Supply Chain Integration, Supply Chain Adaptability and Competitive Advantage of the Food and Beverage Industry in Kenya

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ABSTRACT

The disjointed nature of the food and beverage manufacturing sub-sector presents a significant challenge in relation to competitiveness. This is rooted in the lack of effective linkages in the internal and external supply chains and their adaptability. Consequently, the study also established the moderating effect of supply chain adaptability on the relationship between supply chain integration and the competitive advantage of food and beverage industry in Kenya. The study adopted a cross-sectional survey. According to the Kenya Association of Manufacturers (2020), there were 270 food and beverage industry in Kenya. The study’s target population was 73 food and beverage industry in Kenya. A two-stage sampling design was employed. In the initial stage, 73 food and beverage manufacturing firms were selected through stratified random sampling with the aid of the Nassiuma formula (2000). Subsequently, in the second stage, through purposive sampling, two participants were selected from the 73 food and beverage manufacturing firms to give a sample size of 146 respondents. These included the supply chain managers, procurement managers, operations managers, and finance managers. Primary and secondary data was collected through research questionnaires which were both structured and unstructured. The data obtained was analyzed using SPSS version 28. The reliability results showed that all the variables in the study had a Cronbach’s alpha value that was above 0.7, thus indicating adequate convergence and internal consistency. The data collection tool also passed the content validity test. The findings showed that there was a positive significant correlation between supply chain integration*supply chain adaptability and the competitive advantage of food and beverage industry in Kenya. The study concluded that the competitive advantage is anticipated to grow for every unit increase in supply chain integration and that supply chain adaptability moderates the relationship between supply chain integration and competitive advantage for food and beverage industry in Kenya. The study recommends that food and beverage manufacturers should leverage expertise to support and manage multiple processes and be able to identify exceptional collaborators internally with expertise and a network that spans several departments.

Keywords: Supply Chain Integration, Competitive Advantage, Supply Chain Adaptability, Upside Supply Chain Adaptability, Downside Supply Chain Adaptability

I.0 INTRODUCTION

Integration of the supply chain (SC) is considered to be one of the major factors in improving efficiency and increasing competitiveness (Farahani, Rezapour, Drezner, & Fallah, 2014). In addition, the integration of the supply chain is generally considered a vital contributor to supply chain efficiency, productivity, and competitiveness by both practitioners and researchers (Prajogo & Olhager, 2012). This research advances the development of supply chain integration (SCI) literature to the degree to which a manufacturer collaborates strategically with its supply chain partners and manages intra- and inter-organizational processes collaboratively to achieve effective and efficient flows of goods and services, knowledge, money, and decisions, to provide maximum value to the consumer for greater competitiveness. In their findings on the relationship between SCI and competitiveness, the authors note that prior research is inconsistent and that very few studies have concentrated on competitiveness.

Dubey, Altay, Gunasekaran, Blome, Papadopoulos, and Childe (2018) say that the company would be more efficient, profitable, and competitive if it used the adaptability of the supply chain in its manufacturing process. For this reason, companies adopting supply chain adaptability to improve
versatility in a manner that is not mandatory for a specific operating phenomenon may also lose out on prospective opportunities to penetrate a market area demanding greater sensitivity (Eckstein, Goellner, Blome & Henke, 2015). Greater volatility, as viewed by managers, is linked to a greater emphasis on flexibility and adaptability in the supply chain. This empirical evidence is in line with the results of other studies on manufacturing operations (Chan, Wang, Luong, and Chan, 2009; Whitten, Green, and Zelbst, 2012; Schoenherr and Swink, 2015), as well as the supply chain (Makris, Zoupas, and Chryssolouris, 2011; Feizabadi, Maloni, and Gligor, 2019).

Control of the flow of material for the products, the flow of finance, and the information flow are important to the performance of every supply chain (Eckstein, Goellner, Blome & Henke, 2015). For every supply chain to work well, these flows can't be stopped or changed in a way that doesn't waste resources or require spending money to fix problems. Particularly, much of the total expense is compensated for by the purchase of materials, processing, and delivery of goods, which is vital to customer service and overall competitiveness (Manders, Canils, & Paul, 2016). The growth of the capacity to handle the supply chain for modern firms is therefore a means of contributing to market productivity, performance, and, thus, competitiveness over competitors. Most of the growing improvements have been in the flow of information, which is made easier by the Internet. However, Jin, Vonderembse, Ragu-Nathan, and Smith (2014) found that the overall performance of web supply chains still depends on a continuous and effective physical order fulfillment method.

Adaptability or versatility is becoming an increasingly important principle for achieving competitive advantages in many areas of the whole supply chain (Purvis, Gosling, & Naim, 2014). Substantial changes in supply chain adaptability can be accomplished by the creation and use of strategic supply chain networks. In addition, globalization, modernization, and competitiveness demand less time for international delivery and/or procurement of goods and services (Wang, Mastragostino, & Swartz, 2016). In addition, it is difficult to forecast the demand for goods in many sectors in which consumers need a wide range of items. Companies are compelled to streamline corporate adjustments to pursue substantial, significant savings on cost, reduce production resource requirements, minimize cycle times, as well as minimize inventories, all while simultaneously enhancing their service (Dubey, Altay, Gunasekaran, Blome, Papadopoulos, & Childe, 2018).

Such activities evolve into enormous company management struggles, which include the optimization of manufacturing as well as logistics process frictions, and perhaps even the development of continuous material, financial, and information flows throughout the value-added system (Müller, 2010). These demands cannot be met solely through integration. Integration of the supply chain is an appropriate concept to fulfill these daunting criteria, including strategic and organizational preparation and management of material, financial, and service flows, along with related data and money flows across the supply chain (Sheel & Nath, 2019). A change in consumer focus can be accomplished by adjusting to this, as can the alignment of production supply with demand and consumption, the reduction of inventories along the value chain, and a versatile or adaptable and suitable level of output (Singh & Acharya, 2013).

The subsequent crucial driver of competitiveness in today's markets is a quick response to evolving demands (Sreedevi & Saranga, 2017). At the moment they speak, consumers expect their desires to be met. In order to win or retain market shares, businesses must also have fast response times to changing needs. Adaptability to the supply chain can be seen as a supply chain capability that helps to gain a sustainable competitive advantage and maximize profitability (Keddiss, Kainz, & Zoitl, 2015). Setting up and utilizing such supply chain networks is recommended to increase the adaptability of a supply chain. It is feasible to plan and control an essential part of an entire supply chain by configuring supply chain networks (Almeida, Conceiço, Pinto, De Camargo & Júnior, 2019).
2018). To get a high level of adaptability in the supply chain, different adaptability options can be set up in each supply chain system.

Integration of adaptable technology can produce rapid results while also promoting sustained growth in an increasingly dynamic and competitive trading environment (Biloslavo, Bagnoli, & Figelj, 2013); whereas rigid technology can have a negative impact on organizational efficiency by freezing the business into behavioral and market habits that are resolutely resistant to change (Vanpoucke, Vereecke, & Muylle, 2017; Naway & Rahmat, 2019). The need or requirement to eradicate redundancies in supply chain and logistical operations is not restricted to internal processes and activities due to the adaptability of the supply chain (Wong, Wong, & Boon-itt, 2013). The integration of suppliers focuses on integrating internal work processes with those of external material resource and service providers (Huo, 2012).

As a result of globalization, countless emerging global trading and transportation flows have arisen over the last decades, adding significant logistical obstacles to the organization of long-distance movements (Basso, D'Amours, Rönqvist & Weintraub, 2019). It calls for a much more adaptable strategy for exporting goods to overseas markets (Roh, Hong, & Min, 2014). Consequently, in order for products to be delivered to the right place, at the right time, in the right condition, and at the right price, it is important for companies such as haulers and logistics service providers (LSPs) to build adaptable delivery systems using transport and delivery centers in an optimum configuration (Dai, Che, Lim & Shou, 2020).

Consumers around the globe are increasingly looking for low-cost, high-quality products (Anderson, 2020). This phenomenon will tend to make it possible for standardized marketing mix approaches to be adopted across world markets (Katsikeas, Leonidou, & Zeriti, 2019). The standardization of the marketing program will enable economies of scale (Chiang, Kocabasoglu, Hillmer & Suresh, 2012) plus scope in production (manufacturing), logistics, and marketing, as well as cross-subsidy through the use of financial or monetary resources amassed in one region of the world to acquiesce to competitive struggles in another (Topolsek, Jereb & Cvahte, 2016).

2.0 LITERATURE REVIEW

2.1 Complex Adaptive Systems Theory

Complexity theory has its roots in natural science (Kauffman & Macready, 1995). On the basis of these examples, the theory of CAS can be considered a sub-discipline of the theory of complexity. As often defined in the research on complexity theory, which is relevant to companies (Axelrod, Axelrod & Cohen, 2001), complexity theory started as a method for recognizing non-linear phenomena in the humanities that have not been well explained in the Cartesian or Newtonian view of science. Complex adaptive systems, e.g., in computer simulations, where even simple systems appear to evolve and adapt to their situation in supply chain management (Ying-xin, 2010). An explanation of how complex systems, like societies and organizations adapt as well as evolve over time in response to both internal and external influences is provided by the Complex Adaptive Systems (CAS) Theory. The CAS Theory states that complex systems are made up of numerous interdependent components, and that these interactions determine how the system behaves as a whole.

As shown by Goldstein (2001), the CAS is distinguished by a capacity for self-organization and resides in a non-equilibrium state. Lansing (2003) positioned the research of CASs as a component of non-linear dynamic systems. It is also understood to mean that CAS is closely related to the concepts of self-poiesis, self-organization, and self-referencing. Supply networks consist of a variety of companies from a number of interlinked industries. These systems are subject to changing strategies and priorities in a dynamic and complex environment. In recent decades, when
confronted with a dynamic and complex environment, a variety of disciplines have adopted the Complex Adaptive System (CAS) approach in order to gain insight into important issues within their field of research (Pathak et al., 2007). CAS demonstrates the opportunities for integrating conventional Supply Chain Management (SCM) research into a formal body of knowledge while also providing a basis for creating, validating, as well as refining new ideas applicable to actual-world supply chains (Pathak et al., 2007).

Complex linkages between multiple vendors, manufacturers, assemblies, distribution companies, and retailers are also the standard for industrial supply chain systems (Pathak et al., 2007). While decision-making in such networks remains centered on quasi-complex assumptions, including linearity, buyer-supplier dyads, poor communication, static phenomena, fixed behaviors, and even un-adaptive individual company behavior, challenges are often concealed, creating plenty of space for identifying and enhancing fundamental processes (Pathak et al., 2007). In addition to handling the uncertainty inherent in the interconnectivity of their supply networks, companies have also started to understand the advantages of adaptive action. Choi, Dooley, and Rungtusanatham (2001), a seminal paper, looked at how the properties of CAS are expressed in supply networks. After this post, there have only been a few papers that use the CAS view of supply networks. This suggests that the SCM field has not yet enthusiastically adopted the CAS view.

A CAS is an integrated network of multiple organizations (or agents) that demonstrate adaptive behavior in response to changes in both the operating environment and the entity system itself (Choi, Dooley, & Rungtusanatham, 2001). Mutual system performance and action arise as a non-linear and complex function of a large variety of activities carried out in parallel by collaborative entities. The CAS is coevolving to the edge of chaos. Choi Dooley and Rungtusanatham (2001) explain coevolution, suggesting that the CAS reacts to and creates its environment in such a way that, as the environment changes, it can cause the agents within it to change, which, in turn, will cause other environmental changes. The CAS demonstrates dynamism as changes take place in the environment; this dynamism affects the system. Environmental factors that trigger changes to be adapted by the agents, influencing the way in which the agents view their environment or the scheme used by the agents themselves.

Complexity theory is also applicable at a number of levels, from individual-human, interpersonal, organizational, and community-based (Selviaridis & Spring, 2010). Some scholar-practitioners have come to use their understanding of complex theoretical principles to direct business and personal decisions in their own lives (Hearnshaw & Wilson, 2013). Complexity theory principles are also used for computer modeling, including agent-based modeling of organizational dynamics in particular (Nissen & Levitt, 2004). Quite often, though, the complexity theory of organizational change appears to be seen in organizational development-style approaches (Axelrod, Axelrod, & Cohen, 2001). Such types of approaches include a consultant who facilitates progress—often by explaining complexity theory as a metaphor for the members of the client group and then by initiating a dialogue where participants focus on potential changes in their company and their individual behaviors. Although a number of practitioners say that their practice is successful, careful analysis of the studies shows minimal efficacy.

The capacity of a supply chain to respond as well as adapt to evolving circumstances and demands is one use of the CAS Theory in the context of supply chain adaptability (Statsenko, Gorod & Ireland, 2018). Supply chains are intricate systems which are influenced by a variety of internal but also external factors, including shifts in consumer demand, advancements in technology, and prevailing state of the economy (Surana et al., 2005). In accordance with CAS Theory, a firm's ability to respond to evolving market conditions but also retain a competitive edge depends on its ability to adapt its supply chain (Yang, Huo & Gu, 2022). Embracing a CAS viewpoint enables
companies to comprehend how diverse internal or even external factors affect their supply chain and how to modify their supply chains to better address these factors (Dentoni, Pinkse & Lubberink, 2021).

The capacity to act swiftly and effectively in response to demand changes is a crucial component of supply chain adaptability (Surana, Kumara*, Greaves & Raghavan, 2005). Long-term success is more likely for businesses that can swiftly modify their manufacturing as well as distribution capabilities in connection to shifts in consumer demand (Hearnshaw & Wilson, 2013). Organizations can use CAS perspectives to identify the main demand drivers and create strategies for controlling and addressing them. The capacity to adjust to shifts in the exterior environment, including such technological advancements or changes in economic conditions, is another crucial component of supply chain adaptability (Adobor, 2020). Organizations can use CAS perspectives to recognize prospective disruption sources, then create strategic interventions for reducing these risks and seizing new business opportunities (Wieland & Durach, 2021).

Supply chain adaptability is not without its risks and difficulties, though, including the prospects for steadily increasing complexity as well as the danger of overstimulation (Espinosa et al., 2021). Organizations could perhaps carefully evaluate the both internal as well as external variables that may have an impact on their supply chain and develop strategies for quickly and effectively adapting to these factors in order to mitigate these risks while also maximizing the advantages of supply chain adaptability (Day, 2014). In this view, the CAS Theory contends that perhaps the ability of a firm’s supply chain to adapt to changing conditions and preserve a competitive advantage is essential for organizational success (Adobor & McMullen, 2018). Organizations can develop strategic approaches for managing as well as adapting to these drivers of change with the aid of CAS approaches (Van de Wetering, Mikalef & Helms, 2017). To minimize the risks as well as maximize the advantages of this strategy, nevertheless, meticulous planning as well as management are necessary.

Most supply networks arise rather than benefit from the purposeful creation of a single organization. Much of the SCM literature gives emphasis to negative feedback for control resolution (Choi, Dooley, & Rungtusanatham, 2001); however, evolving trends in the supply network can be best controlled by constructive feedback that allows for autonomous action. Imposing too much control undermines creativity and adaptability; on the other hand, allowing too much to emerge may undermine managerial predictability and job routines (Choi, Dooley, & Rungtusanatham, 2001). Furthermore, when managing supply networks, executives need to carefully weigh how much to monitor and how much to allow to materialize.

2.2 Supply Chain Adaptability

Liao, Hong, and Rao (2010) say that cross-functional and inter-organizational collaboration is all about being able to respond quickly and in a variety of ways to changing consumer and market needs. Supply adaptability may not occur at random. It’s the tactical benefit of investment, innovation, growth, and development over the years (Ivanov, Sokolov, & Kaeschel, 2010). With this reason, pressure on resources in the logistics network means that services need to be strengthened and extended in line with changes in the operating environment. The supply chain’s network structure affects resource flows throughout the supply chain (Wang, 2010).

Consequently, adequate designing, structuring, alignment, and management of the supply network would contribute to greater use of the supply base assets (Williams et al., 2013). Thus, the adaptability of the supply network represents the ability of the company to incur low costs by adjusting the uses to which its assets are deployed. This dimension implies the complex flexibility and performance required to reconfigure the resource chain (Dubey, Singh, & Gupta, 2015). Nevertheless, even if the adaptability of the supply network of a business is strong, the limited
capacity of the current supplier might constrain the form of flexibility that it could effectively offer to a changing climate (Eckstein et al., 2015). The value chain can be redesigned and then used in different ways depending on how flexible the assets on the supply side are. Supply chain adaptability is its flexibility to adjust to unexpected market shifts so as to achieve or sustain a competitive edge in the performance of the logistics chain (Sheel & Nath, 2019). As a consequence, adaptability is a supply chain efficiency factor that considers how readily manufacturing firms could really respond to customers’ specific needs (Dubey et al., 2018). Thus, adaptation has become especially important in the production of new goods. Manufacturers benefit by producing new goods faster than their rivals or competitors in the market in order to increase the efficiency and performance of the supply chain (Dubey & Gunasekaran, 2016). It has stakeholders and partners in the supply chain who are responsive and can work together with designers, manufacturers, engineers, and sales and marketing reps (Pfohl, Bode, & Ha, 2012).

Response time in the supply chain and manufacturing adaptability are two benchmarks for the flexibility of manufacturers (Whitten, Green, & Zelbst, 2012). Response time in the supply chain tests the total number of days the supply chain takes to respond to industry and market shifts or changes without cost implications (Jermsittiparsert & Pithuk, 2019). For instance, in certain markets, the ability of a business to respond to increased demand is an important factor in winning orders from manufacturers to maximize supply chain efficiency and performance (Wilfried, Henrik, & Markus, 2013). The Japanese car companies are a good example of how to be flexible. They have set up and are still building a program that can respond to specific customer needs (Swafford, Ghosh & Murthy, 2008).

There are four forms of network flexibility along manufacturing supply chains, each of which can be calculated in terms of range and response: distribution adaptability, volume adaptability, mix adaptability, as well as new product adaptability (Ying-Xin, 2010). A variety of factors have been integrated to accelerate the adaptability of the supply chain to the top of the priority agenda for measuring as well as maximizing supply chain efficiency and performance (Christopher & Holweg, 2011). For example, emerging markets in emerging economies are growing at double-digit rates, which is changing the way people want to buy things around the world. Such shifts include improvements in physical structures but also product flows, along with demand for more customized goods with quicker order-to-delivery times in the entire supply chain (Schoenherr & Swink, 2015). Simultaneously, competitive market factors associated with cost, speed of delivery, and customer service are increasing the complexity of managing the supply chain. Supply chains are also susceptible to disturbances due to natural catastrophes, political instability, and strikes, which could impair the efficiency and performance of the supply chain (Wamba et al., 2020). Lobbying groups, the media, and customers who know how to use social media are putting more pressure on manufacturing companies to keep working standards and sustainable practices through supply chains, which are becoming much more complex and dynamic because of regional distribution (Schonleben, 2016).

For these considerations, a responsive and accessible supply chain has become a necessity in today’s supply chain-oriented manufacturing operating environment (Amelec, 2015). Getting there would allow businesses to prioritize supply chain operations and closely align them with other business functions to promote measurement and optimization of performance (Sihn, Florian, & Gommel, 2011). To emphasize the strategic value, multiple organizations have elevated existing supply chain managers and executives to C-suite levels. Feizabadi, Maloni, and Gligor (2019) say that managing an adaptable supply chain requires not only a leader with a clear vision, but also advice, support, and input from managers who work in planning, procurement, production, logistics, sales and marketing, and other traditional supply chain roles.
Upside supply chain adaptability is the highest sustainable change in percentage in the delivered quantities that a company will reach within 30 days (Aslam et al., 2018). When estimating this metric, companies find that 30 days is indeed an arbitrary number of options for benchmarking purposes. In some sectors and organizations, 30 days may be unfeasible in some cases or too restrictive in others (Eckstein et al., 2015). Component parameters of Upside Source Adaptability, Upside Make Adaptability, among many others, can be enhanced in tandem, and, as a consequence, this equation demands that the result be the least feasible rise in quantities in the stated 30 days. Adaptability on the downside of the supply chain is the maximum percentage reduction required by the company department to be achieved 30 days prior to production without any inventory or cost penalty (Aslam et al., 2018). While measuring this statistic, the method assumes that the 30 stated days are an arbitrary choice given for purposes of benchmarking. For certain sectors and firms, 30 days might be unreachable in some cases or too restrictive in others (Dubey et al., 2018). In order to figure out how flexible the supply chain is when things go wrong, the measurement has to be based on both the smallest possible drop and the average drop when looking at the parts of sourcing, making, and delivering.

Adaptability of the information system is characterized as the ability of the collective information system organization to adapt and support the evolving environment of various functions within the firm, such as procurement, development of products and production (Singh & Acharya, 2013). The aspect can also enhance the capability to adapt and respond to environmental dynamics (Pu et al., 2019). For robotics, these dimensions are significant because studies have already shown that producers have to assess their utilization of information technology so as to increase the adaptability of the information system and thus increase overall adaptability (Kabra & Ramesh, 2016). Having a well-designed information system has a number of strategic benefits, such as making it easier to keep the supply chain in sync (Sheel & Nath, 2019).

Information systems may replace inventory, accelerate new product development and design, shorten the delivery time of orders, and drive reengineering of processes and organize activities in the supply chain (Jermsittiparsert & Pithuk, 2019). Information technology can also be regarded as a strategic facilitator or enabler. Additionally, information-enabled coordination and collaboration increase customer support and customer value as well as lower costs (Whitten, Green, & Zelbst, 2012). Empirical research has also shown that providing an information system that is well developed and includes information dissemination across the supply chain improves the adaptability of the supply chain (Liu, Esangbedo, & Bai, 2019). Wamba et al. (2020), say that the flow of real-time information makes the chain more responsive, builds customer loyalty, and makes the most of its available capacity.

Accessibility and the ability to exchange information have an effect on the efficiency, performance, and competitiveness of the whole supply chain (Ivanov, Sokolov, & Kaeschel, 2010). Connectivity along with willingness are clarified as two different dimensions of the effect of information technology on the efficiency of the supply chain (Feizabadi, Maloni, & Gligor, 2019). Where connectivity provides the potential for information sharing. Therefore, connectivity helps businesses collect and evaluate information about the whole supply chain and, therefore, has the potential to make increasingly precise and collective decisions by linking businesses through information systems and management as well as other workers (Raza et al., 2020). Real-time networking also provides managers with empowerment as they can spot environmental patterns and points of inflection sooner. Firms are able to adapt to changes in consumer needs and also share information with everyone in the supply chain (Jermsittiparsert & Kampooppraserl, 2019). Because of the fact that it could mean a competitive disadvantage, many people are reluctant to share details. However, it is important for companies to recognize that the exchange of information
in the supply chain increases the efficiency of decisions and that the full potential of IT solutions cannot be achieved if the desire to share information is not in place (Qrunfleh & Tarafdar, 2014). The concept of information systems indicates that an organization's culture affects the ability of the people who work in the company to exchange crucial information about operations. This implies that, compared with other organizations, the approach towards the information system and sharing might be different (Gonzálvez-Gallego et al., 2015). So, for a supply chain to take advantage of the benefits of a knowledge system, where managers can have a lot of control over rewards and grow them (Marin-Garcia, Alfalla-Luque, and Machuca, 2018), businesses need to make sure that all key actors are very willing to work together.

In line with Christopher and Holweg (2011), the conceptualization of flexibility as a supply chain adaptability dimension describes structural flexibility as the ability of companies to create versatile alternatives in the design of their supply chains in response to fundamental changes in various parameters that determine the supply chain as well as the market climate. For supply chain adaptability, systemic detection is critical, as successful structural change involves mapping and understanding specific processes across the entire value chain (Christopher & Holweg, 2017). Adaptability in the supply chain can lead to major cost advantages. Structural flexibility (outsourcing to contract manufacturers and third-party logistics companies) increases the access of companies to this ability, turning fixed costs into variable costs as necessary (Eckstein, Goellner, Blome & Henke, 2015).

Adaptability to the supply chain may also impact operational efficiency. In times of structural changes in markets and economies, creating new supply bases and markets and relocating production facilities will safeguard quality standards and ensure delivery and steady service (Liao, Hong, & Rao, 2010). Achieving systemic stability across diversified footprints of production and procurement helps businesses increase the efficiency of distribution and service levels (Gosling, Purvis, & Naim, 2010). Adaptability to the supply chain requires the ability to cost-effectively tailor the systemic supply chain design to a range of goods to achieve the best production and delivery capabilities for each offering. With high product complexity, the ability to restructure supply chain operations will result in reduced costs and improved profitability (Dubey et al., 2018).

In general, in an environment characterized by shortening technology and product life cycles, along with the demand for product variety, supply chain adaptability is considered to be especially important (Aslam et al., 2018). The need to remain competitive drives supply chain integration. Caniato et al. (2009), demonstrate that businesses that use the web to optimize these processes in the supply chain benefit from lower costs of transactions and smoother flows of information, along with greater responsiveness. Firms need to adopt organizational integration techniques to build a competitive edge. More precisely, organizational integration helps businesses to streamline, improve, and automate complex processes in the supply chain. These advanced and streamlined inventory movements through the supply chain shorten lead times and decrease the impact of bullwhips, while continuing to increase cash flows to boost business efficiency and competitiveness.

Empirical evidence also emphasizes adaptability in light of the current business landscape's accelerated rate of structural change (Gligor et al., 2020). According to Feizabadi, Maloni, and Gligor (2019), these structural adaptations may result from significant changes in supply (that is, place [location], expense [cost], plus quality), demand requirements (e.g., location [place], variety [assortment], and volumes), as well as the business ecosystem (technology, regulatory requirements, and civil unrest). As a result, rapid product development is recognized as a principal framework for the ability to adapt (Schoenherr and Swink, 2012).
Furthermore, the practices of innovation and continuous improvement in general, and particularly supply chain restructuring, influence how companies adjust to changing ecosystems (Adebanjo, Teh, & Ahmed, 2018). As a result, supply chains must be able to restructure in order to adeptly deal with systemic as well as structural transformations and changes (Eckstein, Goellner, Blome & Henke, 2015). According to existing literature, adaptability can improve long-term organization viability besides significantly optimizing performance gains, including sales growth as well as share of the market (Gligor et al., 2020).

Eckstein, Goellner, Blome, and Henke (2015) also demonstrate that the capacity to acclimate to long-term reconfiguration and structural changes is correlated with enhanced cost and organizational performance. Numerous different studies have found a link between the adaptability of supply chains and the impeccable performance of the organization. It can, for example, significantly raise the bar for company innovation while also increasing customer value through flexible and adaptable operational skills and competencies (Dobrzykowski & Leuschner, 2015).

Hypothesis: \( H_01 \): Supply chain integration has no significant effect on the competitive advantage of food and beverage industry in Kenya.

Hypothesis: \( H_02 \): Supply chain adaptability has no significant moderating effect on the relationship between supply chain integration and the competitive advantage of food and beverage industry in Kenya.

2.3 Conceptual Framework

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**Moderating Variable**

3.0 RESEARCH METHODOLOGY

The research followed a cross-section survey design. Kothari (2017) noted that a cross-sectional survey design assists in formulating hypotheses and testing the relationship analysis among study variables. The choice of this design is suitable for this study since it makes use of a questionnaire as a data collection tool. The population of this study was 270 food and beverage manufacturing firms in Kenya (KAM, 2020). The sampling frame for this study was a list of managers working in operations, logistics and supply chain functions. Two-stage sampling was used by the study. In the first stage, cluster random sampling was used to select 73 food and beverages manufacturing firms from a list of 270 companies with the aid of the Nassiuma formula (2000). In the second stage, convenience sampling was used to select two participants from each of the participating organization. Thus, the sample size of the study was 146 respondents from 73 food and beverage manufacturing firms in Kenya. Primary data was obtained by means of research questionnaires. For secondary data collection, the study utilized document analysis. Data collection was carried out using the drop and pick method as well as mailing questionnaires. Quantitative data collected was analyzed by using SPSS version 28 to calculate the response rate using descriptive statistics. Qualitative data analysis was conducted using content analysis (computer-aided). Inferential
analysis focusing on correlation analysis, and regression analysis were done. The results were summarized in this analysis using tables.

4.0 DISCUSSION OF FINDINGS

The study sought to establish the moderating effect of supply chain adaptability on the relationship between supply chain integration and the competitive advantage of food and beverage industry in Kenya. The objective was measured by the following constructs; upside supply chain adaptability, and downside supply chain adaptability. The study's participants were asked to indicate the extent to which they agreed with the moderating effect of supply chain adaptability on the relationship between supply chain integration and the competitive advantage of food and beverage industry in Kenya using the five-point Likert scale of 5= [SA] strongly agree, 4= [A] agree, 3= [N] neutral, 2= [D] disagree, 1= [SD] strongly disagree). To illustrate the key findings of supply chain adaptability, the study used mean averages and standard deviations.

The means and standard deviations are depicted in the descriptive findings of upside supply chain adaptability in table 1. On upside supply chain adaptability, the findings showed that majority of food and beverage manufacturing firms did not reduce the quantity of days to complete an unforeseen sustainable percentage increase in quantities delivered ($\bar{x} = 2.304$, $\sigma = 0.4618$). Given the five-point scale Likert mean of less than ($\bar{x} = 2.6$) and an average standard deviation, it is clear that a major section of the respondents disagreed with the statement. These results are consistent with those of Al-Hawajreh and Attiany (2014), who stated that in order to enhance effectiveness, a company should shorten, if not accelerate, its supply chain responsiveness. Consequently, a reduction in supply chain response time results in a reduction in order cycle time, which is an important measure and a major competitive edge because it significantly affects the level of customer satisfaction.

In addition, the study found out that majority of food and beverage manufacturing firms did not utilize tools and capabilities to quickly identify changes in demand ($\bar{x} = 2.406$, $\sigma = 0.4928$). Given the five-point scale Likert mean of less than ($\bar{x} = 2.6$) and an average standard deviation, it is clear that a major section of the respondents disagreed with the statement. Further, the study established that majority of food and beverage manufacturing firms have a contingency plan of dealing with variable demand and supply chain efficiency ($\bar{x} = 3.464$, $\sigma = 0.5005$). Given the five-point scale Likert mean of more than ($\bar{x} = 3.4$) and an average standard deviation, it is clear that a major section of the respondents agreed with the statement. Chaghooshi, Arbatani, and Samadi (2015), poised that upside supply chain adaptability allows the food and beverage manufacturers to collaborate closely with possibly widely divergent business groups to gain a better understanding of their operational activities, goals, and time constraints, as well as fluctuations in demand and supply, allowing for easier performance monitoring and evaluation and, as a result, increased competitiveness.

On downside supply chain adaptability, the findings illustrated that majority of food and beverage manufacturing firms do not have a flexible organizational structure and work support processes ($\bar{x} = 2.362$, $\sigma = 0.4824$). Given the five-point scale Likert mean of less than ($\bar{x} = 2.6$) and an average standard deviation, it is clear that a major section of the respondents disagreed with the statement. The findings are in dissent with those of Ying-xin (2010), who noted that the forms of network flexibility along manufacturing supply chains, each of which can be calculated in terms of range and response: organizational structure adaptability, distribution adaptability, volume adaptability, mix adaptability, as well as new product adaptability. Such changes include improvements in physical structures as well as product flows, as well as increased demand for more customized goods with shorter order-to-delivery times across the entire supply chain (Schoenherr & Swink, 2015).
Moreover, the study established that majority of the food and beverage manufacturing firms did not develop capacity to change vehicular distribution lines (trucks) ($\bar{x} = 2.435$, $\sigma = .4975$). Given the five-point scale Likert mean of less than ($\bar{x} = 2.6$) and an average standard deviation, it is clear that a major section of the respondents disagreed with the statement. However, Chaghooshi, Arbatani, and Samadi (2015), noted that downside supply chain adaptability allows food and beverage manufacturers to collaborate closely with inadvertently disparate companies in the downstream to gain a better understanding of their individual operations, goals, and deadlines in the flow of products to marketplaces, facilitating process improvement and enhancement and, as a result, increasing competitiveness.

Also, the findings showed that majority of food and beverage manufacturing firms promote real time information sharing throughout the supply chain increasing supply chain adaptability ($\bar{x} = 3.403$, $\sigma = .4618$). Given the five-point scale Likert mean of more than ($\bar{x} = 3.4$) and an average standard deviation, it is clear that a major section of the respondents agreed with the statement. The findings are in concurrence with those of Wamba, Dubey, Gunasekaran, and Akter (2020), who stated that the actual flow of real-time information enhances the chain’s overall responsiveness, increases loyalty, and maximizes the availability of capacity.

Further, the study established that food and beverage manufacturing firms cultivated a high degree of willingness for all key members of the supply chain to link their information systems ($\bar{x} = 2.289$, $\sigma = .4554$). Given the five-point scale Likert mean of less than ($\bar{x} = 2.6$) and an average standard deviation, it is clear that a major section of the respondents disagreed with the statement. The findings are in dissent with those of Singh and Acharya (2013), who stated that the ability of the collaborative information system organization to adapt and facilitate the evolving ecosystems of multiple functions within the firm is characterized as "information system adaptability."

Consequently, the accessibility and the ability to exchange information have an impact on the overall efficiency and competitiveness of the supply chain (Ivanov, Sokolov & Kaeschel, 2010). According to Mutunga, Minja, and Gachanja (2014), food and beverage manufacturing firms that encourage real-time information sharing throughout the supply chain develop a high level of desire among all important supply chain participants to integrate their information systems, enhancing supply chain adaptability.

**Table 1: Supply Chain Adaptability Descriptive Statistics**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our firm reduced the quantity of days to complete an unforeseen sustainable percentage increase in quantities delivered.</td>
<td>2.304</td>
<td>.4618</td>
</tr>
<tr>
<td>Our firm utilizes tools and capabilities to quickly identify changes in demand.</td>
<td>2.406</td>
<td>.4928</td>
</tr>
<tr>
<td>Our firm has a contingency plan of dealing with variable demand and supply chain efficiency.</td>
<td>3.464</td>
<td>.5005</td>
</tr>
<tr>
<td>Our firm has a flexible organizational structure and work support processes.</td>
<td>2.362</td>
<td>.4824</td>
</tr>
<tr>
<td>Our firm developed capacity to change vehicular distribution lines (trucks).</td>
<td>2.435</td>
<td>.4975</td>
</tr>
<tr>
<td>Our firm promotes real time information sharing throughout the supply chain increasing supply chain adaptability.</td>
<td>3.403</td>
<td>.4618</td>
</tr>
<tr>
<td>Our firm cultivates a high degree of willingness for all key members of the supply chain to link their information systems.</td>
<td>2.289</td>
<td>.4554</td>
</tr>
</tbody>
</table>

The study’s participants were asked to indicate the ways in which they utilize supply chain adaptability in amplifying supply chain integration to enhance the competitive advantage in their firms. In table 2, the study found out that 74.10% of food and beverage manufacturing firms
embraced sourcing adaptability; 62.59% embrace supply adaptability, 30.94% embraced transshipment adaptability, 36.69% embraced machine adaptability, 25.18% embraced product adaptability, 66.91% embraced volume adaptability, 35.25% embraced labour adaptability, 61.15% embraced delivery adaptability, 66.91% embraced distribution adaptability, 55.40% embraced process adaptability, 23.74% embraced system adaptability, 46.76% embraced market adaptability, 48.20% embraced logistical adaptability, and 51.08% embraced organizational adaptability. The high adoption rates of sourcing adaptability (74.10%), volume adaptability (66.91%), delivery adaptability (61.15%), and distribution adaptability (66.91%) suggest a strong focus on managing upstream and downstream flexibility. This aligns with the just-in-time (JIT) inventory management practices often employed in the food and beverage industry, where responsiveness to fluctuating demand and maintaining efficient logistics are crucial.

Besides, the lower adoption rates for process adaptability (55.40%), product adaptability (25.18%), and machine adaptability (36.69%) might indicate a prioritization of core competencies. Food and beverage manufacturers may be hesitant to drastically alter established processes or invest in significant equipment changes for fear of compromising product quality or production efficiency. In addition, the relatively low adoption rates for transshipment adaptability (30.94%) and labor adaptability (35.25%) suggest these areas present opportunities for further exploration. Transshipment, the strategic movement of goods between locations, could offer greater agility in managing disruptions, while labor adaptability practices like upskilling or contingent workforce strategies could enhance responsiveness to fluctuating demand for personnel.

The findings on system adaptability (23.74%) and organizational adaptability (51.08%) are intriguing. System adaptability, likely referring to the ability to adjust information technology systems to accommodate changes, might be an under-recognized yet critical factor. Similarly, organizational adaptability, encompassing a company culture that embraces change, warrants further investigation to understand how it fosters a foundation for effective supply chain adaptability across all dimensions. Moreover, the moderate adoption rates for market adaptability (46.76%) and logistical adaptability (48.20%) suggest a potential gap between internal agility and external responsiveness. Effectively translating market trends into product offerings and optimizing transportation and warehousing strategies remain crucial aspects of achieving a competitive advantage. Thus, while focusing on upside supply chain adaptability, and downside supply chain adaptability; food and beverage manufacturers will also need to implement supply chain adaptability in the specific forms of sourcing adaptability, volume adaptability, distribution adaptability, supply adaptability, delivery adaptability, process adaptability, organizational adaptability, logistical adaptability, market adaptability, machine adaptability, labour adaptability, transshipment adaptability, product adaptability, and system adaptability.

**Table 2: Supply Chain Adaptability Forms Embraced Percentages**

<table>
<thead>
<tr>
<th>Specific Form of Supply Chain Adaptability</th>
<th>Yes %</th>
<th>No %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sourcing Adaptability</td>
<td>74.10</td>
<td>25.90</td>
</tr>
<tr>
<td>Supply Adaptability</td>
<td>62.59</td>
<td>37.41</td>
</tr>
<tr>
<td>Transshipment Adaptability</td>
<td>30.94</td>
<td>69.06</td>
</tr>
<tr>
<td>Machine Adaptability</td>
<td>36.69</td>
<td>63.31</td>
</tr>
<tr>
<td>Product Adaptability</td>
<td>25.18</td>
<td>74.82</td>
</tr>
<tr>
<td>Volume Adaptability</td>
<td>66.91</td>
<td>33.09</td>
</tr>
<tr>
<td>Labour Adaptability</td>
<td>35.25</td>
<td>64.75</td>
</tr>
<tr>
<td>Delivery Adaptability</td>
<td>61.15</td>
<td>38.85</td>
</tr>
<tr>
<td>Distribution Adaptability</td>
<td>66.91</td>
<td>33.09</td>
</tr>
</tbody>
</table>
For this investigation, the Pearson Product Moment Correlation was used to determine the strength and direction of the linear relationship between supply chain adaptability and the dependent variable (competitive advantage), and the results are summarized in table 3. The study revealed that supply chain adaptability had a positive, significant, linear relationship with the competitive advantage of food and beverage industry in Kenya, as shown by a Pearson correlation coefficient of .311 at .01 level of significance. This implied that there was a weak positive relationship between supply chain adaptability and the competitive advantage of food and beverage industry in Kenya. Therefore, while the study demonstrates that greater adaptability in a firm's supply chain coincides with a tendency towards a competitive advantage, the effect size is relatively small. This implies that other factors beyond supply chain adaptability likely play a more substantial role in shaping a firm's competitive edge within the Kenyan food and beverage industry. While the strength of the correlation is weak, it underscores the importance of fostering adaptability within supply chains for achieving a competitive edge.

Table 3: Pearson Product-Moment Correlations between Supply Chain Adaptability & Competitive Advantage

<table>
<thead>
<tr>
<th>Variable</th>
<th>CA</th>
<th>SCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA Pearson Correlation</td>
<td>1</td>
<td>.311**</td>
</tr>
<tr>
<td>CA Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>SCA Pearson Correlation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCA Sig. (2-tailed)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed)

Regression Analysis Findings

Hypothesis: \( H_01 \): Supply chain integration has no significant effect on the competitive advantage of food and beverage industry in Kenya.

The relationship between competitive advantage and the independent variables of supply chain integration was examined using multiple regression analysis as shown in Table 4. The findings of Model 1 revealed that supply chain integration and competitive advantage have a positive relationship \( (R = .658, R^2 = .433, \text{ and } F (4,134) = 4443.754, p = .000) \). As such, the results of model 1 revealed that the coefficient of determination \( (R^2) \) was .433, indicating that the independent variable of supply chain integration (SCI) can only account for 43.3 percent of the variation in competitive advantage. The effect of supply chain integration explains 44.3 percent variability in competitive advantage above and beyond the variations explained by the other independent variables, along with an \( R^2 \) change of .443. According to Munizu, Pono, and Alam (2019), supply chain integration can improve competitive advantage.

Hypothesis: \( H_02 \): Supply chain adaptability has no significant moderating effect on the relationship between supply chain integration and the competitive advantage of food and beverage industry in Kenya.

The results of Model 2 were seen after the moderator's interaction (supply chain adaptability) was included in the model. With \( (R = .849, R^2 = .721) \) and \( F (5,133) = 343.700, p = .000 \), the results
revealed a positive relationship between supply chain integration and the competitive advantage of food and beverage industry moderated by supply chain adaptability. Besides, the firm's competitive advantage can be enhanced indirectly through the supply chain adaptability's moderating effect on the supply chain integration components. The results of Model 2 indicated what happened when the moderating variable was factored into the equation and interacted with it. The coefficient of determination $R^2$ of .721 was obtained, indicating that the independent variable of supply chain integration (SCI) with the interaction of the moderator [supply chain adaptability (SCA)] can explain 72.1 percent of the variance in competitive advantage. The addition of the moderating variable culminated in a .656 $R^2$ change. The moderating effect of supply chain adaptability explains 65.6 percent of the variability in competitive advantage, above and beyond the variations explained by the other independent variables, along with an $R^2$ change of .656.

### Table 4: Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>$R^2$</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R$^2$ Change</td>
<td>F Change</td>
<td>Df1</td>
</tr>
<tr>
<td>1</td>
<td>.658a</td>
<td>.433</td>
<td>.429</td>
<td>.07867</td>
<td>.443</td>
<td>4a</td>
</tr>
<tr>
<td>2</td>
<td>.849b</td>
<td>.721</td>
<td>.717</td>
<td>.18099</td>
<td>.656</td>
<td>4b</td>
</tr>
</tbody>
</table>

a. Predictor (Constant), Supply Chain Integration (SCI)  
b. Predictor (Constant), Supply Chain Integration*Supply Chain Adaptability (SCII*SCA)

The results in table 5 showed that the F-ratio was 4443.754, with a P value of .000 being < .05 in Model 1, and the F-ratio was 812.027, with a P value of .000 being < .05 in Model 2. This indicates that the regression model used in the investigation had a high degree of goodness of fit.

### Table 5: ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>110.014</td>
<td>4</td>
<td>27.503</td>
<td>4443.754</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>.829</td>
<td>134</td>
<td>.006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>110.843</td>
<td>138</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Regression</td>
<td>106.453</td>
<td>4</td>
<td>26.613</td>
<td>812.027</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>4.390</td>
<td>134</td>
<td>.033</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>110.843</td>
<td>138</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Supply Chain Integration (SCI)  
b. Predictor (Constant), Supply Chain Integration*Supply Chain Adaptability (SCII*SCA)  
c. Dependent Variable: Competitive Advantage (CA)

### 5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary

The study sought to establish the moderating effect of supply chain adaptability on the relationship between supply chain integration and the competitive advantage of food and beverage industry in Kenya. The study established a positive statistically significant relationship between supply chain integration and the competitive advantage of food and beverage industry in Kenya. Further, the results revealed a positive and significant relationship between supply chain integration and the competitive advantage of food and beverage industry after the moderator interaction (supply chain integration*supply chain adaptability) was included in the model.
5.2 Conclusion
The study concluded that supply chain adaptability in its elements of upside supply chain adaptability, and downside supply chain adaptability, had a significant moderating effect on the relationship between the predictor variables and the competitive advantage of Kenyan food and beverage industry. Thus, the supply chain integration is crucial in determining a company's competitive advantage in the food and beverage industry. Also, the study concluded that food and beverage manufacturers in Kenya had already adopted supply chain integration and supply chain adaptability for achieving improved organizational performance and enhanced competitiveness. However, the results support the conclusion that the firms did not effectively plan for unanticipated sustainable increases in delivery quantities. This is clear from the fact that despite the rise in demand, they did not shorten the number of days required to execute such deliveries. Additionally, the companies did not make use of the resources and instruments available to them to swiftly recognize shifts in demand, which points to a lack of adaptation and flexibility in their business practices. Additionally, despite the fact that changing vehicle distribution lines (trucks) is a crucial part of logistics and supply chain management, the firms did not have this capability. The companies' inability to modify their processes to accommodate the increasing demand implies a lack of forethought and planning on their behalf.

5.4 Recommendations
The study recommends that, food and beverages industry should use data and analytical tools to forecast demand properly and be better equipped to handle any unanticipated sustainable increases in quantity deliveries. In order to quickly adapt their business operations as well as shipping schedules to changes in demand, the food and beverages industry need also invest in the tools and capabilities necessary to do so. The study also suggests that the food and beverages industry build the capability to switch out truck-based distribution systems to accommodate the rising demand. In order to ensure that the businesses can modify the way they operate in a timely and effective manner, this will require good planning and forethought. To preserve customer satisfaction and satisfy market demand, the food and beverages industry should adopt mechanisms for minimizing the number of days required to accomplish such deliveries if demand for deliveries rises. Additionally, the food and beverages industry should assess their current processes to find any areas of inefficiency or bottlenecks that could limit their capacity to adjust to changing marketplace circumstances. This will enable them to spot potential areas for optimization and, where necessary, take appropriate action.

REFERENCES


