dynamic businesses, institutions, and organizations are those that are more sophisticated and strategic when it comes to innovation and change, going above and beyond the typical capabilities required to smoothly run their daily operations (Bahrami & Shokouhyar, 2021).

In order to maintain a sustainable competitive advantage, businesses must internally develop valuable, rare, unique, organizational, and non-substitutable (VRION) resources, according to the resource-based theory (Dushime *et al.*, 2022). Dynamic Capabilities Theory (DCT) tackles these constraints. DCT takes into account both internal and external competencies, giving firms a foundation for strategic decision-making as well as alternate options. In the wake of COVID-19, its aftermath, and the geopolitical crisis brought on by the Ukraine War, organizations globally are facing huge hurdles in simultaneously achieving supply chain efficiency and reacting to quickly changing customer demand and buyer expectations (Tate *et al.*, 2022). Businesses are rapidly growing their global networks of suppliers, distribution centers, warehouses, and production facilities in response to both short and long-term challenges. To combat growing unpredictability and geopolitical risks they are raising inventory and storage capacity throughout their supply chain. In addition to mitigating the increasing risks within their supply chain, corporations want to efficiently and effectively meet customer expectations (Rapaccini *et al.*, 2020; Ardolino *et al.*, 2022). Resilience, then, is a dynamic capability that allows companies to function in a dynamic and unstable environment by continuously rearranging their resources and skills.

Resource Orchestration Theory (ROT)

According to Nemeh and Yami (2019), the Resource Orchestration Theory (ROT) emerged from the Resource-Based Theory (RBT). The primary critiques

and constraints of the Resource-Based View (RBT) approach pertain to the absence of clarification regarding the manager's involvement in the procedures and methods that convert resources into the capabilities of the organization. According to Carnes *et al.* (2017), innovation research has demonstrated a significant deal of interest in resource orchestration, which provides a systematic framework explaining how organizations coordinate their resources to achieve innovation (Li & Jia, 2018). Diversification can enhance the supply chain's resistance, flexibility, convertibility, and innovation, all of which can contribute to the enhancement of these characteristics. Supply chain diversity can assist businesses in maintaining their original operations and performance in an unpredictable and changing environment by enhancing the chain's resistance to risks. (Gomez *et al.*, 2021).

The resource orchestration theory states that companies need to properly orchestrate, configure, and use their resources in addition to having the necessary resources on hand. The three main operations that make up resource orchestration are: acquiring resources from outside the company, building up resources internally, and disposing off expendable resources.

The resource portfolio needs to be organized. Second, resources need to be combined into capabilities through process innovation to create new capabilities, small adjustments (i.e., stabilizing), or enhancement of current capabilities. Ultimately, there are three sub processes that must be used to leverage these capabilities: mobilization, which identifies the necessary capabilities; coordination, which integrates these capabilities into capability configurations; and physical deployment, which employs a variety of deployment strategies to physically place these capabilities in the product market. Li and Jia (2018) establish resource orchestration for innovation as "a process of arrangement of all enterprise resources and external resources" with the goal of generating combinative capabilities and using these freshly acquired abilities to problem-solving. Poor coordination might make it more difficult for an organization to adjust to changes (Sarker, 2017).

Hanelt, Bohnsack, Marz, and Antunes Marante (2021) assert that enhancing supply chain resilience is essential to enhancing their capacity to address supply chain risks. Businesses may better see their supply chains and spot risks by putting digital transformation projects into practice. Their supply chains will be stronger as a result, and they will be able to develop risk management strategies more skilfully. Digital transformation can improve supply chain resilience by enabling greater resource sharing and integration, state Faruquee, Paulraj, and Irawan (2021). Resource orchestration theory says that having resources and, more importantly, the ability to coordinate them is necessary for businesses looking to get a competitive edge.

Conceptual Framework

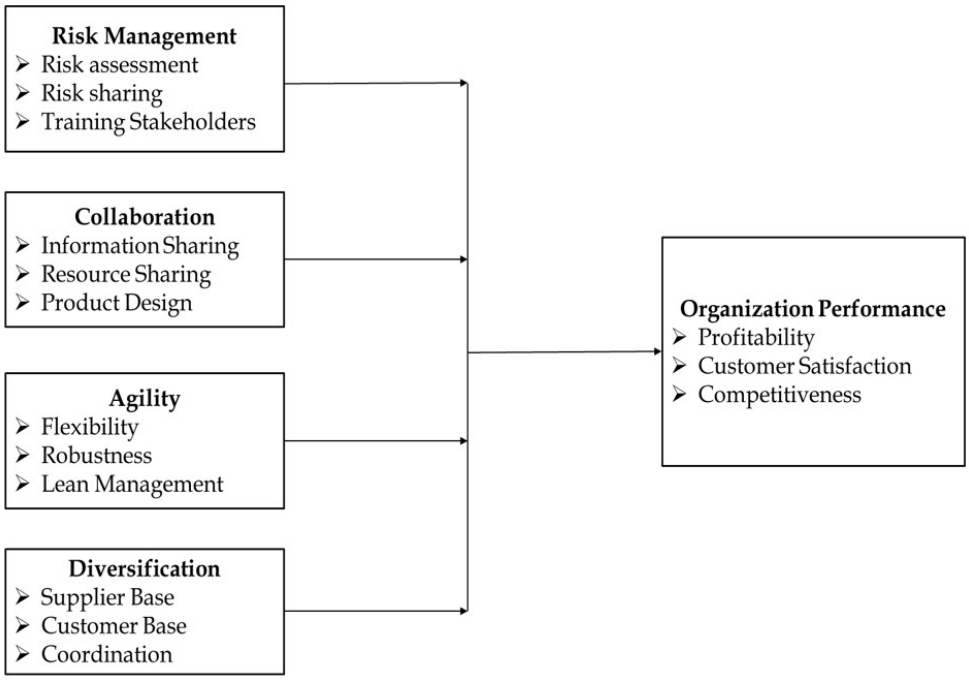

Figure 1; Conceptual framework

Empirical Review

According to Awwed's (2018) findings, Toyota's supply chain was improved by working with stakeholder initiatives, reducing risk, redesigning the supply chain, and being flexible. The COVID-19 pandemic caused significant disruptions to global supply networks, which was unanticipated and required a high degree of supply chain resilience (Ivanov, 2020; Paul & Chowdhury, 2020). Adobor and McMullen (2018) distinguish three categories of supply chain resilience: engineering, evolutionary, and

ecological resilience. Engineering resilience primarily addresses supply chain velocity and visibility in relation to supply and demand volatility, as well as supply chain efficiency, management, and optimization.

Ecological resilience is the ability of an organization to leverage diversity and additional capacities in its supply chains to lower redundancies and boost adaptability. Evolutionary resilience is the ability of a supply network to bounce back after being disrupted. Hosseini, Ivanov, and Dolgui (2019) assert that a supply chain's resilience is determined by its capacity to take in, modify, and replenish. Yang *et al.* (2021) additionally determined that a company's supply chain resilience is influenced by its ability to manage supply chain risks. This suggests that companies with robust supply networks can manage risks and carry on with business as usual even in the face of major interruptions.

The resilience of the supply chain can be significantly increased by encouraging increased collaboration and trust among its members (Dubey *et al.*, 2020). Utilizing technological improvements and integrating information flows and procedures into a chain can help to foster supply chain resilience (Kwak *et al.*, 2018). This allows firms to effectively respond to changes, opportunities, and threats. Furthermore, it has been discovered that resilience and agility are complimentary dynamic qualities that enhance proactivity and are connected to supply chain performance and sensing ability in the context of humanitarian supply chains and relief operations (Altay *et al.*, 2018). Supply chain resilience, according to Yu *et al.* (2019), can be seen as a rational organizational response to a supply chain's dynamism.

Pettit *et al.* (2019) conducted an empirical evaluation of a study on SCR and discriminated between vulnerability and capability factors as SCR predictors. Capability elements are indicators of successful SCR outcomes, implying that as capabilities increase, the resilience triangle contracts and the cost of disruption decreases as well. A system's resilience to external shocks might be hindered by vulnerability factors. Liu (2020) examines the four internal capabilities in China: information management, operation flexibility, resource redundancy, and robustness. All of these features have a beneficial impact on SCR. According to Hosseni *et al.* (2019), a firm's production and supply chain network resilience are necessary to combat epidemics and other disruptive events. In the downstream supply chain, disruptive events may result in delivery delays and material shortages. These issues may have an adverse impact and reduce performance in terms of income, process productivity, and service quality (Dolgui *et al.*, 2020).

In his investigation of the operations of pharmaceutical manufacturing businesses concerning supply chain stability, Ochieng (2018) found that the resilience approaches most frequently employed are reengineering, lean and agile supply chain integration, and risk management. Diversified supply bases give firms a steadier stream of supply, preventing idle capacity due to a shortage of manufacturing inputs during the pandemic. Their capacity utilization can therefore be raised. A steady income stream can also be maintained by firms by having inventory on hand for manufacturing, this is made possible by consistent supply streams. In addition, firms can avoid penalties and backlogs caused by unfulfilled orders from customers by keeping a diverse supply base. These elements have been especially crucial during the global epidemic because of the lockdowns that have been imposed everywhere. In the event of a pandemic, companies lacking a diverse supply chain could not even be able to generate revenue, as profitability evaluates how economical a business is at supplying goods to the market.

Critiques for the Existing Literature

The effects of the development of supply chain risk management (SCRM) on the resilience of the supply chain and its influence on several antecedents of the SC resilience are examined by Liu *et al.* (2021), Soni *et al.* (2020), and Christopher and Peck (2016). According to Christopher, Peck, Sheffi, and Rice, SCRMC can be seen as an organizational resource that aids businesses in swiftly recovering from disruptions and adjusting to changes in the environment. This could enhance organizations' performance in risk management and, consequently, boost overall firm performance. Risks must be identified and addressed throughout the supply chain network in order to enable the adoption of a backup plan and supplier assessment, which will lessen the impact of risk and boost supply chain resilience.

Aityassine *et al.* (2022) state that collaboration across the SC partners is essential for continuing risk detection and mitigation. It enhances joint planning amongst SC partners, facilitates easy real-time information exchange, creates synergies, and enhances the capacity needed to respond swiftly to SC disruptions. Partners that collaborate well are able to learn together and produce knowledge that is mutually beneficial. As a result, collaboration helps SC partners to react rapidly to changes and prepares for disruptions. Furthermore, collaborative initiatives, such as collaborative planning, forecasting, and restocking (CPFR), joint product development, mutual knowledge creation, and so on, provide accurate, real-time data on the movement of products throughout the SC, improving the ability to manage disruptions. Put in other words, strong collaboration across SC members is a prerequisite for achieving resilience, and doing so will enhance organizational performance.

Agility, according to Sadikoglu and Demirkesen (2022), is the capacity to quickly adjust to the constantly shifting demands of the market. It enables businesses to react quickly to a disastrous situation brought on by an unforeseen disruption. Flexibility in SCs refers to a company's capacity to manage unanticipated disruptions in SCs using its current capabilities (Kamalahmadi *et al.*, 2022). To improve resilience in the event of unplanned interruptions, SCs must be adaptable enough to react to disruptions and recover from them with the least amount

of negative impact on operations and customer timely delivery (Hsu *et al.*, 2022). Capacity and stock planning are crucial for improving the robustness of SC procedures (Lopes *et al.*, 2022). The ability to be adaptable in capacity planning and having a safety stock in place for unexpected events in the SCs guarantee that the SC processes can go on while addressing issues in the background (Ozdemir *et al.*, 2022).

Akintokunbo and Victor (2020) conducted a theoretical investigation on the ways in which COVID-19 impacted supply chain disruption and the strategies employed. This work demonstrates how online data, when combined with other information, can be useful for real-time policymaking. Supply networks are more fragile and vulnerable to items that travel great distances before being sold to customers during COVID-19, according to the research.

Research Gap

A lot of academics have moved from figuring out the causes and likelihood of each supply chain disruption to a more consequence-driven approach because the chance of a major disruption in the chain is very low and difficult to identify. Creating various resilience assessment instruments to gauge the level of resilience of a business's supply chain network and introducing resilience investment talks into regular S&OP/IBP meetings are two other tactics recommended by experts in the field (Trepte & Rice, 2018).

Supply chain resilience has long attracted the attention of academics and business experts. It is clear that businesses must react quickly to unanticipated events, but research on resilience investment alternatives and their pricing is still lacking. The supply chain ecosystem, resilience investments, and the three resilience disruption characteristics components (Macdonald *et al.*, 2018) are examined in order to identify the critical factors impacting resilience. This establishes the basis for calculating the investment required to implement resilience in the supply chain. There is still a lack of research offering a technique to evaluate particular steps to take to increase resilience and quantify the required investments, despite efforts to develop new approaches to measure and improve resilience inside an organization.

Summary

The literature review provided a thorough examination of critical variables in a variety of settings. In a highly diverse business environment, disruption and fluctuation were nearly impossible to ignore. Hence, distribution network managers needed to accept uncertainty and design a strategy to balance supply and demand while keeping costs low. Organizations were flexible and adaptive to thrive in a comparable environment, which aids in the construction of an advantageous element for the organization to stay a step ahead of others, hence positively boost their profit margin.

MATERIALS AND METHODS

Research Design

According to Andrew Kirumbi (2018), a research design is a set of methods and processes used to collect and analyze measurements of the variables specified in the issue statement. This study involved descriptive research design that provided adequate data to help make inferences and majorly involved field surveys, interviews and questionnaires. A research design is a thorough strategy that outlines how a study will be carried out with the data needed to successfully answer the research questions. It also serves as a framework that directs the collection and analysis of data. It served as an explanation of the purpose, methodology, and organization of the inquiry, which sought to identify or address a variety of concerns (Ngozwana, 2018).

The absolute shortcoming was that the validity of the information was not verified as the respondents' accurate data. To reduce inaccurate data, the researcher talked to the respondents and informed them that the information was purely for research and was useful to them in the long run. Building the rapport resulted into massive turnout and positivity amidst the respondents. The primary objective of this study's descriptive research approach was to determine the relationship between supply chain resilience and organizational performance in manufacturing firms located in Mombasa County.

Target Population

According to Boura *et al.* (2019), the target population is the broader group from which a sample is taken and consists of all instances of people or organizations exhibiting specific characteristics. The study's formal target population consisted of registered manufacturing firms in Mombasa County, Kenya. The study investigated the 100 Mombasa County manufacturing firms that were officially registered. The Kenya Manufacturers Association (KAM) members made up the list. The unit of observation concentrated on senior staff members involved in supply chain systems within each of the 100 manufacturing firms that made up the target population. A random sample approach was used to select 100 supply chain managers from two types of manufacturing firms mineral-based and food-processing who made up the study's population of 100 manufacturing firms.

Sample Size and Sampling Technique

According to Allen (2020), the total number of participants is the sample size for a given study. The sample frame is the total number of people with an equal chance of being included in the study sample size. In the table above, our sample frame was 100 supply chain managers from formally registered manufacturing firms in Mombasa County. The probability sampling method was applied in this instance. The least biased of all the selection techniques was stratified random sampling; there was no discrimination and each member of the

population had an equal chance of being chosen for the research. In this study, Yamane's sample size estimate for cross-sectional research was used, Harper and Yamane (2021). 80 respondents were found using the formula, as indicated in table 1.

$n = N/(1+Ne^2)$

Where N- Target population= 100, n- Sample Size and e- error margin (0.05)

Hence: $n = 100/(1+100\ (0.05)^2) = 80$

From the calculation above, the study sample size was 80 participants.

Data Collection

The process through which a researcher gathers information for a study is referred to as data gathering (Bhat, 2019). Both primary and secondary data were used in this investigation. Well-structured questionnaires with closed-ended and Likert scale items were utilized in this study to collect variable and demographic data, respectively. For accuracy, predetermined questions with precise responses were substantially used in the study. Besides, flexible questions helped the respondents' express certain views that aided in data analysis and inference fortitude (Namdar *et al.*, 2018). The questionnaire is divided into two sections, one for each of the study's specific objectives. While Section B looked at the effect of supply resilience on manufacturing firm performance, Section A contained general information on the respondents (managers position, job experience, and education level) as well as contextual factors.

Data Analysis and Presentation

Response Rate

The study employed a census-style research approach, which involved counting each research participant. As a result, 100 surveys were given out to responders in addition to the sample frame. From the 100 questionnaires, 78 were accurately filled and sent back. This revealed a 78% response rate that was appropriate for analysis. 22 questionnaires, or 22% of the total, were never filled out by respondents and were never returned. The outcomes were shown in table 1.

Table 1: Response Rate

Questionnaires	Frequency	Percentage (%)
Responsive	78	78
Non-Responsive	22	22
Total	100	100

Reliability Results

Cronbach Alpha's thumb rule is that dependability increases with alpha's proximity to 1.00 (Lishenga 2021). Cooper and Schindler (2017) define reliability as the data's dependability, consistency, and stability. Reliability study was conducted using Cronbach's alpha to evaluate the survey concept. The most popular reliability coefficient, Cronbach's alpha, measures the internal coherence of the test as a whole and the relationship between each test item and all other test items in order to assess internal consistency. A coefficient between 0 and 1.00 was used to express this relationship.

Results were genuine and dependable in order to be used in subsequent research steps. The impact sizes guideline given by Lee *et al.* (2019) and Morris (2019) adhered. An acceptable reliability cutoff of 0.7 was employed during the study finding. With Cronbach Alpha values of 0.861, 0.772, 0.795, 0.862, and 0.867 for risk management, collaboration, agility, diversification, and performance, respectively, the pilot study demonstrated a high degree of reliability. According to Sekaran and Bougie (2017), basic research can tolerate a coefficient of larger than or equal to 0.7. The reliability findings for the thesis were displayed in table 2.

Table 2: Reliability Results

Independent Variables	Cronbach Alpha	Number of Items	Conclusion
Risk Management	0.861	78	Acceptable
Collaboration	0.772	78	Acceptable
Agility	0.795	78	Acceptable
Diversification	0.867	78	Acceptable
Dependent Variable Performance of Manufacturing firms	0.824	78	Acceptable

Regression Analysis

Regression analysis was employed in this study to investigate the relationship between the independent and dependent variables. The performance of the organization was the dependent variable in this study, whereas risk management, collaboration, agility, and diversification were the independent variables. When the link between the dependent and independent variables was analyzed at the 1.00 level of significance, the R-Square, or coefficient of determination, was utilized to show the percentage of changes in organization performance that could be attributed to the independent variables.

Table 3: Regression Coefficients

Coefficients[a]					
Model	Standardized Coefficients		Unstandardized Coefficients	T	Sig.
	B	Std. Error	Beta		

1	(Constant)	.5	.501		0.5	.001
	Risk Management	.430	.127	.098	.498	.029
	Collaboration	.370	.237	.094	.326	.041
	Agility	.456	.191	.781	.437	.006
	Diversification	.175	.095	.475	.345	.047

a. Dependent Variable: Financial Performance

The regression model that connects the dependent and independent variables is solved by the coefficients in Table 3 above. Each variable had a significance value of less than 0.05, showing the importance of the results, as seen in Table 4.16 above, which looks at the coefficients' significance at the 0.01 significance level. Additionally, every variable in the table showed a positive coefficient, suggesting a positive correlation between the independent and dependent variables. As a result, the regression model is created using these coefficients. The Organization's Performance (Y): 0.5 β0+ 0.430 PR1 + 0.370 SA2 + 0.456 MA3 + 0.175 LA4 + Ɛ.

Summary, Conclusions and Recommendations

Summary of Study Findings

Effect of Risk Management on Performance of Manufacturing Firms

The majority of respondents, according to the analysis of the thesis data, claimed that risk management reduces manufacturing costs since it increases and maintains firm productivity. It was observed that risk management had improved by 60% the identification and maintenance of risk registries for efficient operation. According to the analysis of the results, risk management facilitates the distribution and pooling of risks among supply chain participants, which has an effect on the resilience of the supply chain and the performance of Mombasa County manufacturing companies. The results of the thesis showed that risk management has made it easier to identify and mitigate risks, and that it raises the quality of customer service in manufacturing companies. The performance of manufacturing firms in Mombasa County was impacted by risk management, as indicated by the mean of 3.6 and standard deviation of 1.1. The results validated Ambe's (2021) claim that agile supply chain strategy had a major impact on business performance.

Effect of Collaboration on Organization Performance of Manufacturing Firms

The findings of the research thesis revealed that suppliers of manufacturing firms are involved in the initial stages of product design in the organization while the collaboration and supply engagement protect the manufacturing firms' supply chain from risks. It was noted that there was a well-coordinated response between manufacturing firms and their suppliers by ensuring customers' demands were met in the organization. It was found that that supply collaboration and partnership increases efficiency in the organization. The majority of respondents agreed that collaboration has a significant impact on the performance of manufacturing firms in Mombasa County, according to the aggregate mean of 3.7. The standard deviation of 1.2 suggested that the data was spread around the mean. According to Birhanu *et al.* (2022), the study's thesis supported the finding that implementing a collaborative approach to supply chain strategy performance improves a company's competitiveness and market position relative to its competitors.

Effect of Agility on Organization Performance of Manufacturing Firms

The results of the thesis demonstrate that the implementation of agility has allowed manufacturing firms to create a continuous flow of production. This has allowed the manufacturing organization to enhance customer service, which in turn has improved supply chain performance. The results demonstrated that agility allowed manufacturing organizations to determine when and how to respond to the level of risks, and 70% of respondents admitted that robustness has allowed organizations to determine their inventory level because an organization's adoption of agility helps to maintain operational levels that minimize costs by storing parts or products at distribution points closer to the customer.

Effect of Diversification on Organization Performance of Manufacturing Firms

The thesis results revealed that that the coordination in supply chain improves manufacturing firm is responsiveness to market change while diversified supply improves the capacity utilization of firms. Manufacturing companies in Mombasa County performed better because of varied supply bases, which allow them to maintain inventory for production, and flexibility, which benefits businesses with a wide range of customers. According to the overall mean of 3.8, manufacturing businesses' performance is significantly impacted by diversification.

Organization Performance of Manufacturing Firms

The thesis findings revealed that the manufacturing organization had improved on customer satisfaction. It was noted that the organization achieved its annual targets and the market shares of the manufacturing firms have been increasing in the last 5 years as the organization deliveries were timely. From the study findings, it was noted that the organization operational costs have been low in the last 2 years whereby 51% of the respondents cited that their firm is profitable and the organization revenues had been increasing in the last 5 years. With a mean score of 4.4 and a standard deviation of 1.747,

the findings indicated that the respondents believed the organization had achieved its yearly goals. Lastly, the study's findings indicated that the company's earnings had increased during the previous five years, with a mean of 3.8 and a standard deviation of 1.4.

CONCLUSION

Following the research thesis results and outcomes, the following conclusions were reached. It was concluded that risk management reduced manufacturing costs of the manufacturing firms in Mombasa County. The study also concluded that risk management enhances risk registry identification and maintenance for effective performance and that risk management makes it easier for supply chain partners (SCP) to distribute and pool risks. The study concluded that supplier engagement and collaboration protects the organization against supply chain risks. The study concluded that the company has well-coordinated responses with suppliers to ensure that customer expectations are fulfilled. While supplier collaboration and partnership increase organizational efficiency. It was concluded that the manufacturing organizations were able to decide when and how to respond to the degree of risks because of agility. From the finding of the research thesis, it was concluded that the organization operational costs had been low in the last two years and their firm was profitable as the organization revenues had been increasing.

Recommendation

The study's goals, conclusions, and findings are all in agreement with the recommendations made by the research.

In order for manufacturing companies to be completely responsive to customer demands the study suggested that they employ risk management measures. For example, integrating electronic data interchange to provide seamless communication with consumers.

Manufacturing firms should create a risk management policy that will assist the company in identifying risks, preventing them, and having remedial actions in place when they do occur.

The research thesis suggested that in order to provide flexibility in handling any order at any time, the management of manufacturing business organizations should work with other managements in the region to deploy additional machinery and equipment in the procurement department.

According to the report, companies should specifically create agility strategies to help their suppliers grow, including collaborative product creation, sharing and developing specifications, capacity building, reducing order cycle time, training and empowerment, and on-time product delivery.

In order to benefit from economies of scale in consolidation, the study advises manufacturing companies to delay the assembly or fabrication of their final products. Manufacturing companies should have a policy allowing for frequent product customization in order to stay up to date with evolving customer needs.

To reduce inventory waste and obsolescence, the report advises manufacturing companies to estimate demand, diversify their business, and utilize their workers.

Areas for Further Research

The impact of supply chain resilience on the operations of manufacturing firms in Mombasa County was examined in the study thesis. Future studies might concentrate on successful distribution networks and a range of industries. Additionally, this study focused on four supply chain resilience solutions: collaboration, risk management, agility on performance, and diversification on manufacturing firms' performance. Future studies can therefore consider other moderators like information, communication, and technology in addition to the legal system and governmental regulation. Furthermore, additional topics for future research might employ various research strategies and data gathering equipment, possibly triangulation.

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