SUPPLY CHAIN INTEGRATION AND THE COMPETITIVE ADVANTAGE OF FOOD AND BEVERAGE MANUFACTURING FIRMS IN KENYA

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DOCTOR OF PHILOSOPHY

(Supply Chain Management)

JOMO KENYATTA UNIVERSITY

OF

AGRICULTURE AND TECHNOLOGY

2023

Supply Chain Integration and the Competitive Advantage of Food and Beverage Manufacturing Firms in Kenya

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Supply Chain Management of the Jomo Kenyatta University of Agriculture and Technology

2023

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Signature ………………………………………………….. Date…………………………

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This thesis has been submitted for examination with our approval as the university supervisors.

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DEDICATION

This thesis is admiringly dedicated to my daughter, my spouse, my mother, my brothers, my late father, and my late grandfather. To my beloved daughter Muriel, ‘thank you for gracing my life at this special time. One day, I hope you will know that you gave me the drive, desire, self-reliance, and discipline to meet every assignment not just in academia but also in life with passion and dedication.’ To my adorable wife Joyceleen, ‘you have been my best friend, the mother of our beautiful daughter, and perfect teammate. Without your tremendous understanding, endurance in times of isolation, sustenance in the past few years, and your professional and financial support, it would have been impossible to complete my study.’ To my cherished mother Joyce, the Matriarch of our family, ‘Mum, you have been my endless spring and source of pride, inspiration, and encouragement.’ To my brothers, Cleophas & Moses, ‘A brighter future beckons. May you continue aspiring to achieve more. It is possible.’ To my late father Daniel, ‘Dad, I would have liked you to be here during this great triumph but I take consolation that you are watching over me. Your love, strength, confidence, trust, integrity and bravery in life instilled in me great family as well as life values. Although you are no longer in this world, your memories continue to regulate my life. I miss you Dad. May you find eternal peace in paradise.’ To my late grandfather Christopher, ‘thank you for believing in me. Your affection and especially resilience in your latter years gave me a new indebtedness and gratitude to the true meaning of the family. I miss you, Sokoro. Continue resting in eternal peace.’

ACKNOWLEDGEMENT

Foremost, I thank God for letting me live to see this thesis through. My Ph.D. thesis instructors and advisors have my deepest gratitude and admiration. They helped me become a critical thinker and independent researcher. I appreciate the guidance, advice, and encouragement of my supervisors, Dr. Odari Sammy of Jomo Kenyatta University of Agriculture and Technology and Dr. Arani Wycliffe of Multimedia University of Kenya. Their comments, observations, critiques, and contributions made this thesis and Ph.D. a success. Their knowledge and experience inspire my academic and daily life. They gave me a new appreciation of both the uniqueness and depth of this study. It is a privilege to have learned from the finest. Also, I extend my sincere thanks to Jomo Kenyatta University of Agriculture and Technology for giving me the opportunity to undertake my Ph.D. in the institution.

A big thank you to all the participants from food and beverages manufacturing firms in Kenya who assisted me in obtaining relevant data for this study. I must recognize the support of Prof. Kinyua Robert (Deputy Vice Chancellor, Academic Affairs – JKUAT), Dr. Simiyu Alice (Chairperson, Department of Procurement and Logistics – JKUAT), esteemed professors notably Prof. Gregory Namusonge, and Prof. Henry Bwisa; senior lecturers, lecturers, plus my colleagues whose contribution towards this study cannot be ignored. I thank all the members of various presentation & defense panels who provided me with extensive professional guidance and taught me a great deal about supply chain research. Special gratitude to Dr. Muli Samuel. As my teacher and mentor, by his example, he has taught me more than I could ever give him credit for here.

Special gratitude to Dr. Anaya Senelwa, Dr. Osoro Anthony and Dr. Ngatia Peter for their technical support. Special appreciation to Rev. Fr. Prof. Lawrence Njoroge (Vice Postulator for the Cause of Servant of God Maurice Michael Cardinal Otunga, Beatification and Canonization; and Catholic Chaplain JKUAT) for his inspiration and Rev. Dr. Karihe John (University Chaplain – Christian Union) for his encouragement. Their prayers and unforgettable conversations kept me mindful of my mental health while appreciating the challenges of undertaking this study. These helped me realize that every step in this journey is worth celebrating and that God's grace will always carry me throughout the Ph.D. journey as well as life.

I'm grateful to my family for their steadfast trust, proactive encouragement, reassurance, and inexorable patience. When I was weary, it was your love that enabled me get back up. Great admiration goes to my wife Joyceleen and daughter Muriel. You understood me best as a Ph.D. candidate, husband and father. You've been my greatest companions and magnificent friends; who loved, supported, motivated, entertained, and assisted me get thru the intense and agonizing periods of my Ph.D. in the best way possible. Sincere thankfulness to my cherished Mum Joyce, whose prayers and prudent counsel were so crucial in the pursuit of my academic goals. My sincere gratitude to my brothers Cleophas (Kenyatta University) & Moses (JKUAT) who also contributed greatly to this endeavour.

My appreciation to Uncle David who allowed me to utilize his office space while we were having the online presentations. I would want to express my sincere gratitude to Uncle James, without whom I would not have been able to reach this monumental milestone in my educational journey. I am grateful to Uncle Richard for always checking on me to ensure my mental and physical health are intact and Uncle Jacob for his wise counsel and encouragement over the years; always reminding me that I am up to the task. Thank you for believing in me. I'd also want to convey my utmost gratitude to Gertrude & Annastacia, my wonderful sisters-in-law, for their unwavering support. Thank you for your thoughtfulness and graciousness. To my cousins Valerie, Gregory, Faith and Collins, thank you for your lively company along this journey.

Appreciation to my students who utilized their networks to assist me carry out data collection. A big thanks to Mr. Murakaru Charles – CMG (Retd Snr), Valerie Onsembe (University of Nairobi), Cavin Ayal, Michael Muricho, Charles Muo, Mark Mwendwa and George Kitheka who supported me greatly. I'll never forget to be grateful to the associates and friends who stood by me during tough times, cheered me on, and lauded my progress every step of the way. I appreciate Kubende Delphine (Kongoni Technical and Vocational College), Sr. Rose Nafula – ASN (St. Mary's Mission Hospital, Langata), Eda Mumo (UN-OCHA), Dr. Felix Anemba (Phar.B.), Kellen Karimi & Anita Wambugu for countless research pauses, good cheer, and prayers.

Dr. Dennis Chege, Dr. Carren Chepng'etich, Dr. Anthony Karani, Dr. Elizabeth Wachiuri, Dr. Thogori Miriam (Chuka University), Dr. Mwangi Peter (University of Embu), and Dr. Ndolo Jackson (KCA University), Mr. Erastus Nyile (Taita Taveta University), Macharia Martin, Murungi Harriet, Loyetta Egline, Agura Martha, Oguku Joel, Dennis Gwaya, Dominic Ochoi, Were Eunice, Lenah Kiptoo Mary Wainaina and family deserve special recognition. I cannot forget to thank my Ph.D. classmates. Finally, to everyone I haven't managed to mention, feel appreciated for supporting me in your unique ways. In God's Abundance, may He greatly reward you all!

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ABBREVIATIONS AND ACRONYMS

BPR	Business Process Reengineering
CA	Competitive Advantage
CAS	Complex Adaptive Systems
CDSC	Customer Driven Supply Chains
CI	Customer Integration
CRM	Customer Relationship Management
EAC	East African Community
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
ESI	Early Supplier Involvement
EU	European Union
FI	Functional Integration
GDP	Gross Domestic Product
IT	Information Technology
JIT	Just in Time
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KAM	Kenya Association of Manufacturers

KEBS	Kenya Bureau of Standards
KISM	Kenya Institute of Supplies Management
KITP	Kenya Industrial Transformation Plan
KNBS	Kenya National Bureau Statistics
LI	Logistics Integration
LSPs	Logistics Service Providers
MCDM	Multiple Criteria Decision Making
MES	Manufacturing execution systems
MIDC	Manufacturing Industry in Developing Countries
NACOSTI	National Commission for Science, Technology & Innovation
NPD	New Product Development
PDI	Product Data Interchange
R&D	Research and Development
RBV	Resource Based View
SC	Supply Chain
SCA	Supply Chain Adaptability
SCI	Supply Chain Integration
SCM	Supply Chain Management

SCO	Supply Chain Operation
SCOR	Supply Chain Operations Reference
SET	Social Exchange Theory
SI	Supplier Integration
SPSS	Statistical Package for Social Sciences
SRM	Supplier Relationship Management
TI	Technology Integration
TQM	Total Quality Management
USA	United States of America
VAT	Value Added Tax
VIF	Variance Inflation Factor
VMI	Vendor Managed Inventory
WMS	Warehouse Management Systems

DEFINITION OF TERMS

Competitive Advantage refers to a feature that helps a company to outperform its competitors, enhancing a firm's ability to generate significant returns relative to its competitors and creating value for the firm as well as its stakeholders (Sabet, Yazdani, & De Leeuw, 2017).

Customer Integration It is described as the consumer's active participation in the development, manufacturing, and distribution of products and services, including their downstream and upstream processes (Reaidy *et al.*, 2021).

Food and Beverages Manufacturing Firms Comprises establishments that produce or process or manufacture raw food resources, foods in addition to beverages for individuals to consume, along with certain associated products (KAM, 2020). These establishments also package and distribute these goods.

Functional Integration It is described as a continuous process in which the supply chain's various functional areas collaborate, organize, and interact in an attempt to optimize a firm's competitiveness and performance (Liu, Liu & Gu, 2021).

Logistics Integration involves practices, processes, and procedures by which companies achieve operational and competitive efficiencies both in the internal and external environment through close tactical collaboration between internal functional departments and the operations of other firms (Barykin *et al.*, 2021).

Performance refers to supply chain initiatives to meet end-consumer expectations and company goals. These measures include ensuring products are available, deliveries are on time, and the supply chain has enough inventory and capacity to deliver performance on time (Gupta *et al.,* 2021). Supply chain performance crosses organizational boundaries because it involves raw materials (inputs), subassemblies, or components, finished items, and distribution through several defined routes to the final consumer (Lima-Junior & Carpinetti, 2020).

Supplier Integration Supplier integration (Mafini, Dhurup & Madzimure, 2020) means combining the internal resources and skills of a few key suppliers with the business processes of other companies in order to gain a competitive edge.

Supply Chain Adaptability is described as the proficiency of a company to detect enduring, fundamental, and systemic changes in the supply chain besides the market environment and to quickly respond to these changes by adjusting or modifying the design and configuration of the supply chain in a flexible manner (Feizabadi, Gligor & Alibakhshi, 2021).

Supply Chain Integration refers to where both stakeholders share the same goal in the supply chain (moving the right product to the right location at the right time for the right price to delight the customer/end user), are united in their efforts to achieve this goal, and work with each other through compatible systems and processes that provide a clear understanding of customer-to-supplier demand (Rudyanto *et al.,* 2020).

Technology Integration is defined as the combination of supply chain partner technologies that are holistically incorporated into an end-to-end framework to deliver efficiency improvements, enhance competitiveness, as well as better support evolving and increasing consumer expectations and requirements (Tiwari, 2021).

ABSTRACT

Integration of the supply chain is generally considered a vital contributor to supply chain efficiency, productivity, competitiveness and performance. However, the disjointed nature of the food and beverage manufacturing sub-sector presents a significant challenge in relation to competitive advantage. This is rooted in the lack of effective linkages in the internal and external supply chains. Consequently, the major aim was to establish the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya. The study was also guided by specific objectives with variables, namely functional integration, supplier integration, customer integration, and technology integration. 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 manufacturing firms in Kenya. The study adopted a cross-sectional survey. According to the Kenya Association of Manufacturers (2020), there were 270 food and beverage manufacturing firms in Kenya. The study's target population was 73 food and beverage manufacturing firms 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 convergent validity test. The results showed that Kenyan food and beverage manufacturers' competitive advantage was positively correlated with functional integration, supplier integration, customer integration, and technology integration with the inclusion of supply chain adaptability (moderator). The study concluded that the competitive advantage is anticipated to grow for every unit increase in functional integration, supplier integration, customer integration, and technology integration, respectively. The study also concluded that supply chain adaptability moderates the relationship between supply chain integration and competitive advantage for food and beverage manufacturing firms 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.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

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.

Chang and Talley (2019) have called for more empirical research on the relationship between integration, competitiveness, and performance, and Yu, Jacobs, Salisbury, and Enns (2013) say that it is hard for both academics and managers to understand the effects of integration. Consequently, it is problematic to provide practitioners with normative guidance about how and when to implement integration, the investment required for integration, and the likely negative impact of this on innovation, creativity, and agility (Zhang & Huo, 2013). This is a challenge for scholars and researchers if the same terms are interpreted in multiple ways and if different concepts have been used with about the same interpretation.

Studies appear to overlap partly without clear arguments about commonalities and inconsistencies with respect to previous studies and how they build on previous studies and lead to the advancement of current theory if concepts are vague (Schoenherr & Swink, 2012). A deeper understanding and interpretation of the concept of integration, its dimensions, and its effects are therefore of both managerial and academic value and can lead to the theory-building of company logistics, operations, and SCM. The increased complexity of products plus the higher degree of outsourcing have changed the level of competition from independent firms to companies' groups or chains (Sturgeon & Gereffi, 2012).

For this purpose, the strategic importance of the integration of the supply chain as a source of competitive advantage is increasingly acknowledged in the literature (Lii & Kuo, 2016). It can be accomplished by taking the system as a whole into perspective and therefore embracing global rather than local optimization. Through integrating all of the main business operations, from end consumers to original vendors, this can be done (Kamal & Irani, 2014). The integration of the supply chain is closely tied to communication systems. In particular, it means that business processes should be streamlined and linked both inside and outside the organization (Ayoub, Abdallah, & Suifan, 2017). In general, firms that depend heavily on outside suppliers for their strategic activities (Pati, Sundram, Chandran, & Bhatti, 2016) need to be closely integrated with their suppliers. This is because they are focusing on their core capabilities.

Manufacturers of food and beverage firms are placed under pressure from various sides of the supply as well as the value chain (Gilmore, 2020). The most prevalent friction stems from the gradual shift from producers to distributors in the power balance within the sector. Smaller retail chains have more power with their food and drink suppliers when it comes to demand prices, logistics, service, and technology in the supply chain (Hsiao, Kemp, Van der Vorst, and Omta, 2010). This is because consumers and other retail stores are becoming more and more similar to each other.

Competition continues to increase, with firms trying to suck out limited market value gains, sometimes at enormous marketing, distribution, logistics, and investment costs in the development of new products (Syed & Chaudhury, 2016). It is not surprising then that food and beverage managers see supply chain integration (a supply chain management intervention) as the critical business strategy to compete in this demanding global environment. Supply chain interventions can cost tens or hundreds of millions to allow a firm to gain a competitive advantage (Greer & Theuri, 2012). Even though there are many requirements for good logistics management, implementation-based supply chain integration (Gilmore, 2020) gives managers in companies that make food and drinks a lot of value.

In addition, Gilmore (2020) acknowledged that logistics and supply chain programs remain vital not just to the strategies of the entire supply chain but also to broader strategic corporate thrusts. Vertical, horizontal, and conglomerate integration are the three most common types of integration in a production environment (Telukdarie, Buhulaiga, Bag, Gupta, & Luo, 2018). Dependent on their requirements and long-term plans, companies decide on the form of incorporation. Collaboration and integration among companies at various levels of a supply chain is called "vertical integration" (Pellinen, Teittinen & Järvenpää, 2016).

This integration happens when, by merging with its suppliers or distributors, who play a wholly distinct role in the supply chain, an organization seeks to expand its reach in a supply chain (Pinto & Diemer, 2020). And on the other hand, when a firm plans to increase its existing market share for a type of product, horizontal integration is typically favored, which reduces competitiveness for the firm at the same time (Liu & Xu, 2017). Conglomerate interlinkage or integration happens when a company decides to enter or penetrate new markets to make more money and then buys an established business in that area instead of starting a new business from scratch (Elia, Maggi, & Mariotti, 2011).

Typically, the buyer and the company being acquired have completely separate product lines (Sanfiel-Fumero, Ramos-Dominguez, & Oreja-Rodrguez, 2012). The competitiveness, performance, and success of the business lie in the degree of synergy it holds, so the key elements involved in the creation, production, and manufacturing of the product and its administration must be considered; the vertical integration mapping is to analyze the system in a different way to recognize critical areas for their assistance (Atalay, Hortaçsu, & Syverson, 2014). There is indeed a dynamic relationship between the strategic as well as the operational objectives of the various levels of production systems that hinders the development of an intelligent production system. So as to operate as a single organization, SCI needs both intra- and inter-company integration across the entire SC (Demeter, Szász, & Rácz, 2016). Companies, nevertheless, are often not effective in achieving greater integration levels throughout their SCs.

The very first tier of backward or forward integration has only been reached by several organizations (Lin, Parlaktürk, & Swaminathan, 2014). Multiple research studies show that a low degree of internal integration is one of the factors that hinders the achievement of high-level external integration (Spiegel, 2013). The starting point for wider integration across the SC is intra-firm integration. While both internal and external integration are important components of SCI, only consumer and supplier integration are highlighted, ignoring internal integration's critical central connection. For instance, three types of integration are classified by Lin, Parlaktürk, and Swaminathan (2014): backward integration, forward integration, as well as full forward plus backward integration. Li and Chen (2018) also call the integration arcs "periphery-facing," "inward-facing," "customer-facing," "supplier-facing," and "outward-facing."

Other articles have followed a broader perspective and have considered all aspects of internal and external integration. For instance, three forms of integration, including business integration with suppliers, business integration with customers, plus internal integration, are indicated by Zhao, Feng, and Wang (2015). Three SCI dimensions are suggested by Flynn, Huo, and Zhao (2010): consumer, supplier, and internal (functional) integration. With the development of information and communication technologies, the integration of logistics has been seen as a competitive strategy for businesses to enhance their performance and competitiveness. The integration of logistics through processes and then between companies has improved the creation of customer value. But the dynamic nature of the industry in Third World countries reveals a clear competitiveness, performance, and productivity challenge (Georgise, Thoben, & Seifert, 2011).

Many firms manufacturing food and beverage have developed a logistics function in the ensuing years to account for the growing proportion of transportation and storage functions. Due to emerging industry dynamics, the manufacturing industry in developing countries has recently been under intense competition (Georgise, Thoben, & Seifert, 2014). Food and beverage manufacturing firms have tried to improve their operations to cope with this competition pressure by using various manufacturing strategies such as TQM (total quality management), BPR (business process reengineering), plus lean technology, among many others.

Notwithstanding such efforts, MIDCs still haven't made sufficient market penetration. The latter drives food and beverage producing firms to make their manufacturing processes more effective (Georgise, Klause-Dieter, & Seifert, 2014). Proactive logistics management and integration into the supply chain (SC) are becoming ever more significant factors for commercial success through enhanced performance and competitiveness. According to Hosseini, Azizi, and Sheikhi (2012), integration of the supply chain is becoming one of the fields of academic focus for study as well as practical application. Companies have certainly begun to establish ways to integrate and improve their business operations, as well as processes of material flows, financial flows, and information flows within the entities and even with their supply chain partners (Kureshi, 2010). Therefore, it is essential for businesses to collaborate efficiently with their vendors, consumers, warehouses, as well as other integral value-adding partners in order to fully benefit from and adopt concepts of integrating the supply chain. Various findings have shown that greater collaboration with vendors and consumers in the supply chain supports firms in leveraging a competitive advantage (Georgise, Thoben, & Seife, 2014).

1.1.1 State of Supply Chain Integration in the Global Arena

The evolving global economy is eminently complex, according to the World Bank (2009), and significant attempts have previously been made to promote an increasingly decentralized global integration of production, or manufacturing, distribution, and consumption. High fragmentation rates require a higher degree of freight transport volume, e.g., ton-kilometers. The USA has an excellently developed and integrated supply chain network with significant insufficiencies and deteriorating infrastructure and seems to be slow to respond to changing demand and consumption trends (Guerrero, Lucenti, & Galarza, 2010). The U.S.'s fully integrated supply chain network, on the other hand, connects manufacturers and customers through many different types of transportation, such as air, express distribution systems, truck transportation, freight rail, and maritime transport (Spillan, McGinnis, Kara, and Yi, 2013).

Throughout Asia, China's supply chain infrastructure has so far been inadequate, although recent innovations and policy efforts to promote investment in the manufacturing industry have resulted in major changes (Abdulrahman, Gunasekaran, & Subramanian, 2014). China is currently poised for significant growth in the logistics and supply chain sector throughout the next several years. This is because multiple firms have begun to develop more revolutionary strategies that will provide growth opportunities and a competitive edge for the dynamic Chinese economy (Kearney, 2010). This demonstrates that China's supply chain network is improving and adapting to developments in the integration of the supply chain (Spillan, McGinnis, Kara, & Yi, 2013).

The latest EU-level logistics and supply chain innovation roadmaps are too limited in scope, since the roadmaps are often influenced by transport, information and communication technology, or security priorities, lack adequate feedback from shippers and logistics service providers, and therefore fail to tackle issues that are vital to achieving fully sustainable supply chain integration (Prajogo & Olhager, 2012). Logistics/supply chains are evolving towards an affordable and much more efficient yet, at the same time, a more personalized and service-oriented industry, driven by the complete integration, alignment, and synchronization of production (manufacturing), procurement (purchasing), marketing, warehousing, distribution, and transportation chains, i.e., the integration of the supply chain (Kim, 2013). The greatest challenge would be to continue making the European manufacturing industry responsive to a genuinely human, ecological, profit-driven logistics and supply chain market, i.e., a market that is environmentally, socially, and economically sustainable, making contributions to both the competitiveness of the industry and the EU's policy objectives (Puertas, Mart, & Garca, 2014).

1.1.2 State of Supply Chain Integration in Africa

Africa is divided into five economic zones, all with different objectives for growth and development of the respective economies, together with unique requirements for infrastructure building that are essential for the creation of a supply chain system that is competitive (Chinomona, 2013). Due to this new imbalance, we don't see the African Continent as an assorted market, because there are customers with different requirements in each of these 54 member states. This has generated an increasing demand for logistics services among producers and consumers with the sole objective of expanding their operations and improving their transport networks and supply chains (Chinomona & Pooe, 2013). Also, over the last ten years, globalization and technology have made it easier to work together, improve supply chains, and increase competition in Africa. Since Africa is a developing continent, it offers untapped opportunities for multinational companies that want to grow into new markets (Lowitt, 2017).

The much more important logistics and supply chain countries are currently Algeria, the Democratic Republic of Congo, Angola, Egypt, Kenya, Ghana, Nigeria, Mozambique, Tanzania, and South Africa. Some of them own the largest ports on the continent: Barra do Dande and Lobito in Angola, Lamu in Kenya, Musoma in Tanzania, and Lekki in Nigeria (Business Daily, 2018). Africa is rich in natural resources such as gas, oil, agricultural products, and minerals. However, infrastructure development on the African continent lags behind that of all other continents, and there are gaps between its various regions: on the one hand, despite having the lowest annual rate of growth, South Africa has a modern infrastructure; on the other hand, Kenya and Nigeria have recorded some of the strongest growth rates in recent years (Swardton, 2011).

The logistics and supply chain industry are increasingly important to the growth and development of property in sub-Saharan Africa due to the growing demand for retail warehousing as well as the manufacture of consumption goods (Hanif & Kaluwa, 2016). This is due to the growth of the middle class, the rise of consumer markets, as well as the boost in internet sales. Soon, Nigeria will become a leading logistics and supply chain center for central and West Africa, and it is now considered one of the best and fastest, due in part to its exports of crude oil, the rapid expansion of the working class, and the fact that half the population lives in metropolitan areas (Adebambo & Toyin, 2011). All of these aspects make it a desirable country for logistics and supply chain investors. Indeed, because of its Vision 2020 plan, Nigeria focuses on making itself among the top 20 world economies by 2020 (Eneh, 2011).

Despite the problems resulting from insufficient infrastructure, Nigeria continues to be a global destination for supply chain, logistics, and transport investors as well as suppliers. In the meantime, Liberia and Ghana are also becoming key conduits to the West African market as they provide competitive business opportunities (Dadzie, Winston, & Hinson, 2015). The region has the most organized and controlled markets in Africa. However, countries with membership in the East African Community are Kenya, Burundi, and Uganda. Rwanda, Tanzania, and South Sudan have the highest degree of economic integration (Sitati, 2015). The logistics and supply chain industry across different African countries has shown that below-standard infrastructure and superstructure continue to adversely affect the efficient flow of materials and goods and also have a direct consequence on both the high cost of the materials and goods as well as on the cost of doing business in the market (Dadzie, Winston, & Hinson, 2015).

Rapid growth in demand and accessibility for broad raw materials is currently happening from time to time on the African continent. Africa, however, does have an abundance of natural resources and essential prospects for agricultural expansion, such as oil, gas, and mineral resources (Dametew, Ebinger, & Abebe, 2016). Supply chains in South Africa need to progress, improve, and innovate as well as stay consistent with supply chains around the world on an ongoing basis. There has been an increasing need for companies in South Africa to work more closely with government and state-owned enterprises so that businesses can integrate their supply chains more efficiently and combat spiraling supply chain costs. All sectors and all public and private partnerships need to be involved in such cooperation (Gunasekaran, Lai, & Cheng, 2008).

As the continents continue to face such weak infrastructure and challenging business conditions, it is important that innovative and scalable supply chain structures be planned and built on the continents in order to upgrade and expand the African economies (Amadi-Echendu & Kruger, 2016). Practical and theoretical evidence suggests that a supply chain wants to supply the right amount at the right time to the right place at the right price. This is done by an integrated company operation, a proper transportation network and practices, a well-organized development process, the incorporation of information systems, and appropriate infrastructure (Kwamega, Li, & Abrokwah, 2018). Kannan & Tan (2010) also carried out a study and discovered the value of integrating vendors, producers, dealers, distributors, and consumers in a supply chain. Correspondingly, the preceding finding indicates that integration of the supply chain provides coordination between different roles in the supply chain to increase company efficiency and efficient resource flow between company organizations and improve the manufacturing industry's competitive climate (Annan, Boso, & Essuman, 2016).

Although viable competitive advantage is achieved by efficient collaboration, integration, and alignment of supply chain activities for supply chain companies, such as all activities related to the transportation of goods in supply chain processes from the raw material level through the processing stage and to the end consumer (Danese, Romano, & Formentini, 2013). Consequently, any well-defined continuous flows of goods and services, information, money, and decisions are generated by an effective and efficient supply chain integration that will provide the customer with full value at a low price and high velocity (Alfalla-Luque, Medina-Lopez, & Dey, 2013). Integration of the supply chain can therefore be assessed through cooperation, coordination, and collaboration, the sharing of knowledge, trust, collaborations, and the exchange of technology, and a fundamental shift from the management of individual functional processes to the management of interconnected process chains (Krishnapriya, 2014).

In order to boost sustainability and gain competitive advantages across supply chain networks, the basic metal sector in East Africa can be realistic and depend on the potential of regional integration and partnerships (Lisanza, 2013). Regional integration has since played an important role in enhancing intra-East African trade while expanding access to foreign economies in the EAC region (Francis & Waiganjo, 2014). Although regional integration gives a basic consensus that perhaps the sector has an enormous, unlimited market to strengthen the region's sustainable development, with the right business climate, including improved access to markets, facilitating infrastructure, enhancing science and technology sharing and development, technology, resource utilization, and skills development (Uwamahoro, 2018).

Sustainable and comprehensive development in the basic metals industry could thus be enhanced through the incorporation of the supply chain sectors at the regional level (Georgise, Thoben & Seifert, 2014). The performance and competitiveness of manufacturing companies in developing countries in terms of supply chain relationship capabilities, manufacturing company capabilities, information and communication technology capabilities and operational capabilities, along with the desire of the final customer to produce and accumulate the supply chain value, was very low and limited (Georgise, Thobe & Thobe, 2014). In conjunction, the Ethiopian leather footwear manufacturing industries, implementing the activities of customer service, managing inventory, raw material sourcing, transport including WMS were examined as a case business.

As per the study, the company's supply chain and logistics processes have begun, but issues such as shortages of foreign currency, planned taxes, poor logistics coordination, and inadequate and non-integration structures are the key challenges facing the industry, decreasing efficiency and reducing competitive advantages (Getahun, 2012). Until then, due to power disruptions, due to poor electricity facilities, transportation problems due to poor road infrastructure, due to inadequate resources and currency issues raising raw material costs, due to lack of skilled manpower, obsolete technology, inappropriate planning of production, and control mechanisms, performance and efficiency issues have occurred in Ethiopia's soap and detergent industries (Gelagay, 2018).

1.1.3 State of Supply Chain Integration in Kenya

Mbaisi (2016) analyzed the factors effecting the integration of the supply chain in Kenya's major manufacturing companies. In the research, among many vendor-managed inventory practices, customer relationship management practices, and joint planning, forecasting, and replenishment practices, the supply chain integration practices most practiced by multinational corporations in Kenya were highly ranked. Mideva and Moronge (2019) claim that the integrated supply chain increases the efficiency of Keya's food and beverage production companies. Njagi and Muli (2020), however, studied the Kenya Breweries Limited case while investigating the effect of supply chain integration practices on the performance of manufacturing firms in Kenya. It has been identified that organizational success is not contingent on the integration of suppliers. The study further concluded that excellence in customer support and business practice should be generated by a well-integrated internal supply chain. The highest level of market share and profit is also reached when there is the most integration.

The Kenyan market and national logistics have traditionally operated from Mombasa Port to reap the benefits of the Ugandan Railway (Njambi & Katuse, 2013). This predictable spatial configuration along the corridor, so popular in sub-Saharan Africa, continues to exist even after road traffic has taken over the railroad as well as the most recent establishment of an aerial solution to the corridor. Today, many cities and sectors of the economy in Kenya and the hinterland (Rwanda and Uganda) are situated in or near the Northern Corridor (Sitati, 2015). The logistics system in Kenya is also dominated by one type of operation: where operators face multiple legislative, procedural, and physical impediments to the flow of goods through the corridor and eventually not far away (David & Shalle, 2014). Presently, around ten million tons are traveling through the corridor by different means: rail, trucking, or Kenyan pipelines.

In addition to the logistic costs levied by geography, manufacturers usually face bottlenecks in trade facilitation on imported industrial inputs, which increase costs, making it much more volatile in terms of input, lead times, and difficulty integrating into the global manufacturing circle (KAM, 2018). The pattern in the logistics industry is vertical integration of other logistical activities such as transport, warehousing, distribution, and shipping. Indeed, while most of them aren't licensed as clearing agents, major transport operations companies in Kenya are offering freight forwarding services, including operating inland logistics facilities such as private container depots (Mwaura, Selling, Nicholas, Ithinji & Orwa, 2016). Kenya should gain from economies of scale through the integration of logistics infrastructure and services at the national level in the longer term. Kenya should, potentially in the light of the EAC Customs Union, examine, review, and address some of the business operating environment issues (customs exemption, VAT, taxes) that impede the growth of regional logistics services.

Manufacturing firms in Kenya have tried to follow improved supply chain practices in order to substantially enhance the management of the entire supply chain. It is on this basis that these organizations have considered the implementation of supply chain and logistics integration as a means of achieving superior supply chain process efficiency (Katua, 2014). The implementation of logistics and supply chain integration by the manufacturing companies in Kenya has spurred the achievement of the strategic objectives of the organizations, the decrease of risks, and the enhancement of internal and external management process synchronization. Integration of the supply chain and logistics between commercial banks in Kenya has seen the adoption of practices such as knowledge sharing in order to respond to customer demands, improve product quality, and manage processes efficiently in order to reduce costs, provide better customer service, increase revenue, and have properly driven capacity plans (Owino, 2015).

Manufacturing food and beverage requires several value chains, starting with agricultural production and entering domestic, national, and global markets. Beverage or drink manufacturing companies deal with products ranging from drinking liquid alcohol to non-alcoholic beverage, bottled water, fruit or vegetable juices, and soft drinks. Kenya's food and beverage manufacturing industry is a key competitive sub-sector highlighted for the growth and expansion of the economy and therefore has tremendous potential for job creation, poverty reduction or eradication, and wealth creation (Mideva & Moronge, 2019).

The sub-sector continues to contribute positively in the intermediate and far-reaching term to the achievement of the Millennium Development Goals, especially the goal of eradicating hunger and extreme poverty and the goal of Growth and Global Partnership (Mideva & Moronge, 2019). Food and beverage manufacturers integrate the supply function, which includes supplier selection and management, procurement planning, the production function, which is responsible for managing manufacturing operations, optimizing stock flows, and material handling, and the marketing function (Mwaura, Letting, Nicholas, Ithinji, & Orwa, 2016). Integration of the supply chain hasn't been used much in the Kenyan economy, especially in the manufacturing sector (Nzioka, 2010).

1.1.4 Supply Chain Integration, Supply Chain Adaptability and Competitive Advantage of Food and Beverage Manufacturing Firms

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 (Keddis, 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, 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, Rönnqvist & 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, KocabasogluHillmer & 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).

1.1.5 State of the Manufacturing Industry in Kenya

Like several developing countries, Kenya has not been able to create a robust and strong manufacturing industry, and growth and expansion are being driven mainly by the agricultural and utilities or services sectors (Nkurunziza, 2010). As a result, the country experienced untimely deindustrialization, as evidenced by a declining contribution of the manufacturing industry or sector to the gross domestic product (GDP), which was a paltry 8.4% in 2017 and 9.2% in 2016 (KAM, 2018). Deindustrialization of the industry has been marked by a growing share of the services sector in GDP and has thus fueled discussion about whether services will replace the manufacturing sector as a driver of growth in the economy (KAM, 2018).

The manufacturing industry in Kenya has experienced major obstacles throughout the last decade (KAM, 2019). As a result, its contribution to GDP has declined dramatically, giving rise to fears of an early deindustrialization trend. There has been little improvement in the structure of the manufacturing sector over the years, following targeted policy measures to try to improve this. The contribution of the manufacturing industry to GDP has stayed static with merely small rises in the previous decades, thus contributing up to an average of 10% from 1964–1973 and rising slightly to 13.6% from 1990–2007 and remaining below 10% in contemporary years (KAM, 2019).

Production operations in the manufacturing industry are primarily targeted at consumer goods. Given the statistical aspect of the manufacturing industry in terms of its overall position in the economy, there have been major changes in the production rates of the various manufacturing sub-sectors over the last decade alone (KAM, 2016). It is a significant factor for any economic study of the specific manufacturing sector. The sector looks like a single unit of study, but the undercurrents of different sub-sectors need to be looked at to get a full picture of its success and place in the economy (KAM, 2019).

The manufacturing sector has frequently served as a growth engine for the majority of developed countries, and it has also achieved a high level of income. The contribution of the manufacturing sector to the Kenyan economy has scored about 10% over several decades and decreased from 8.4% in 2017 to 7.7% in 2018 (KAM, 2019). Several policy initiatives have been launched to boost the manufacturing sector in Kenya, including Vision 2030, the Kenya Industrial Transformation Plan (KITP), the National Trade Policy, and recently the Big 4 Agenda (KAM, 2019).

1.1.6 State of Food and Beverage Manufacturing Firms in Kenya

The food products sub-sector is the largest contributor to the total contribution or input of the manufacturing sector to GDP (KAM, 2020). Within the group of "others," we have subsectors such as wood and furniture, clothing, machinery, and transport equipment (KAM, 2018). As shown by KNBS 2017 data, food and beverage, the largest manufacturing mini-sector, dominated the export category, accounting for 45.2 percent of the total domestic exports in the year 2016, while industrial (non-food) supplies accounted for 27 percent. The food and beverage industry has seven sub-sectors, namely: bakers and millers; alcoholic beverage and spirits; cocoa, chocolate, and sugar confectionery; juices/water/carbonated soft drinks; dairy products; meat slaughter, preparation, and preservation; and tobacco and edible oils (KAM, 2018).

Food and beverage industries have a unique role to play in expanding economic opportunities as they are fundamental to human life and health (Vashta, 2012). The food processing industry can consequently be a key enabler of economic growth, and growth in this industry can have a direct and vital effect on the economy of Kenya as a whole. Logistics, for example, is attracting growing attention as an environment where quality and productivity gains can be accomplished in order to enhance customer satisfaction and minimize costs (Wambua, Mukulu, & Waiganjo, 2017).

There are several groups of players in this sub-sector of manufacturing. Such players operate around the country and in various sizes, with the majority operating as informal firms or enterprises (KNBS, 2018). Most of the companies in this subsector are privately owned. In terms of GDP contribution, food, beverage, and tobacco production is projected to have contributed to some 3.5 percent of GDP in 2017 (KNBS, 2018). Exports from the food and beverage sub-sector or industry were valued at Ksh. 254,686 million in 2017. During the same year, Ksh. 245,280 million was expended on food and beverage imports. The food processing industry can thus be a crucial driver of economic development for Kenya. Growth and development in the food and beverage sub-sector can have a direct and important effect on the economy as a whole (KAM, 2019).

Food-manufacturing companies in Kenya procure much of their raw materials directly from agricultural products. Consequently, an increase or decrease in both the quantity and quality of agricultural production will have important consequences for the industry. Exports of food and drink for domestic consumption accounted for 48 percent of total exports in 2017, up from 45.2 percent in 2016, while non-food manufacturing supplies stayed the dominant category of imported goods, making up 31.93 percent in 2017 (KNBS, 2018). Food and beverage imports more than doubled from 8 percent in 2016 to around 14 percent in 2017. This was because the government tried to make up for food shortages caused by a drought in the country in 2017 by letting maize be brought in duty-free (KAM, 2019).

1.2 Statement of the Problem

Due to steadily increasing globalization, Kenyan manufacturers are facing intense competition from global and foreign firms (Muiruri, Ngugi, & Kihara, 2021). In context, Kenya's manufacturing sector GDP contribution has steadily decreased from 12.05 percent in the year 2011 to 7.61 percent in the year 2020 (KAM, 2022). The food and beverage subsector were the most affected in the Kenyan economy as its performance declined by 13.4% (KNBS, 2021). Moreover, Kenyan food and beverage firms are vulnerable to SC disruptions and challenges, which are rooted in the lack of effective internal and external supply chains (Mideva & Moronge, 2019). As such, the disjointed nature of the food and beverage manufacturing subsector presents a significant challenge in relation to competitive advantage (Maina, Njehia & Eric, 2020). In manufacturing firms, supply chain integration improves value creation (Birgen, 2021). As a result, it is seen as a core factor for companies seeking to increase their competitiveness (Muthoni & Mose, 2020). So, companies have started to think about how they can better integrate and optimize their information and material flow activities and processes, both within their own companies and with their supply chain partners (Muricho & Muli, 2021).

Still, integration of the supply chain remains an uphill challenge due to the dynamics, complexity, and participation of multiple firms (Wambua, 2021). Companies are enhancing competitiveness by strategically utilizing cooperative relationships internally, with consumers and suppliers, as well as technology (Abdullah, Mohamad, & Thurasamy, 2017). As markets and/or strategies change, manufacturers must be able to adjust their supply chains in order to match their supply chain systems and management with their core value proposition to achieve a competitive advantage that is sustainable (Dubey *et al.,* 2018). This is why supply chains are changing to deal with the next threat or new idea.

While contemporary studies have addressed the vital effect of supply chain integration in augmenting the competitiveness of the business (Mellat-Parast & Spillan, 2014), little consideration has been paid to the relative importance of the competitiveness of various forms of supply chain integration with the aid of supply chain adaptability. Admittedly, food and beverage manufacturers are integrating their supply chains (Chirchir, Stephen & John, 2022). Together with SCI having no clear topology, just a few theories explained how it functions, and only a handful of studies used cross-sectional surveys as well as longitudinal research designs. In addition to the limited empirical and academic literature on cases involving SCI, this is a convincing argument for further study (Chelimo, 2019). The main goal was therefore to fill these gaps in the literature on supply chain management by establishing the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

1.3 Objectives of the Study

Both a general objective and specific objectives guided the study.

1.3.1 General Objective

To determine the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

1.3.2 Specific Objectives

1. To examine the effect of functional integration on the competitive advantage of food and beverage manufacturing firms in Kenya.
2. To analyze the effect of supplier integration on the competitive advantage of food and beverage manufacturing firms in Kenya.

3. To assess the effect of customer integration on the competitive advantage of food and beverage manufacturing firms in Kenya.
4. To evaluate the effect of technology integration on the competitive advantage of food and beverage manufacturing firms in Kenya.
5. To establish the moderating effect of supply chain adaptability on the relationship between supply chain integration and competitive advantage of food and beverage manufacturing firms in Kenya.

1.4 Research Hypotheses

A research hypothesis is a provisional assertion pertaining to the association among a set of variables. The study utilized null hypotheses. These null hypotheses were valuable since they can be examined to check whether or not two measurable variables have a relationship (Rouder, Speckman, Sun, Morey & Iverson, 2009). As such, this could inform if the findings were obtained by chance or by manipulating or altering phenomena. This technique has the benefit of testing the null vs an alternative distribution which embodies one particular theory, consequently presenting a validation of such a theory (Newell & Rakow, 2011). As a result, the null research hypotheses were as follows:

H_{01}: Functional integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

H_{02}: Supplier integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

H_{03}: Customer integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

H_{04}: Technology integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

H_{05}: Supply chain adaptability has no significant moderating effect on the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

***H_{05i}*:** *Supply chain adaptability has no significant moderating effect on the relationship between functional integration and the competitive advantage of food and beverage manufacturing firms in Kenya.*

***H_{05ii}*:** *Supply chain adaptability has no significant moderating effect on the relationship between supplier integration and the competitive advantage of food and beverage manufacturing firms in Kenya.*

***H_{05iii}*:** *Supply chain adaptability has no significant moderating effect on the relationship between customer integration and the competitive advantage of food and beverage manufacturing firms in Kenya.*

***H_{05iv}*:** *Supply chain adaptability has no significant moderating effect on the relationship between technology integration and the competitive advantage of food and beverage manufacturing firms in Kenya.*

1.5 Significance of the Study

This research was conducted at a time when Kenyan food and beverage manufacturers are confronting multiple challenges. Various food and beverage production companies have shut down; some have relocated operations to other countries, whereas others are trying to stay afloat. The food processing industry can thus be a crucial driver of economic development for Kenya. Growth and development in the food and beverage sub-sector can have a direct and important effect on the economy as a whole (KAM, 2019). Of importance, Kenya's government aims to ensure that the manufacturing sector contributes 15% of the country's GDP by 2022. Nevertheless, the manufacturing sector’s contribution to GDP has been on a substantial downward course over the last few years (PBO, 2018). The following stakeholders, as well as the food and beverage manufacturing firms, which are primarily privately owned and require more supply chain integration and supply chain adaptability to achieve their set goals and objectives and remain competitive, could benefit greatly from this study:

1.5.1 Policy Makers and Government

The study would enable policy makers and the government to devise policies that would allow food and beverage manufacturers to integrate supply chains and thus help avoid losses that impact the efficiency of these businesses and eventually the economy as a whole. The findings of the study would help the government take a more systematic approach to ensuring the growth and development of supply chain integration in Kenyan food and beverage manufacturing firms in order to maintain a competitive edge. The research would provide useful data that would assist the government, as well as several other regulatory agencies, in developing and implementing policies that would promote successful supply chain integration in the food and beverage industry.

1.5.2 Scholars, Researchers and Research Institutions

The findings of this research are of great importance to scholars, researchers, and research institutions such as the Kenya Bureau of Standards (KEBS), the Kenya National Bureau of Statistics (KNBS), and the Kenya Institute of Supplies Management (KISM). The findings of this research are of great importance to those working in the field of supply chain management, as they will assist them in the design of systems that will enable better supply chain integration mechanisms for the integration of customers, integration of functions, integration of suppliers, and integration of technology. The research findings would also add to the existing literature on adaptability of the supply chain, supply chain integration, efficiency, performance, and competitiveness among food and beverage manufacturing firms. The goal of this research is to find out things that academics in the logistics and supply chain fields would find useful.

1.5.3 Food and Beverage Manufacturing Firms

The research findings would enable supply chain executives in food and beverage manufacturing companies to gain a greater understanding of supply chain integration and processes to ensure secure and reliable distribution of goods and services. The research could provide insights to manufacturing firms' management that will help them execute their core business functions more efficiently and effectively. As a result, the industry's competitiveness, performance, and profitability could improve. It can also provide insight into the different facets of supply chain integration that can be used to gain a competitive edge and achieve operational excellence. The research also outlined the important performance metrics for assessing, measuring, and monitoring the efficiency, performance, and competitiveness of the supply chain.

1.5.4 Other Stakeholders

Stakeholders, practitioners, and businesses would benefit from this research because they will be able to assess the supply chain integration capabilities that managers are introducing to adapt to market dynamics and the degree to which they are influencing the efficiency, performance, and competitiveness of their firms. Suppliers may benefit from the study as they gain a better understanding of how manufacturing companies perform their operations in terms of supply chain integration. As a result, they may be better able to schedule their operations to reduce interruptions of manufacturing activity in their customers' factories.

Supply chain practitioners and professionals can benefit from generating new knowledge regarding supply chain integration at a time when supply chain management is consistently evolving in response to challenges as well as dynamics that the food and beverage industry is facing in particular, the much more recent of which is the COVID-19 global pandemic. The results could also help the country's supply chain management grow and improve. The results of the study would be useful to shareholders in assessing managerial techniques and the degree to which supply chain integration in food and beverage manufacturing firms can be optimized to increase profit margins.

1.5.5 The Researcher

The researcher aims to gain value from this study by acquiring evidence-based knowledge on supply chain integration and its practical implementation in the food and beverage manufacturing operating environment. Scholastically, the researcher provided valuable insights on the topology of integration in supply chains that have a propensity for enhancing competitiveness, and the findings were published to serve as a framework for reference in the future by other scholars and academics interested in conducting studies in the areas of competitive advantage and supply chain integration. The research (study) is also planned to be part of the researcher's degree program for the award of the Doctor of Philosophy in Supply Chain Management.

1.6 Scope of the Study

The research was confined to the Food and Beverage Manufacturing sub-sector of the Kenyan manufacturing sector registered by KAM (Kenya Association of Manufacturers) (2020). The food sub-sector performance declined by 10.8%, mainly due to the low availability of raw materials (KNBS, 2018). Moreover, the food products sub-sector is the largest contributor to the total contribution or input of the manufacturing sector to GDP (KAM, 2020). Similarly, preliminary research, conversations with industry professionals, and a review of relevant literature all indicated that the food and beverage sub-sector of manufacturers had developed supply chain integration frameworks and structures that made it possible to investigate the subject at hand. In addition, the research has direct policy consequences, and its results can be put into practice immediately to produce positive outcomes. Further, the Kenyan government would achieve rapid success in areas such as manufacturing transformation, revenue generation, and employment generation in this sub-sector (GoK, 2019). The research was conducted in all the counties to help concentrate on access to critical information on the supply chain integration activities and processes [functional integration, supplier integration, customer integration, and technology integration] of food and beverage manufacturers across Kenya. This helped evaluate the efficiency and performance of the firms as well as the correlation between competitiveness, supply chain integration, and supply chain adaptability as moderator. The research was conducted on 139 respondents from food and beverage manufacturing companies in Kenya between December 2020 and August 2021.

1.7 Limitations of the Study

The research had a few limitations. To begin with, it was quite a challenge to secure time with the supply chain managers who were the key respondents in this study. The researcher, however, gave these managers enough time to respond to the questionnaires. Moreover, the researcher encouraged them to respond because of the strategic benefits of the study. The researcher also ensured that follow-ups were made to ensure prompt filling of the research questionnaire items. Furthermore, some executives had such a negative perception regarding filling out the questionnaires due to the strategic aspect of the study. The researcher, nonetheless, approached the top management as well as the CEOs and invited them to take part in the study. The researcher also sought the assistance of people who are known to the respondents.

Thirdly, out of concern that the details might be exposed to their competitors, the study’s participants were reluctant to fill out the questionnaire. However, these issues were countered by assuring the participants that the data was to be used with the support of a letter of authority to obtain data from the University for academic purposes and a research permit (license) from the National Commission for Science, Technology, and Innovation (NACOSTI). Fourthly, due to the fear and risk of the spread of COVID-19, like many organizations across the world, the management of the food and beverage manufacturing firms were concerned with the printed copies of questionnaires distributed during the time of the pandemic. This was countered by automating the research questionnaire through the online Google Forms, which were emailed to the respondents as agreed with the various participants to avoid one-on-one meetings, which were risky and not recommended to help reduce the spread of COVID-19 as guided by the Ministry of Health.

Fifth, due to the non-closure clauses signed by the employees of numerous food and beverage manufacturing firms, accessing information via the document [reports] analysis guide proved difficult. This was then countered by deliberations with the top management of the companies (food and beverage) about the best ways to obtain relevant information. Consequently, it was agreed that the heads of the various departments would be invited to facilitate in making available an estimated average range of the statistical data sought in the document [reports] analysis guide. For this reason, the document analysis guide was dropped and the data sought included in the questionnaires. Sixth, the research utilized managerial self-reported data, and this can be biased or provide incorrect information. The cross-sectional nature of the research made it difficult to determine cause and effect relationships or monitor changes over the course of time. Additionally, the analysis was unable to evaluate the surveyed firms' levels of competition. Finally, the research did not take shifts in marketplace conditions, disruptions in politics, or natural disasters into consideration as external variables that could impact company's capacity to compete.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a literature review focusing on a theoretical review of the theories underpinning the study; the conceptual framework showing the link between independent (predictor) variables, moderating variable and dependent (predicted) variable; a literature review of study variables; and an empirical review and critical analysis of existing literature with regard to supply chain integration, supply chain adaptability, competitive advantage, and gaps in research.

2.2 Theoretical Review

This part of the chapter presents different theoretical perspectives that undergird the current research. A theoretical review is a set of interrelated concepts, including theories and models, but often not as well developed (Ravitch & Riggan, 2016). A theoretical review of the framework directs the study and specifies whatever the investigator will evaluate or measure and the particular statistical links the study will explore. Theoretical frameworks are of major significance in deductive, hypothetical-testing studies. The theoretical framework or review of these types of studies must be very thorough and well worked out (Varpio *et al.,* 2020). As such, theories are developed to describe in detail, predict, as well as comprehend phenomena, as well as to question and expand current knowledge well within the constraints of crucial confining assumptions.

2.2.1 Systems Theory

General System Theory was initially developed in 1972 by the Hungarian biologist Ludwig Von Bertalanffy. From such a sociological viewpoint, the theory of systems is an institution's cross-disciplinary strategy (Von Bertalanffy, 1972). There are four elements in a sociological system, notably: attributes, objects, and internal object-environment interactions (Osifo & Omoregbe, 2011). Components are regarded to be pieces, components, or variables within the system (Zenko et al., 2013). Characteristics are the features, aspects, and qualities of a device as well as its components. Each system contains internal connections between its components that exist.

When referring to a system or organization, "functional integration" relates to the collaboration, coordination and integration of several functions or processes that are housed within it (Bueno, De Toledo & Da Silva, 2020). Systems theory is a type of theoretical framework that places an emphasis on the interconnectivity and interdependence of various parts of a system, as well as the manner in which these parts interact with and influence one another. The approach of systems theory in the perspective of integrating functionally within entities is going to be investigated as part of this research (Fatorachian & Kazemi, 2018).

Numerous disciplines, including biological sciences, ecology, sociology, or even management, have all found applications for systems theory (León & Calvo-Amodio, 2017). Systems theory has been utilized in the fields of organizational behavior and management with the purpose of comprehending and analyzing the intricate interrelationships as well as interdependencies that exist between the various functions and procedures that are carried out within organizations (Fatorachian & Kazemi, 2021).

Based on the theory of systems, an organization can be conceptualized as a system (León & Calvo-Amodio, 2017). This system is comprised of numerous component parts (including departments, functions, and processes), all of which interact with one another and have an effect on one another in order to accomplish the objectives of the organization (León & Calvo-Amodio, 2017). The capacity of these different parts of the organization to collaborate with one another and coordinate their actions is critical to the overall efficiency of the business as a whole. In the field of systems theory, there are a number of fundamental ideas that can be applied to functional integration (Osifo & Omoregbe, 2011).

The idea of feedback is one of these, and it describes the process by which information is conveyed from one portion of the system to the other, and then utilized to reconfigure or regulate the system's behavior (Gorkhali & Xu, 2019). Feedback refers to the process by which information is conveyed from one component of the system to another. Feedback is essential for the system's continued equilibrium and stability, and it can also be applied to the process of adapting and modifying the system that responds to changes in the environment or within the system itself (Wang, Li, Wang & Jones, 2012). Evolving attributes are a concept that is essential to systems theory and refers to the character traits or behaviors of a system which are not prevalent in the independent parts of the system but unfold as a direct consequence of the interplay between those components (Jaradat *et al.,* 2017). This is an additional important concept in the field of systems theory. Evolving properties can either be beneficial or harmful to the system, and they have the potential to significantly alter both the system's performance and its effectiveness.

In an environment, a system exists (Zenko *et al.,* 2013). This system is a set of artifacts within an environment that affect one another and shape a larger trend that is distinct from each of the components (Puche *et al.,* 2016). A system may also be viewed as a set of individuals working together to serve a particular function. A system is isolated by a boundary from its setting, separating what would be in the system and what is not. The open system theory (Gunasekaran & Choy, 2012) looks at how different departments and people in an organization interact with each other and how the organization interacts with the outside world.

An entity is a system created by an efficient input-output system in which the pressure from the output is used to initialize the system using the open systems approach (Lindskog, 2012). Another part of the definition of the open framework focuses on the effect of adjustments within an enterprise. All other areas of the organization are influenced by the changes in one part of the organization (Nilsson & Gammelgaard, 2012). The primary role of management in an organization is to serve as a boundary-linked pin within the organizational structure between the different subsystems. The theory of systems focuses on the position of complex systems in society, nature, and science, and is a structure that can be used to explain and examine a group of objects that act as a unit that results in some result (Rudolf, 2011).

A system can refer to a culture, an entity, or any artifact of information or electromechanics. In general, it refers to structured social units that project results from inputs that communicate with outputs to provide results (Helou & Caddy, 2006). Companies should be agile by using system theory, learning, and the regulatory skills needed to make sure that a certain level of efficiency and profitability is improved. This is important for a company's survival and competitive success, which Caddy and Helou (2007) define as the timely delivery of the right product to the right customer at the right price and location.

Functional integration describes the degree to which divisions are interrelated and therefore are able to react rapidly to changes, and this principle has been important to understanding how departments or functions in food and beverage manufacturing companies are integrated (Nilsson & Gammelgaard, 2012). The theory also shows how important it is to reduce the chance of conflicts between roles and processes by getting all parts of the system to work together well. Contact is an important part of this (Jaradat *et al.,* 2017).

In addition, the system specifies the distribution of resources, establishes priorities, and gives corresponding accountability to the unit while defining possible synergies because it exerts control throughout operational excellence (Defee *et al.,* 2010). Perhaps every system can be characterized with inventiveness, which is the system's ability to recognize and correctly implement changes in its global environment. As the new system gets more complicated, companies are more likely to combine their external and internal processes to help them reach the goal of their supply chain (Langevin & Riopel, 2005).

Managerial integration, organizational integration, and geographical integration may take the form of these integrations. Unit theory makes it more competitive for companies to incorporate consumers and customers into the supply chain (Liu, Wang, & Zhang, 2012).

Integration is a trait of businesses that have closely connected their internal processes and specific supply chains to their external customers and suppliers (Mohammadi *et al.,* 2015). Thus, in system theory, an interpretation of functional integration is better suited. Puche *et al.,* (2016) demonstrate that the application of a systems approach to functional integration is based on the concepts that control the theory's viability.

The organizational (autonomous) units controlling the different output elements embody the first concept of the theory. A critical feature of the theory of modular manufacturing is how complex structures can be separated into smaller components and evaluated separately to improve their performance and competitiveness. To this point, Helou and Caddy (2006) applied the theory of systems to the production concepts of separating the complex system into smaller systems and to the management system in order to increase the quality and effectiveness of the production process. This note observes that the systems theory fits current investigations of supply chain integration-based manufacturing.

The second premise of the theory is that there are no barriers to handling various processes and roles and, hence, the need to resolve problems in the system through careful planning. Via the excellent knowledge exchange mechanism and core components of supply chain relationship management, proper communication in the supply chain takes place. Autry & Golicic (2010) noted that manufacturing supply chains would be affected by communication problems that result in poor performance without good knowledge sharing amongst their internal functions. Puche *et al.,* (2016) emphasize that collaboration is required at both internal and external levels in the supply chain system.

The investigation of how different parts of an organization work together functionally can make use of aspects of systems theory in a number of different ways (Gong, Jiang & Jia, 2021). One of the most important ways to do this is to use systems thinking to conduct an analysis of the interrelatedness and interdependencies that exist between the various functions and processes of the organization, as well as how these ties influence the organization's overall performance (Zanon & Carpinetti, 2018). For instance, one application of systems theory is to gain an understanding of how shifts in one part of an organization (like a department or function, for instance) can have an effect on other components of the organization and how the enterprise as a whole can adjust to and react to these shifts in the environment. This can be accomplished by making use of various tools and methods, also including causal loop infographics, that also help to understand and conceptualize the feedback mechanisms and distinctive characteristics that are contained within the system (Ivanov *et al.*, 2018).

One more way that systems theory could be attributed to functional integration is by utilizing it to design and put into action organizational structural elements and procedures that are more efficient (Bueno, De Toledo & Da Silva, 2020). For instance, systems theory can be utilized to identify as well as address impediments or inadequacies in the movement of information or capabilities within an entity, or it can be utilized to design or configure organizational structures that are probably more suited to the requirements and objectives of the organization. Both of these applications are possible thanks to the application of systems theory. In conclusion, systems theory is an important theoretical framework that can be used to comprehend and investigate the functional integration that occurs within organizations.

When the concept of systems thinking or theory is applied to the research of functional integration, researchers are able to acquire a more in-depth comprehension of the intricate interrelationships as well as interdependencies that exist within organizations, as well as discover ways to enhance the efficiency and productivity of these underlying structures. Supply chain integration confounds the idea that competitiveness, based on external integration systems and the internal integration systems in place, can only result in improved firm efficiency. This highlights the importance of integrating logistics to improve communication with customers and suppliers within the business. The theory of systems offers an interpretation of functional integration within companies manufacturing food and beverage in Kenya (Rudolf, 2011). The information above shows how important system theory is for studying how food and beverage companies in Kenya integrate their supply chains and how competitive they are.

2.2.2 Resource Based View Theory

As shown by Birger Wernerfelt and Barney, who formulated this theory in 1984, when rivals do not find alternate ways to obtain the benefits provided by a resource, the resource is defined as not substitutable. Resources, skills, and strategic assets are the main topics addressed by resource-based theory (Wernerfelt, 2014). Companies that pool their resources in a specific way will gain an advantage over their rival companies that are unable to do so, according to Dyer and Singh (1998). Companies can achieve a market edge and gain a sustainable competitive advantage by owning limited capital and properties and excelling in their core competencies and capabilities.

The Resource-Based View (RBV) Theory is a theoretical framework that places primary emphasis on the capabilities and resources that are already present within an organization as the most important factors influencing that organization's level of success (Wang *et al.*, 2016). The RBV Theory proposes that an organization's one-of-a-kind resources, assets and capabilities, including its patent rights, brand recognition, and corporate culture, can be capitalized on to establish a competitive edge and maximize superior performance (Xu, Huo & Sun, 2014). This theory notes that, since they have access to strategic capital, businesses achieve a continuous competitive advantage. Such assets have distinctive features that are unusual, important, cannot be imitated, and do not have a near replacement (Lai *et al.*, 2012).

A competitive advantage is created when these circumstances are met. This theory discusses the competitive advantages of heterogeneous resources (physical, financial, technical, human, reputational, and organizational) and capabilities held by the corporation (Grant, 1991). These tools and skills make up the company's core competence and, in the long run, give it a sustainable competitive advantage (Steinle & Schiele, 2008). This same Resource Based Theory (RBT) suggests that deploying peculiar firm resources, which seem to be the firm's strengths and weaknesses that enable it to achieve its goals and objectives, results in long-term competitive advantage (Wang & Sengupta, 2016). Input, conversion, and performance capital can range from tangible assets such as machines and facilities to intangible assets such as goodwill, organizational characteristics, protocols, processes, capacities, and expertise (Agyapong *et al.*, 2021).

RBT is recognized as among the most frequently cited and prominent theories of management. It recognizes that a firm's resources are the most important source of its long-term competitive advantage (Leonidou, Palihawadana, & Theodosiou, 2011). The resource-based view (RBV) theory has been widely utilized to investigate the degree to which businesses might gain competitive advantages. Such an advantage can be largely determined by its ability to distribute its resources and capabilities in an appropriate manner; this is rare and valuable, cannot be supplanted, and is extremely challenging to try and emulate (Barney & Mackey, 2016). Many of these resources and capabilities are frequently viewed as both tangible and immaterial assets, such as managerial skills, procedures (processes), and company routines (Barney & Mackey, 2016).

Because each company's resources and capabilities differ, the efficiency and performance of each subsystem will vary as well. Amit and Schoemaker (1993), arguing that even though the aforementioned resources are defined as a set of factors owned and/or controlled by the firm, capability is characterized as the potential to allocate and disseminate these kinds of resources. According to Zegarra (2016), the sources of long-term competitive advantage can be found in the effects of each organization's process, so they must be sought both within the organization and in the interaction with the environment. Moreover, Mweru and Maina (2015) argue that there are enough conceptual proposals in the standard literature that unequivocally describe these internal as well as external influences and suggest systematic frameworks for exploration.

Suppliers were identified by Kozlenkova, Samaha, and Palmatier (2014) as a special type of resource, specifically an organizationally non-transferable resource whose function was to increase the efficiency of the organization's other resources. Companies should make sure that their capital, which includes tangible, intangible, and capability properties, can still give them a long-term strategic advantage. Resources can be regarded as inputs that allow firms to undertake their activities. Enterprises' strategic decisions in the external market climate are influenced by internal resources and skills. As per RBV, not all of a company's capital would be strategic. Madhani (2010) says that there will only be a competitive advantage if there is an extrusion method (different skills among businesses) and resources that can't move.

The resource-based view asserts that a company's drivers of sustainable competitive advantage are both internal and external, i.e., firms have unique and valuable resources and skills that are exceptional, difficult to replicate, abstractly substitutable, and portable, and that they can achieve and maintain competitiveness (Solesvik, 2018). Resource-based incentives are often important in a company's decision to support cooperative partnerships. The RBV Theory has found some applications in the research area of vendor integration, that also encompasses the linkages of a firm's supply chain as well as the establishment, and development of closer relationships with its vendors (Lai *et al.,* 2012). The application and relevance of the RBV Theory can be found in this area. This goal can be accomplished in a variety of ways, including through the formation of partnerships as well as joint ventures, the exchange of resources and information, among others (Yuen *et al.,* 2019). In accordance with the RBV Theory, the alignment and integration of suppliers can provide organizations with a significant source of valuable competitive advantage.

An organization can gain access to a variety of resources and capabilities, some of which may be difficult or expensive to develop internally, if the organization integrates with its suppliers (Yu *et al.,* 2017). For instance, a company might decide to integrate its operations with those of a supplier that possesses advanced technology or specialized knowledge in a particular field. This would make it possible for the company to provide its customers with products and services that are either new or improved (Yang, Ho & Chang, 2012). Optimizing the supply chain as well as cutting down on the number of middlemen are two additional benefits that can accrue to an organization as a result of integrating its suppliers (Chae, Olson & Sheu, 2014). This can help the company save money and operate more effectively. In addition to this, it has the potential to enhance the agility and speed of the supply chain, making it possible for the organization to react more quickly to shifting market conditions and the varying demands of its customers (Yu *et al.*, 2017).

Notwithstanding, there are also challenges and risks attributed to supplier integration, including the prospects for reliance on a single vendor as well as the danger or risk of losing control over vital resources (Nakano, Akikawa & Shimazu, 2013). These risks and challenges are discussed in more detail in the following paragraphs. Organizations could perhaps meticulously appraise their core competencies and then identify prospective partners that can complement as well as augment these resources in order to mitigate all such risks plus maximize the benefits to be accrued from supplier integration (Yu, Chavez, Jacobs & Feng, 2018). Only then will they be able to effectively mitigate these risks and realize the full potential of supplier integration. In addition to that, they need to establish transparent communication channels with their suppliers and establish goals and objectives that are beneficial to both parties (Koufteros, Vickery & Droge, 2012).

As such, the RBV Theory proposes that the integration of suppliers can be a significant source of sustainable competitive advantage for businesses (Wiengarten *et al.*, 2013). This is because it enables organizations to gain access to a wider variety of resources, assets and capabilities while also enhancing their levels of efficiency and adaptability. However, in order to minimize the risks and make the most of the opportunities presented by this approach, meticulous planning as well as control are necessary (Wiengarten *et al.*, 2013). Companies are increasingly aware of the interlinkages that inevitably occur between all the institutional operating processes of an organization and those of suppliers and clients (Wang *et al.*, 2016).

More and more businesses are establishing clear ties with suppliers and even with consumers because of the advantages of such linkages in order to enhance efficiency at the industry level (Eltantawy, 2005). The study talks about supply chain links that a business makes with important parts of its supply chain to improve the process and/or quality of supplier inputs into the business and company outputs to customers (Koufteros, Vickery & Droge, 2012). These links are established by adopting practices, which include the participation of suppliers and consumers in product design activities and capital expenditure in enterprise resource planning systems to facilitate information exchange throughout the supply chain (Rungtusanatham *et al.,* 2003).

In a number of activities, many companies have profited from closer involvement with their suppliers. This is particularly true of food and beverage manufacturers in Japan (Dyer, 1996). Early supplier involvement lets suppliers know and understand what the customer needs and how decisions are made, which helps better use of resources. Supplier integration entails the supplier's long-term commitment as well as adequate technical preparedness (Espino Rodriguez & Padrón Robaina, 2006). The growth of suppliers is fundamentally a significant criterion for the performance of an integrated manufacturing supply chain. It requires the focal firm's proactive effort and participation and is "mutually beneficial" for both parties (Wiengarten *et al.,* 2013).

From an enlarged view of the RBV, theoretical support for the definition of supplier integration is given. Although the company's RBV suggests it is the resources and capabilities within the company that are a source of competitive advantage, it also suggests that cooperation with external entities can increase resources and capabilities. Capron, Dussauge, and Mitchell (1998) say that a business can learn and come up with new ideas either by growing on its own or by working with other businesses. Although internal expertise is created by the activities of companies in various fields such as manufacturing, R&D, and marketing, among others, external information sources include other companies, suppliers, consumers, and scientific and technological developments (Wiengarten *et al.,* 2013).

The broader perspective that indicates that essential resources are not inherently located inside the particular firm but can cross organizational boundaries (Das, Narasimhan, & Talluri, 2006) provides the idea of supplier integration with additional theoretical help. The main reason for more supplier integration is the realization that the source of a business's competitive advantage may lie in the resources and relationships it has with other businesses. The participation of suppliers in operations such as product design, continuous improvement, and other joint activities has a positive effect on efficiency (Mesquita, Anand & Brush, 2008) and provides a strategic and the competitive advantage for all supply chain participants.

As outsourcing intensifies, not only for parts but also for the design and production of component parts, there is a growing dependency on suppliers. Early participation by suppliers has the ability to minimize design and production costs, reduce time to market, reduce associated risks with supply instability, as well as boost consumer value (Eltantawy, Giunipero & Fox, 2009). A seamless integration of suppliers means that the resources and capacities of the whole supply chain are used. This is thought to be a major factor in how competitive food and beverage manufacturing firms are (Salema & Buvik, 2016).

2.2.3 Social Exchange Theory

The theory of social exchange dates back to 1958, when George Homans, the American sociologist, published a paper entitled "Social Behavior as Exchange." By tradition, two separate mechanisms have been suggested in the theory of social exchange by which individual actors assess results in relation to some internal standard (Blau, 1964): first, a cognitive assessment in which actors equate actual results with anticipated results (Cook *et al.,* 2013); second, a normative or moral appraisal in which actors equate real effects with justice based on a certain normative concept such as fairness, success, or need (Muldoon, Liguori, & Bendickson, 2013). With the exception of economic exchanges, people who engage in social exchanges shouldn't expect to get something right away. Instead, they should rely on the goodwill of the other person, which will pay off in the long run (Cropanzano *et al.,* 2017).

The Social Exchange Theory is a social psychologist theory that describes how social relations are established, sustained, as well as rescinded according to the implied costs and advantages of the association for each person (Chou & Hsu, 2016). Individuals are said to start engaging in social exchange with other people when they have the belief that the potential advantages of the exchange will exceed the total cost of participating in the exchange (Yang *et al.*, 2021). The establishment of closer relationships with consumers and the incorporation of consumer feedback as well as preferences and tastes into the composition, design and the delivery of goods and provision of services is an example of an application of the Social Exchange Theory that can be found in the field of consumer integration, which is also known as customer integration (Cortez & Johnston, 2020).

In line with the Social Exchange Theory, integrating customers into business processes can be an efficient way for companies to generate value not only for themselves but also for the people they serve (Shiau & Luo, 2012). By integrating and aligning with customers, businesses can gain a more thorough understanding of the needs and preferences of those customers, which can then lead to the creation of goods and offering services which are more intricately aligned with both the requirements of those consumers (Shi, Feng & Li, 2021). This can contribute to increased satisfaction among customers and loyalty, which in turn can lead to increased levels of customer retention and subsequent business.

Furthermore, customer integration could indeed assist organizations in recognizing and responding to any difficulties or issues that customers may be going through, thereby contributing to an overall improvement in the quality of the experience they have with the company (Busser, Shulga & Kang, 2019). Entities can affirm their dedication to guaranteeing the satisfaction of their customers and create stronger, perhaps more beneficial relationships with those consumers if they effectively seek out and respond to the feedback provided by their customer base (Priporas *et al.*, 2017).

Notwithstanding, there are indeed challenges and risks pertaining to customer integration, including the possibility that customer expectations will surpass what the entity is able to deliver (Shiau & Luo, 2012). In order to mitigate such risks as well as reap the most of the economic advantages of consumer integration, businesses need to set up transparent communication channels with their customers and collaborate with them to establish goals and objectives that are beneficial to both parties (Chou & Hsu, 2016). They should also provide dependably high quality of products and services, as well as be transparent but also responsive to the feedback provided by customers, in order to sustain the satisfaction, delight and loyalty of their customers (Shi, Feng & Li, 2021).

Zafirovski (2005) gives us another way to look at social networks. He says that sometimes they are used to study how businesses or people talk to each other. He does this by describing the many casual ties that tie managers together. In the context of marketing networks, these prominent opinions were mainly established. According to Nammir, Marane, & Ali (2012), in supply chain management, the principle of social exchange is used as a powerful method when evaluating buyer-supplier engagement. For instance, in making informed decisions about how to deal with customers and suppliers, this is directly applicable.

A consumer should make his agency interesting when engaging in an exchange and should concentrate on social norms such as confidence and devotion alongside economic transactions (Kraiselburd, Pibernik & Raman, 2011). The likelihood of a continuation of this relationship is greater in a cooperation-sharing relationship. Reliable supply is maintained by a stable, continuous, and robust trade relationship. Also, López-Navarro, Callarisa-Fiol, and Moliner-Tena (2013) say that the main goal is to become a "favored buyer" instead of just a "normal buyer" or "exit buyer," because a "favored buyer" gets special care and a guaranteed supply that looks for and deals with threats all along the supply chain.

According to Mohanty and Gahan (2015), the theory of social exchange may be realistic, but as mentioned earlier, there is only a limited emphasis on social norms and actions. The theory of social exchange also describes behavioral aspects, which are important because they lead to excluded and enhanced business relationships, which in turn lead to an improvement in the efficiency of the company. In two places, the Social Exchange Principle makes assumptions (Shiau & Luo, 2012). First, human nature, and second, the consistency and nature of relationships. People think that the essence of human behavior is that people want to get paid and win prizes while also trying to avoid getting punished.

The basic principle, according to Zolkiewski *et al.* (2006), is that human beings aim for a favorable result in order to maximize their level of fulfillment while contemplating the benefits and costs of a partnership. In addition, human beings become rational and therefore will try to manipulate their development to ensure particular goals that optimize their own advantages (Mitchell, Cropanzano & Quisenberry, 2012). Furthermore, it is believed that human expectations vary over a long period of time when calculating costs and relevant incentives and are unique to each person. Furthermore, Liao (2008) noted that the Social Exchange Theory makes assumptions regarding the existence of relationships. The theory of social exchange says that relationships between people in transactions are two-way and depend on each other.

In their study on vendor selection by integrated fuzzy MCDM techniques with independent and interdependent relationships, Yang *et al.,* (2008) established that in a totally integrated network, all cross-criteria of the processes are intrinsically related to each other for both the advantage and disadvantage of the relevant parties. In a given climate, human beings are thus attuned and mutually reliant on each other. For this reason, Cropanzano and Mitchell (2005) noted that transactions are bidirectional within the theory of social exchange, implying that there is reciprocal exchange of material objects, where something in a given setting has to be given in exchange for something else.

Furthermore, the principle of social exchange suggests that people only engage in an exchange when they expect their benefits from it to justify the cost of participation (Mandal, 2016). It means that the relationship between customer and supplier is reciprocal and that there is an equal transfer of information, including benefits. Nevertheless, given the lack of contractual commitments, there is no guarantee in the Social Exchange Theory for mutual benefits after investing expenses or assets (St. John *et al.,* 2016). So, the goal of an exchange would be to maximize benefits and reduce costs at the same time in a given environment, which would be good.

A central point of the theory of social exchange is that the transaction between the buyer and the seller is not equally successful under all circumstances, under which the relationship must reconfigure its consistency in a highly unpredictable setting to overcome dramatic shifts (Wei, Wong & Lai, 2012). while consumer engagement is important for social content marketing exchange, relationship quality, and relationship efficiency. The principles of relationship as well as exchange really aren't opposites; across relationships there is an exchange of goods, information, and technology along with social exchange (Davis-Sramek *et al.*, 2020). Further, Dwyer, Schurr, and Oh (1987) recognize the difference between partnership exchanges and discrete exchanges.

To conclude, the Social Exchange Theory proposes that improving customer satisfaction, delight and loyalty, as well as gaining a superior awareness of consumer needs and preferences, can be an effective way for businesses to generate value for both their customers and the firms (Zeglat & Shrafat, 2022). This can be accomplished through the use of customer integration, which can be an effective way for businesses to create value. But even so, in order to minimize the risks and make the most of the opportunities presented by this approach, prudent strategic planning as well as management are vitally important (Davis-Sramek *et al.,* 2020).

Customers are often regarded as secondary customers or co-producers, and therefore, high customer participation, such as customer engagement, ensures that during a service meeting, customers present themselves mentally, cognitively, as well as emotionally. A customer is delighted by the organization they support and is positive and optimistic about the role they play. He or she is also influenced by the clients of the service, the business, the brand, or the other clients. Absorption means that the client is completely focused, happy, and deeply involved in what he is doing.

2.2.4 Relational Exchange Theory

In 1994, Morgan and Hunt introduced the theory of relational exchange extensively to model long-term customer-bank relationship drivers and describe the personal and social exchange of benefits and costs. Though critical to supply chain production activities, technological systems do not function in isolation. Various technical processes frequently interact in unexpected ways, necessitating imagination and creativity (Gottschalk & SolliSther, 2005). Consequently, logistics information systems are better understood from the viewpoint of relational theory. As stated by Palvia (2009), the theory attempts to clarify competitive advantage and superior efficiency by concentrating as units of study on dyads and networks of businesses. Patnayakuni, Rai, and Seth (2006) say that relational rents are more likely to happen when partners are more committed to routines for sharing information between companies and to relationship-specific properties.

There is no question that knowledge sharing is a feature of information systems implemented by organizations. Consequently, as organizations implement uniform standards for particular structures, they establish relational standards as partners that enable the principle of relational exchange to be implemented (Kern & Willcocks, 2000). Furthermore, relationshipism fosters the technological communication of creativity and innovation (Wang *et al.,* 2015), allowing a variety of information systems to be incorporated by extension. Blackhurst, Dunn, and Craighead (2011) found that relationship skills like having established contact networks, tried-and-true supplier management systems, and monitoring systems are all linked to a stable supply chain. In this study, this relational view was used to figure out how advanced relational competencies could improve organizational efficiency.

Given the fact that it is well adapted to software developments as well as the absorption of information technology as well as information systems like those used in manufacturing supply chain operations, relational theory was especially considered important to the present study (Chen, Wang & Chan, 2017). In addition, the supply chain information infrastructure, the inter-organizational information system, can disseminate real-time demand and supply information across the supply chain, thus enhancing efficiency. Message-based applications that transfer information across partner technologies, such as fax, e-mail, and electronic data interchange (EDI), are some of the infrastructures required. Tang and Zimmerman (2013) found that electronic hubs, platforms, or marketplaces that let people buy goods or services online make it easier for people to work together.

Integration of supply chain information systems into an organization has a big effect on how well it works (Qrunfleh & Tarafdar, 2014). The main benefit is that it makes it easier for stakeholders to work together, improves the flow of information, and makes the supply chain more efficient as a whole. In every sector, however, the use of information systems needs some innovativeness. For companies, there's been a growing trend to create external connections based on knowledge sharing (Barratt & Oke, 2007). This is the contact domain. The flow of explicit information refers to communication, which can be seen as a transmission mechanism (Modi & Mabert, 2007). This means exchanging meaningful and relevant knowledge formally as well as informally.

Another area where the Relational Exchange Theory can be put to use is in the context of technology integration. This is the process of combining different kinds of technology and different kinds of system applications within an organization in order to make it more efficient and effective (Safari & Albaum, 2019). Integration can refer to the process of combining different types of technologies, such as those involving hardware, software, and networking, as well as information and data systems (Wan *et al.,* 2008). In line with the Relational Exchange Theory, the linkage or integration of new technologies can be an efficient method for businesses to generate value not only for themselves but also for their stockholders, including their employees, consumers, and partner organisations (Palvia, 2009).

Integration with numerous systems and technologies enables businesses to gain access to a wide variety of resources and capabilities, some of which may be difficult or expensive for the organization to develop on its own (Qrunfleh & Tarafdar, 2014). An enterprise may, for instance, choose to link with a technology service provider that possesses advanced technology in a specific field or specialized expertise in that field (Chen, Wang, & Chan, 2017). This would enable the organization to provide its customers with products and services that are either new or improved. Integration of technology can also help organizations improve their productivity and performance by simplifying their processes and cutting down on the proportion of manual labor that is considered necessary (Paulin & Ferguson, 2010).

Additionally, it has the potential to enhance the precision and speed of information flow, making it possible for the organization to react more quickly to shifting market trends or conditions and the dynamic requirements of its customers (Aris, Arshad & Mohamed, 2009). Although, there are challenges and risks correlated with the integration of technology, such as the possibility of becoming dependent on a single technology and maybe a provider and the danger of losing control over essential resources (Chin, 2013). Companies should meticulously evaluate their core competencies and then identify possible partners who can complement, augment and help boost these resources in order to mitigate these hazards, risks and optimize the benefits of integrating technology (Chen, Wang, & Chan, 2017). Only then can organizations hope to fully mitigate risks and realize the full potential of this integration (Chen, Wang, & Chan, 2017).

In addition to this, they should establish open channels of communication and work with their technology providers to establish goals and objectives that are beneficial to both parties (Chin, 2013). In conclusion, the Relational Exchange Theory suggests that the integration of technology can be an efficient way for companies to deliver value for themselves and their stakeholders (Qrunfleh & Tarafdar, 2014). This can be accomplished by gaining access to a wider variety of resources and competencies, as well as by improving both their performance and their reliability (Safari & Albaum, 2019). However, in order to minimize the risks and make the most of the opportunities presented by this approach, meticulous planning as well as management are essential. This really is the focus of technology integration, as integration refers to the process of integrating efforts to incorporate knowledge and inputs from suppliers and customers throughout internal planning. Integration enhances the relational level of cooperation by increasing the level of collaboration between structures (planning of business resources) and operations (management of inventory) across stakeholders.

2.2.5 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. 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. 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, 2000). 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 (Wang & Liu, 2021). 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.,* 2019). 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.

2.2.6 Competitive Advantage Theory

The two kinds of competitive advantage that a company can obtain compared to its rivals were identified by Michael Porter: lower cost or distinction (differentiation). The aforementioned gain stems from capabilities that enable a company to outperform its competition, such as dominant market position, expertise, or capital (Porter, 1996). Strategic management, in Porter's opinion, must be correlated with gaining and maintaining a competitive advantage. Competitive advantage attempts to counter some of the critiques of comparative advantage for this reason. The theory was suggested by Porter in 1985. Porter emphasizes productivity development as a policy objective.

According to the theory of competitive advantage, businesses can gain a long-lasting advantage over their competitors by providing distinctive goods or services that clients value (Wang, Lin & Chu, 2011). Cost, quality, innovative thinking, or other distinguishing characteristics that set the company apart from its rivals can all contribute to this advantage (Wang, 2014). To comprehend the streams of the competitive advantage, numerous different frameworks have been developed. Porter's Five Forces model, that also contends that companies can gain an edge by either cutting costs or trying to differentiate their product lines in ways that benefit customers, is one of the most popular (Peranginangin, 2015).

The concept of a "value chain" is a crucial one in the theory of competitive advantage. This makes reference to the sequence of actions that businesses take in order to produce and provide clients with goods or services (Davcik & Sharma, 2016). Businesses can develop a distinct and effective workflow that provides them with a competitive advantage by recognizing and maximizing each phase in the value chain (Huo, Qi, Wang & Zhao, 2014). Companies can employ a variety of tactics to gain a competitive edge. One is cost leadership, which entails looking for ways to cut expenses so that customers can pay less (Mellat-Parast & Spillan, 2014). Another strategy is differentiation, which entails providing special goods or services that clients value and are prepared to pay more for (Otchere, Annan & Anin, 2013).

Innovation can also help businesses gain a competitive edge because they can outsmart rivals by consistently launching new, improved goods and services (Munizu, Pono & Alam, 2019). It is crucial to remember that a competitiveness can be eroded over time and is not always present. To stay competitive, businesses must constantly look for new ways to add value and set themselves apart (Koçoğlu *et al.,* 2011). In the quickly evolving business environment of today, where technological advances and market trends can quickly emerge and disrupt firmly established industries, this can be especially difficult (Hosseini, Azizi & Sheikhi, 2012).

In summary, the theory of competitive advantage contends that businesses can maintain a competitive advantage over rivals by providing distinctive goods or services that clients value (Sinaga *et al.*, 2019). This benefit may be attributable to a number of elements, such as price, value, originality, or other distinguishing characteristics. Businesses can build a value chain which provides them with a competitive advantage and makes them differentiate themselves from their competitors by utilizing their special resources and competencies (Koç, Delibaş & Anadol, 2022). To stay ahead of the competition, sustaining a competitive advantage calls for constant effort and innovation.

The competitive advantage depends on the idea that cheap labor is pervasive and that a good economy does not require natural resources (Porter & Millar, 1985). Another theory, the comparative advantage, will lead countries to specialize in the export of primary products and raw materials that, due to trade conditions, are trapping countries in low-wage economies (Porter, 1985). When introducing a value-creating strategy that is not concurrently introduced by another existing or future player, a business is said to have a competitive advantage (Barney, 1991). The aim of the cost leadership approach is to deliver goods or services in the market at the lowest cost.

Things can be produced in the industry at the lowest possible cost. An example is the use of space for sales in stores and not the storage of surplus goods. The aim of the differentiation strategy is to provide customers with a selection of goods, services, or functionality that rivals have not yet provided or are unable to offer (Li *et al.*, 2006). This approach offers the organization a clear advantage in offering a specific product or service that none of its rivals are able to deliver. This helps the company to be the star of its sales by producing its first product. Porter defines innovation strategy as determining how businesses will use innovation to provide a specific combination of value and gain a competitive advantage, but to what extent (Mentzer, 2004).

The aim of the innovation strategy is to leapfrog other market competitors by launching goods or services that are entirely new or substantially better. This approach is typical for technology start-up companies, which often aim to disrupt the established industry by offering a revolutionary product and becoming the latest market entrants (Sukati *et al.*, 2012). This approach is more difficult for more developed firms to follow because market recognition has been gained by their product offerings. A competitive advantage is achieved when an organization develops or attains a set of capabilities (or advancement actions) that allow it to outperform its competitors (Gold, Seuring, & Beske, 2010).

In other terms, a competitive advantage is discovered when the operations of a given company are more profitable than those of its competitors in the market or when they are more profitable than those of its competitors in terms of other important outcomes (Vargas, Mantilla & de Sousa Jabbour, 2018), like, for example, market share, product quality, or technical development. Many companies are necessarily unable to reach those specified requirements (Marinagi, Trivellas & Sakas, 2014). This means ascribing attributes of differentiation and inherent superiority to competitive benefits. They can therefore be viewed as, for now, not allowing for the accomplishment of objectives, i.e., the achievement of defined strategic goals.

2.3 Conceptual Framework

According to Hammond and Wellington (2012), the conceptual framework is a description of the fundamental relationship between variables in a study. This allows the investigator to see the projected relationship clearly and efficiently as the proposal describes the actions and offers descriptions and forecasts for the mainstream of empirical research findings (Cooper & Schindler, 2008). Moreover, a conceptual framework comprises a set of underlying concepts, hypotheses, assumptions, and guiding principles for an investigation. It helps researchers understand and organize their research by giving them a framework. It also helps them find and critically evaluate the major variables and existing relationships which are valuable to the study [research] problem (Narayan, 2005).

A conceptual framework is useful for various reasons in scientific inquiry: It aids in defining the fundamental topics to be examined and elucidating the research question (Imenda, 2014). It gives you a methodical framework within which to sort your data for analysis. This is useful for pinpointing the missing piece of knowledge and defending the study's existence. It aids in directing the choice of research strategies and information gathering procedures (Leshem & Trafford, 2007). It gives credence to the research findings and facilitates their dissemination. It's useful for making links between the study and prior work in the topic. Fundamentally, a conceptual framework is indeed a vital part of a research study since it ensures the study is founded in logic and structure and adds to the body of knowledge in the topic (Varpio *et al.*, 2020).

This study’s conceptual framework was developed following a thorough assessment of relevant underpinning theories plus a set of empirical analyses on integrating supply chains and the competitiveness of food and beverage manufacturers. It was hypothesized that: from the literature reviewed, this study explored the relationship between functional integration, supplier integration, customer integration, and technology integration as independent variables that formed a unique topology for supply chain integration, particularly from studies such as Cheruiyot (2013), Kibera & Orwa (2015), Chen, Liu, Wei & Gu (2018), Njagi & Muli 2020; and supply chain adaptability as the moderating variable plus competitive advantage as the predicted variable. This study's model was formulated and operationalized, as shown in Figure 2.1 by the conceptual framework.

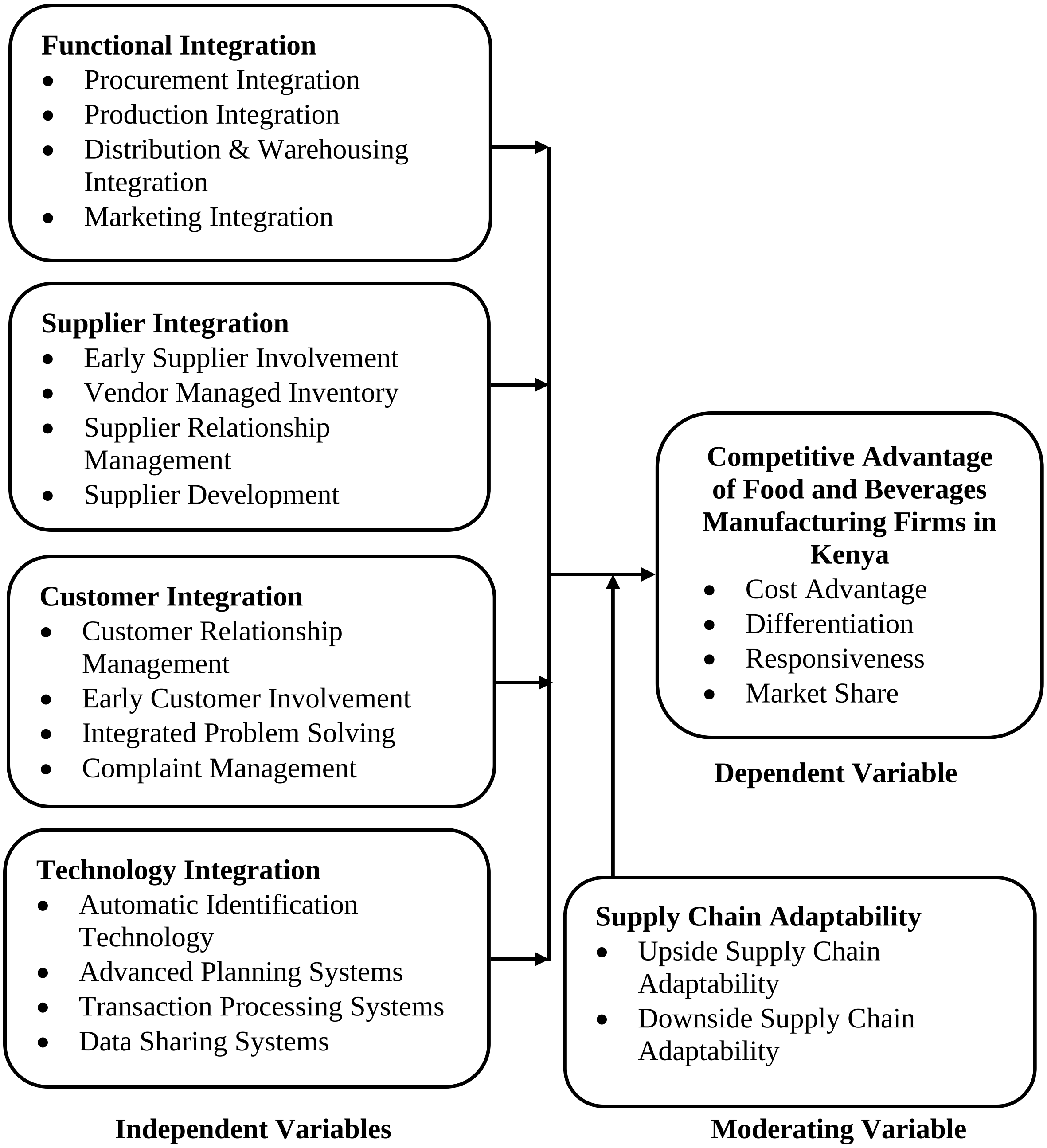

Figure 2.1: Conceptual Framework

2.3.1 Functional Integration

Functional integration covers different functions and operational activities within the buying, marketing and advertising, production and manufacturing, storage, and distribution of companies (De Abreu & Alcântara, 2015). To provide effective customer service, it is clear that these roles need to be combined. The efficiency of the structure of collaboration between departments that is needed to achieve unity of effort with the demands of the environment has been described as functional integration (Njagi & Muli, 2020). As intrinsic to the company, this meaning relates to integration. Most SCM and logistics research has looked at organizational inter-functional alignment and integration, focusing on how different departments work together and collaborate (Turkulainen & Ketokivi, 2012).

Along with the introduction of procurement activities, integration of procurement into the decision-making phase of the business has a big effect on production efficiency (Swink & Schoenherr, 2015). Nevertheless, this is also based on internal integration, while the production logistics process is clearly controlled by internal and external activities in another primary field of alignment (De Leeuw, Schippers, & Hoogervorst, 2015). In this light, the integration of the supply chain is required to be related to the activities and development projects carried out at the level of production (Basnet & Wisner, 2014). The context of marketing/manufacturing integration goes back to the 1970s, when Shapiro first emphasized that both are areas where collaboration is essential but there may be conflict. The relationship between market research and manufacturing has become more important in the last few decades as the rate of change in the business world has sped up (Oliva & Watson, 2011).

The collaboration should allow the manufacturing plant to respond efficiently and cheaply to rapid changes in the market, thereby guaranteeing the customer's value creation (Peters, Hofstetter & Hoffmann, 2011). Across all internal divisions, coordination and integration are integral, from incoming materials to delivery. In order to satisfy the requirements of consumers, it requires integration through divisions and functions under manufacturing control (Mackelprang *et al.,* 2014). This indicates that the interplay in the center of functional divisions, such as production, procurement, logistics, inventory, marketing, sales, and distribution, should be given more thought. Logistics has had an effect on SCM because of its role in managing the flow of materials and information. In fact, researchers have said that SCM needs to go beyond logistics (Da Silva, Poberschnigg, Pimenta, and Hilletofth, 2020).

The strong connection between logistics, sales, and marketing could be due to logistics' roots as the physical side of distribution and, by extension, marketing (Otchere, Annan, and Quansah, 2013), or to the positive effect of inter-functional communication on results related to customer value and service. Empirical research on collaborations between marketing and logistics shows either a significant positive (Stolze *et al.,* 2018) or even a mediating effect on a number of measures of quantitative or qualitative results. Functional integration depicts the extent to which an organization can create all of its roles and procedures collaboratively and organize them to meet the needs of customers (Richey *et al.,* 2009). Consequently, the roles and divisions inside a manufacturer's plant work together as one cohesive and organized structure to meet the needs of customers, maximize performance, and enhance competitiveness.

There are very significant components that contribute to better results. These include information sharing, collaborative planning, cross-functional coordination departments, and working together to ensure that goods really aren't delayed and also that consumers are satisfied with the service and product offerings (Yu *et al.,* 2014). It has not been easily accomplished by functional integration. Managers frequently lack the capacity within the organization to incorporate efficiently through business functions (Hong *et al.,* 2012). Maleki and Cruz-Machado (2013) found that it is easier for buyers to build integrated relationships with their suppliers and logistics managers with their customers than for either party to push for integration within the business.

Disjointed strategies and procedures, misaligned steps and benefits, and missing knowledge that does not endorse a process view of the organization can be the product of lack of progress with functional integration efforts (Wolf, 2011). The ability of a corporation to incorporate efficiently through internal functional areas makes organizational designs more process-oriented. Companies structured around structures are more likely to support integration and thus constitute a SCO (Zhu, Sarkis, & Lai, 2012).

Only at the lowest overall system expenditure, the integration of all internal functions, from materials management to manufacturing, sales, and distribution, is key to meeting consumer requirements (Foerstl, Schleper, & Henke, 2017). Internal integration is thus characterized by complete visibility of processes through various functions including procurement, marketing, production, and operations, logistics, distribution, warehousing, and sales (Thornton, Esper, & Autry, 2016).

Marketing and promotional activities are associated with choices depending on the product, price, distribution, and marketing decisions related to consumer market segmentation, targeting, and positioning (Kim & Schoenherr, 2018). Supply chain approaches or strategies are concerned with maximizing cross-organizational operations and rely on close contact including in-company sales and marketing tools, processes, and skills (Lambert & Enz, 2017). In order to maintain an end-consumer and industry viewpoint across the businesses, even within the entire network of the supply chain, company-level marketing tactics need to be "infused" into intra-organizational existing systems (Murillo-Oviedo *et al.*, 2019).

In global supply chain contexts, it has been proposed that SCM can exploit marketing strategies and the business orientation of a company (Maleki & Cruz-Machado, 2013) or promote marketing strategy and contribute to the development of superior consumer value. Initial empirical evidence indicates that the supply chain approach of a business has a positive influence on marketing success and mediates the relationship between consumer orientation and financial and marketing achievement (McKinnon, 2017). From a marketing standpoint, processes are viewed as an aspect, including its organizational setting, in which marketing is embedded and which should be influenced in such a way that the production of consumer value is optimized (Stank, Dittmann, & Autry, 2011).

With its cross-functional collaboration nature, processes are not always easily allocated to either advertising, marketing, or SCM (Madhani, 2011). The most frequently held gap that still allows room for flexibility is between processes of demand formation (marketing and advertising) and processes of demand fulfillment (supply chain operations) (Christopher, 2017). Integrating the processes of demand formation and fulfillment is often seen as the gateway to producing goods that transmit superior consumer value while efficiently distributing resources. Instead of concentrating on individual process optimization, exploring the interdependencies between processes can lead to market success (Williams *et al.,* 2013).

2.3.2 Supplier Integration

Upstream supply chain integration is vendor integration. A partnership between the company and the upstream suppliers is involved (Bennett & Klug, 2012). With the incorporation of vendors, vendors provide decision-making knowledge and involvement. In advanced businesses, such efficient relationships and interactions have significant significance because suppliers know the components supplied better than the businesses (Njagi & Muli, 2020). Integration of suppliers relates to the acquisition of suppliers' organizational, technological, and financial details. Information regarding production schedules, demand forecasts, including inventory levels, can be exchanged by producers and suppliers (Prajogo & Olhager, 2012). This sharing of information leads to better specifications for products and output, as well as better use of manufacturers' and factories' capacities and cost structures.

As a driving force for the long-term competitiveness of the supply chain as a whole, external integration is often cited (Cao & Zhang, 2011). For this purpose, contacts with suppliers focusing on integrating upward data and downward flows of materials across the supply chain are seen as a key problem in the successful management of the supply chain. This implies that after efficient implementation of internal integration, the efficacy of external integration is best seen (Lee, Seo, & Dinwoodie, 2016). The alignment and integration of a business with its vendors is the product of a partnership between them that is strategic and competitive. That's the product of a high degree of trust, engagement over time, long-term contracts, shared dispute resolution, as well as the sharing of risks and benefits in a reciprocal and continuing partnership (Salema & Buvik, 2016).

All these entities work together to improve the quality of the product and minimize costs, which further leads to profits being shared (So & Sun, 2010). Generally, larger companies make secure deals with smaller firms, who are therefore able to act as primary suppliers. In order to achieve mission cooperation and overcome disputes, closer supplier collaboration helps (Buvik & Salema, 2018). Better teamwork and task alignment cut down on waste while also making supply chain operations management activities more complicated.In addition, integration with suppliers also helps to build routines for problem solving that allow for joint efforts in cost reduction and product design and development (Kull & Ellis, 2016). To achieve time-based efficiency and also product quality and innovation, such joint efforts are necessary.

For years, supplier integration was out of fashion as it was frequently connected to antitrust infringement and perceived to be detrimental to competition (Danese & Romano, 2011). As a result, instead of manufacturing them in-house, businesses tend to outsource intermediate components. As integration restricts organizational flexibility in selecting the most cost-effective provider, the most popular advantage of outsourcing is cost reduction (Alshahrani, Rahman, & Chan, 2018). Besides that, with relatively lower costs becoming less of a consideration, companies are beginning to re-weight options, particularly taking into account the intangible costs incurred as a result of supply chain outsourcing (Flynn, Huo, & Zhao, 2010). Time delays, loss of organizational expertise, supplier relationship management challenges, diminished flexibility, loss of control, and a lack of operational confidentiality all add considerable costs to business activities, processes, and operations (Danese, 2013).

Over the last few decades, vendor managed inventory (VMI) has evolved into a competitive management tool in the supply chains used by retailers, suppliers, and producers to reduce inventory management costs (Beheshti, Clelland & Harrington, 2020). The basic idea behind VMI has been that the vendors [suppliers] are responsible for restocking customers' inventory when supply decreases. This framework is meant to focus on a company's order fulfillment systems. Its three main ideas are lowest inventory levels, shipment or consignment stocks, and purchasing or ordering from vendors.

The most prevalent form of logistics and supply chain integration is supplier integration (He, Lai, Sun, & Chen, 2014). Integration of suppliers includes the efficient coordination, exchange of information, and involvement in the interactions between companies and their suppliers (Lockström *et al.,* 2010). Integration of suppliers requires a shift in mindset away from adversarial to cooperative, including collaborative efforts in product creation, problem solving, sharing of technologies, and support for design. Integration of suppliers is accomplished by alignment, exchange of knowledge, and interactions between companies and their suppliers (Shou *et al.,* 2018).

As this happens, it is much more likely to allow regular small batch deliveries, to use single or dual supply sources, to evaluate alternative supply sources on the basis of quality and delivery rather than price, and to create long-term supplier contracts to boost supplier delivery efficiency (Prajogo *et al.*, 2012). In addition, long-term strategic partnerships can have a beneficial effect on delivery capacity (Salema & Buvik, 2018). Zhang *et al.,* (2018) say that when business and operational information is shared and done so at the right time, producers can better predict and respond to changes in consumer needs.

The direct growth of suppliers and the strategic target alignment of suppliers have proven to be important predictors of purchasing success in terms of on-time delivery as well as quality performance and competitiveness (Wang *et al.,* 2016). On the other hand, supplier linkage deals with strategic supplier linkages, involving suppliers in new products during the design phase, in production planning, and inventory management, implementing a rapid response order processing system with suppliers, creating a supply network that ensures timely distribution, and sharing information with suppliers (Ashenbaum & Maltz, 2017). The suppliers and customers of a business were its key sources of creative concepts that "out-innovated" systems with less productive routines for the sharing of information.

2.3.3 Customer Integration

Integration of customers refers to the acquisition by customers of technical, marketing, development, and inventory details (Ayoub, Abdallah, & Suifan, 2017). Manufacturers may use the knowledge gained and consumer requirements to create goods that meet the needs of consumers. In the attempt to stay integrated with their customers, intense global competition and growing consumer demands have forced supply chains to constantly reevaluate their business processes (Lii & Kuo, 2016). Customer integration is a key component of the process of supply chain integration that leads to the ability of a company to compete, generated by integrating the SC with its essential clients (Da Mota Pedrosa, 2012). Customer integration has been proven to be an enabler for the efficient continuity and overall growth of a business process (Liu & Lee, 2018).

The strategic capacity of the organization to recognize its customers' needs and the degree of its dedication to satisfying those needs defines the level of its customer relationship (Lee, Seo, & Dinwoodie, 2016). Closer customer relationships allow companies to become more receptive to the needs and desires of their customers. Moreover, good customer relationships can be used to increase operating performance, cost performance, and discourage new entrants (He *et al.*, 2014). Via CRM, a company is able to recognize and reward its most loyal clients via targeted marketing to maintain and grow its business. It is therefore easier to maintain clients (Al Shurideh, Alsharari, & Al Kurdi, 2019). Retaining CRM tools helps keep consumers satisfied by supplying a sensitive team of sales and support professionals with excellent service. By enhancing productivity in contact management, distribution prospecting, distribution, and direct marketing, improved CRM tools will help companies acquire new customers (Iriandini, 2015).

By combining their front ends with their clients, integration of the business with its clients makes it highly informed about their customers (Flynn, Huo, & Zhao, 2010). Customer integration is the downstream integration of the supply chain. It is the outgoing collection of goods and services and the incoming set of data (Yu *et al.*, 2013) from consumers to suppliers. Customer integration contributes to the development of a customer relationship and hence a deeper and clearer understanding of the needs of customers. Customer incorporation includes involving the views of consumers in commodity manufacturing decisions (Zhao *et al.*, 2013). It also contains strategies and ways to strengthen communication between the manufacturer and the client.

Huo (2012), pointed out that customer participation has become an important strategy for organizational survival through early customer involvement in new product creation, because innovation can come from how companies communicate with consumers through obtaining customer perspectives, ideas, and thoughts as well as knowledge; enabling customers to participate in improving existing products or services; and encouraging customers to participate in helping to improve product and service offerings. In the early phase of the NPD process, customer engagement is critical because it has a positive impact on customer satisfaction and can lead to improved company results (Danese & Romano, 2011) because new products are successful. Customer participation can also increase new product performance in the late stages of the new product development process (Zogaj & Bretschneider, 2012).

Conversely, contact with customers can not provide any output effect in the medium phases of the new product method. The process of acceptance required for progress can also be improved by customer participation in NPD (Bartl *et al.*, 2012). Collaborating with clients (CC) is an effective way for a company to enhance the efficiency of its innovative products (Song, Ming, & Xu, 2013). In the early phase of the NPD process, CC is critical, and collaborating with clients will minimize the risk of bad design in this development phase. In addition, knowing consumer expectations will help businesses gain fresh ideas about solutions (He *et al.,* 2014), thus increasing the likelihood of new product growth and success. Customer collaboration can also contribute to advantages in product innovation (Elvers & Song, 2016), and it also has a positive effect on the success of product innovation. Thus, the efficiency and reliability of the latest product produced can be enhanced through customer participation (Njagi & Muli, 2020).

All three pillars, which comprise the principle of customer integration, are customer complaint management, relationships, and satisfaction (Li *et al.,* 2006). Customer integration is characterized as a collection of activities related to customer complaint management, building long-term customer relationships, and enhancing customer satisfaction (Flynn, Huo, & Zhao, 2010). Integrating with consumers facilitates the exchange of data between them and the company. In addition, customer relationships enable the company to develop core competencies (Al Shurideh, Alsharari, & Al Kurdi, 2019). The integration of customers means exchanging information between the company and the consumer.

The company collects feedback from its own clients and provides them with inventory, predictions, and schedule-related operational details (Lau, Yam, & Tang, 2010). Droge, Vickery, and Jacobs (2012) suggested that customer integration requires follow-up for input from customers and that a primary component of its SC is the degree to which a company corresponds and works closely with its customers. When a company develops close relationships with its customers, it can differentiate its goods and services from those of its rivals, improve customer loyalty, and dramatically expand value for customers (Ragu-Nathan *et al.,* 2006). For SCM initiatives, the value of customer integration stems from its ability to help organizations understand the customer needs that are needed to establish good relationships (Swink, Narasimhan, & Wang, 2007). Finally, customer integration takes into account customer preferences and includes them through strategies that promote the interaction between the consumer and the producer in the manufacturing process (Lotfi *et al.*, 2013).

2.3.4 Technology Integration

Technology acts in the enterprise as a crucial lynchpin connecting functional areas. Technology acts as a coordinating mechanism for connecting departments within the business and through supply-chain manufacturing companies (Njagi & Muli, 2020). It is possible to divide logistics technology internally and externally. Internal IT promotes tighter internal alignment of logistics and supply chain organizations and internal cooperation (Bell *et al.,* 2014). Prajogo and Olhager (2012) say that it is the company's IT-enabled internal collaboration that makes it possible for the company to work with other organizations in the supply chain outside of its own borders.

For more than 20 years, technology has been commonly defined as a vital instrument for efficient supply chain and logistics organizations (Yee & Oh, 2012). These technologies include automatic identification technologies, advanced planning systems, transaction processing systems, and data sharing systems. Employees need to be given systems such as Electronic Data Interchange (EDI), Enterprise Resource Planning (ERP), Radio Frequency Identification Devices (RFID), Warehouse Management Systems (WMS), Transport Management Systems (TMS), Manufacturing Execution Systems (MES), and Product Data Interchange (PDI) to reinforce and promote the relationships generated via integration (Mellat-Parast & Spillan, 2014). This really is the second degree of integration in the supply chain. By giving reliable information about goods in almost real time, these partnerships reduce inventory and improve communication.

In data sharing systems integration, EDI plays a major role. EDI is the exchange of business transactions between computers without human interference. EDI can manage high-volume transaction-based traffic between businesses and allow them, electronically through a direct communication connection, to exchange precisely formatted business orders, payments, or even engineering drawings (Fu, 2017). Even in the domains of back-end information transfers (e.g., invoice sharing, order records, and inventory management), EDI enables a private network of large companies to be electronically linked. On the other hand, Prajogo and Olhager (2011) found that the Internet is better than EDI when it comes to the cost and ability to share information outside of pre-set company processes.

Integrated data sharing systems can also improve the competitive strengths of companies and discourage new entrants. This is through the coordination between providers and consumers of business processes, knowledge sharing, and joint planning. It strengthens the understanding of the requirements of customers because of the collective approach to developing shared understanding (Subramanian, Abdulrahman, & Zhou, 2014). Also, the timely exchange of business and operational intelligence helps suppliers predict and respond to changing customer needs, which makes delivery more efficient (Naway & Rahmat, 2019). Without the exchange of detailed information, flows of products and information can't be organized, and bullwhip effects can happen, making it hard to keep track of inventory (Chinomona, 2013).

Throughout history, logistics technology remained limited to basic processing and transactional procedures for information, personalized forms, and creative techniques for warehouse management (Mathauer & Hofmann, 2019). To improve logistics and inventory management, new technologies have been developed. Material handling, including equipment for storage, manufacturing, and movement, was a significant technical development (He, Yan, & Zhang, 2012). Usually, the technologies were developed to save on capital and labor costs. Via greater coordination between the supply chain members, better customer support and inventory cost savings were achieved by producing companies (Gligor & Holcomb, 2014). Investments in logistics technologies like EDI, e-commerce, continuous replenishment systems, direct store delivery, and computer-assisted ordering improved customer service by reducing lead times and out-of-stock situations (Gunasekaran, Subramanian, and Papadopoulos, 2017) and boosting cost efficiencies through more cooperation between companies, like lower inventory costs, better order accuracy, and lower shipping and labor costs.

Collaborative synergies among members of the supply chain have matured with the introduction of advanced planning systems and their integration, such as enterprise resource planning (ERP) systems and the advancement of logistics (Folinas & Daniel, 2012). Additional modifications and improvements for transaction processing systems such as warehouse management systems (WMS), transportation management systems (TMS), and manufacturing execution systems (MES) led to the reinvention of the supply chain, which improved the accuracy of the customer demand forecast and revolutionized the way transactions across supply chain partners were carried out (Nettsträter *et al.*, 2015).

Companies have also started to use sophisticated methods to use advanced identification technologies like radio frequency identification (RFID). Even though RFID was not really a new technology, there was an interest in its use in developments in related information and communication technologies coupled with industry mandates (Kirch, Poenicke & Richter, 2017). Experts in the RFID industry say that this is an innovative set of applications that can make supply chains more productive by lowering costs and making them better at what they do (Mejjaouli & Babiceanu, 2015). RFID could be regarded by critics as nothing more than improved bar codes that are considered both inaccurate and expensive, whereas others have serious customer privacy concerns (Alyahya, Wang & Bennett, 2016). However, when these investments are aligned with corporate strategic priorities, RFID has considerable potential to lead to improved firm efficiency. RFID is part of an information and communication technology family that can be used to collect automated data, which could be used to extend ERP systems (Ding, Jiang & Su, 2018).

Companies with an established sense of competition are more likely to collect and use the increased data generated by investments in IT and are more likely to apply the information in a way that leads to changes in operations. The complexity of the supply chain increases exponentially as businesses seek global markets. Companies will have to do something, and operations managers will have to find ways to test their competitiveness and efficiency in the real world so they can find ways to improve.

2.3.5 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, 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 plus 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 & Kampoomprasert, 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.

2.3.6 Competitive Advantage

In the modern environment, supply chains concentrate on the mastery of the evolving markets, including needs such as competition in providing timely goods, low prices, a short life cycle, as well as better quality (Avelar-Sosa, Garca-Alcaraz, & Cedillo-Campos, 2014). More than ever, the competitive landscape of today's companies is dynamic, varied, and comprehensive, making it a major concern for managers to maintain and foster sustainable competitive advantage (Gunasekaran, Subramanian, & Papadopoulos, 2017). The achievement of a competitive advantage helps a company to build a defensible position over its rivals. It also helps companies to separate themselves from rivals. It is difficult for businesses to sustain a competitive edge across a significant amount of time in today's evolving global market environment (Mellat-Parast & Spillan, 2014).

A business must provide added value to the customer in order to retain an edge by either providing lower-priced quality goods or supporting a higher price via greater product features (Marchi, Maria, & Micelli, 2013). The successful use of information management skills throughout functional units of the organization and technical tools to implement this strategy is a prerequisite for this value-creating approach (Hazen & Byrd, 2012). Companies must rely on mostly-developed internal resources as the base on which their company operates when faced with dynamic external environments and high levels of uncertainty (Lee *et al.,* 2009). The importance of cost reduction in logistics for cost leadership capacity and the need for strict quality control on logistics operations for quality enhancement at the company level (Sakchutchawan *et al.,* 2011).

Companies with expertise, practices, and/or information that help them distinguish the value they deliver to their customers from that delivered by their rivals have the opportunity to build a competitive advantage and achieve superior results for the company (Sandberg & Abrahamsson, 2011). The competitive advantage is upstream of the commodity markets and is focused on the idiosyncratic and hard-to-imitate capabilities of the business. The capacity of the organization to handle information stocks efficiently is precisely such an idiosyncratic capacity that is difficult to emulate (Wen, 2012). It has been generally argued that the opportunity to learn, assimilate, and incorporate new expertise from outside the business provides a major potential competitive advantage at the company level (Prajogo & Olhager, 2012).

Enhanced integration will contribute to improved customer experience, performance in supply chain, and overall company performance (Liu & Luo, 2012). Businesses take production capabilities as a source of their competitive advantages in the form of cost, quality, and time (Vanpoucke, Vereecke & Wetzels, 2014). Moreover, in the eyes of its clients, competitive skills differentiate a corporation from its rivals. Competitive capacities are often expressed to define possible capacities as expected, realized capacities, or comparative capacities of order winners and qualifiers (Sakchutchawan, 2011).

These include trust between both the partner organizations as well as close relationships that take time to develop in general (Ahmad & Saifudin, 2014). The strategic resources of the buyer company are embedded within those of the supplier with highly integrated logistics processes to establish processes, skills, and relationships that are discrete and intangible, although usually important, and concealed from and imperfectly imitable by competitors (Sukati *et al.*, 2012). In this sense, agility, the ability to adapt, and coordination characterized by best-value supply chains have been theorized as vital means for businesses to achieve a competitive advantage that is sustainable as well as superior company efficiency (Otchere, Annan, & Anin, 2013).

By aligning business operations internally as well as externally across the supply chain, businesses with the right logistics and supply chain integration will achieve the ultimate objective of competitive advantage (Vanpoucke, Vereecke, & Wetzels, 2014). Companies benefit from integrated supply chains that eliminate individual egotism and maximize the development of value at the level of the supply chain, producing superior competitive results (Mellat-Parast & Spillan, 2014). To gain a competitive edge, the business needs to respond to rivals with better customers. Some businesses that are attentive to consumer needs as well as want to have a competitive edge will compete with many other supply chains in the coming years (Chen, 2019).

Manufacturing companies should consider the responsiveness of the supply chain to consumer requirements in order to respond (Park, Fujimoto, & Hong, 2012). A source of the company's competitive advantage has been the development of supply chain responsiveness (Esper *et al.*, 2010). Companies with greater resilience to the supply chain can be more resilient to market volatility and, due to shorter lead times, can resolve environmental instability at a lower cost (Marinagi, Trivellas, & Sakas, 2014). Resilience to cost efficiency is undermined by lean manufacturing. Adaptable production, however, puts equal emphasis on both expense and flexibility. Flexibility and competitiveness were important for the business. Responsiveness is not a true strategic tactic without cost effectiveness (Liao, Hu, & Ding, 2017).

The company's responsiveness to the supply chain and the competitive advantage were positively linked (Chetthamrongchai & Jermsittiparsert, 2019). Additionally, successful cycle time reduction engineering would lead to substantial improvements in production costs and productivity (Autry & Moon, 2016). Further, the necessary requirement for a sensitive supply chain is to minimize lead times and further reduce the time to market. A source of competitive advantage is responsiveness in the supply chain. Munizu, Pono, and Alam (2019) showed that overall, businesses needed much more time than leading manufacturers to respond to changes in consumer demand. In certain situations, it took as many as eight times longer. Smith (2011), indicated that the responsiveness of the supply chain could minimize prices, while also contributing to a competitive edge for businesses in other aspects.

Responsiveness at the operational level would allow companies to compete based on cost, efficiency, time to market, and reliability of delivery (Alfalla-Luque, Machuca & Marin-Garcia, 2018). The responsiveness of the logistics process of a business would allow companies to launch new products more quickly than major competitors. This can also contribute to a company's greater ability to deliver the product type and volume needed by consumers on time (i.e., improving delivery reliability) (Leuschner, Rogers, & Charvet, 2013); the responsiveness of the supply network of a company will boost the company's ability to quickly launch new products and functionality (i.e., compete on the basis of product creativity and lead times) in the industry, as well as boost the ability of a company to deliver on time (i.e., increase its delivery reliability) (Leuschner, Rogers, & Charvet, 2013).

Vanathi and Swamynathan (2014), indicated that, in terms of time and efficiency, a supply chain characterized by rapid customer responsiveness would be competitive. In fulfilling a client order, a supply chain consists of all stages involved, either directly or indirectly (Maqbool, Rafiq, Imran, Qadeer, & Abbas, 2014). Manufacturing companies, suppliers, transporters, warehouses, retailers, third party distribution companies, and consumers are part of the supply chain. Logistics and supply chain integration seek to optimize the total value generated in a specific supply chain rather than the benefit generated (Pfahl & Moxham, 2014). Pavlou and El Sawy (2010), claim that through logistics and supply chain integration, competitive advantage is achieved. They also argued that reacting to consumer needs implies a high degree of integration of the supply chain and knowledge sharing amongst supply chain members.

2.4 Empirical Review

A review of the empirical literature on the cause and effect of supply chain integration and the competitive advantage, including as moderated by supply chain adaptability, was conducted, and current gaps were found, as well as research methodologies for bridging the gaps in research.

2.4.1 Functional Integration

Positive effects of integration have been observed across functional areas on both delivery reliability as well as speed, considering the value of internal integration (Schoenherr & Swink, 2012). Internal integration breaks down functional barriers and engenders collaboration, which forms the basis for organizing the flow of information through functions (Jonsson, Andersson, Boon-itt, & Wong, 2011). An organization with a high degree of internal integration would also be able to guarantee on-time output. Rather, empirical surveys found that a failure to combine operational and logistic functions would result in poor delivery efficiency (He *et al.*, 2014). In addition, the product design and development literature found that to achieve desirable time-to-market and cycle time efficiency, internal integration is necessary.

According to Cheruiyot (2018), attaining supply chain integration is largely dependent on internal integration, which in turn improves performance for the business. According to their argument, a company with high degrees of internal integration includes well-established policies, practices, and strong bonds amongst its departments. These procedures assist the company's staff in making greater use of outside information acquired through external integration. According to Muricho and Muli (2021), a significant barrier to completely integrating information along with material flows throughout the supply chain network is the organization's inadequate internal management systems. For instance, the absence of established operational procedures, disjointed information flows, along with a lack of system integration among the many information systems employed by the company.

Functional integration offers quick access to key operating data from the centralized database, a highly integrated information system connected to various internal departments of an enterprise, access to inventory information across the supply chain (Liu, Shah, & Schroeder, 2012), real-time retrieval of inventory status, use of a computer-based marketing and manufacturing planning system, and a high degree of integration of information systems for manufacturing processes (Turkulainen & Ketokivi, 2012).

Internal integration is defined as organizational practices that integrate and improve internal resources and information in order to foster knowledge sharing outside of individual roles or divisions, to support external integration initiatives, and to achieve organizational goals (Foerstl *et al.*, 2013).

In fact, internal performance is the degree to which the producer collaboratively builds its systems, facilities, and strategies to collaborate successfully with suppliers and meet consumer needs (Kim & Schoenherr, 2018). The efficiency and internal integration of an organization can be improved by joint planning, functional collaboration, and knowledge sharing, including teamwork to improve consistency of deliveries on schedule and also meet customer requirements (Thun, 2010). In addition, internal integration involves how a manufacturing organization forms its policies, strategies, and long-term plans into structured and continuous processes to meet consumer needs and negotiate effectively with suppliers (Flynn, Huo, & Zhao, 2010). The goal of internal integration is to promote the movement of goods, resources, capital, and knowledge in order to provide fast and low-cost customers with the most value.

Simplification includes the detection and removal of duplications and the non-evaluation of processes by incorporating activities and elements (Marchi, Maria, & Micelli, 2013). This can mainly be accomplished by developing and adhering to popular organizational policies, activities, and procedures; cross-organizational integration; alignment; plus, standardization of processes (Vanpoucke, Vereecke, & Wetzels, 2014). Mostly on the consumer side of the supply chain, firms can penetrate deep into the consumer organization through customer integration to understand the product, culture, business, and organization in such a way that they can respond quickly to the needs as well as customer requirements (Mellat-Parast & Spillan, 2014).

Because it is a result of company integration and focuses on institutional functional integration within firms, supply chain competitiveness is a priority issue for firms seeking a competitive advantage (Mukhtar & Azhar, 2020). The application of Michael Porter's value chain is required to comprehend the conception of networks, linkages, and relationships, as well as cross-functional integration within the firm and among members of the supply chains, for the purpose of creating value. The company's value chain philosophy describes the phenomenon of creating value out of that same firm through cross-functional activities and both primary and secondary function performance (Mukhtar & Azhar, 2020).

Cross-functional alignment and integration to operate inter-related activities generates value and predicts the value of customers. The company's strategy is centered around measuring the competitive advantage and performance of interconnected operations in the organization as a key success element (Reitsma, Hilletofth, & Mukhtar, 2018). Such fractional activities are part of an integrative framework in which activity efficiency and effectiveness are highly dependent on one another. The links among both operations are not limited to the company; they also include the activities of vendors, distributors, and consumers. The final user value will become the result of upstream as well as downstream creation of value by integrating the value chains of the distribution companies, the company, and the vendors (Saragih *et al.*, 2020).

Correspondingly, the supply chain's agility (Khan & Wisner, 2019), reliability, flexibility, quality assurance, and cost efficiency could be transformed into firm performance if functional operations integration as well as value co-creation inside entire value chains are incorporated. Given the industry's complexity, we assert that integration and alignment of internal operations, as mentioned by Freitas *et al.* (2020), as cited by Mukhtar & Azhar (2020), can help to realize greater supply chain resilience. Cross-functional linkage, according to Swink and Schoenherr (2015), is vital to decreasing uncertainty and risk as well as misunderstandings, and it can be viewed as a pivotal capability for processing information throughout the supply chain. Consequently, visibility, internal collaboration, agility, and versatility can all benefit from cross-functional connectivity. Collaborative efforts may result in additional supply chain capabilities including agility, scalability, and flexibility (Scholten & Schilder, 2015). Cross-functional alignment and integration enhance efficiency in decision-making, tend to increase visibility, and also reduce uncertainty, among many other benefits.

2.4.2 Supplier Integration

Supplier integration will benefit producers by reducing business risks through joint R&D or joint technology investment; reducing inventories through the sharing of sales estimates or production schedules (So & Sun, 2010); improving product quality and expertise through co-designing goods; and establishing long-term relationships that will lead to more reliable supply prices (Narasimhan, Swink, & Viswanathan, 2010). Integration of suppliers includes the integration of business processes between producers and suppliers through the use of IT applications, which are transactional with e-business systems-supported planning and operations (Danese & Romano, 2011), include knowledge sharing in decision synchronization achievement, and contractually cooperate with selected risk-sharing suppliers.

In order to give the company insights into supplier operations, competence, along with challenges, supplier integration entails sharing data and coordinating of activities with key suppliers (Omondi, 2022). This allows for enhanced transaction scheduling, improved design of products and processes, and more effective planning and forecasting. Wambua (2021) asserts that integration-supporting techniques have made information exchange possible. Such technologies include web-based integration systems, supply chain optimization (SCO) software, ERP systems, and electronic data interchange (EDI) technology. The growth of supplier relationships, cross-functional participation, and collaborative problem resolution have made coordination possible. In accordance to the RBV theory, these mechanisms lead to capability development, which in turn generates organizational resources that offer the organization a competitive edge (Cheruiyot, 2018).

Effective sharing of information in the supply chains has a significant effect on SCM practice. Manufacturing involves implementing pull systems and supply management based on information sharing, which forms the basis of SCI (Chan & Prakash, 2012). Therefore, the inclusion of suppliers as a particular SCI background could have a positive impact on the adoption of JIT manufacturing as an SCM activity (He *et al.*, 2014). The supplier integration strategy for lean companies is focused on the ability to: exchange information with both suppliers and consumers, including demand, forecast, inventory level, and production planning decisions (Sambasivan *et al.*, 2013), e-business systems to strengthen collaborative collaboration and information sharing with suppliers by synchronizing integration techniques with supply chain capabilities; and based on appropriate metrics, use policy-based supplier selection to help establish and maintain long-term supplier relationships by assessing the performance of suppliers and their ability to offer innovations and co-design goods to meet customer needs (Wolf, 2011).

A strategic aspect of the supplier integration system can be considered the production and management of such a partnership, thus minimizing the costs of purchases through confidence and credibility, the key benefit of establishing long-term relationships with suppliers (Zhang & Huo, 2013). The integration of an organization with its suppliers refers to the presence and effect of the supplier on the decisions of the organization and also to the degree of strategic and structured relationships built through long-term relationship building. Supplier integration therefore requires the sharing of information, expertise, and materials in various directions (Zhao *et al.*, 2013). Partnerships with suppliers do not take a particular shape; they can be altered according to the intent of the relationship.

The evaluation and development of the roles of suppliers, the exchange of knowledge, and improved cooperation between institutions promote mutual trust and establish long-term relationships (Sambasivan & Yen, 2010). Integration between suppliers as well as organizations allows a mutual obligation to help suppliers work efficiently, minimize costs, and select superior design-aiding components and technologies (Yu *et al.*, 2013). In reality, suppliers' participation in the design process helps manufacturers to select the best parts and promotes the minimum cost of designing and testing products (Lai *et al.*, 2012). Wasted effort and time can be reduced or eliminated by collaboration between organizations.

Creating partnerships involving suppliers helps them comprehend the company more thoroughly and be able to foresee its needs. The firm develops plans for manufacturing and produces items on schedule thanks to the interchange of knowledge about products, which improves the product's delivery efficiency (Njagi & Muli 2020). The organizational ability to adapt to changing surroundings is made possible by the relational linkages that knowledge-based integration creates. Due to better communication and coordination, supplier integration generally lowers transaction costs. As more information becomes available, it also facilitates quick decision-making (Mideva & Moronge, 2019). The establishment of cross-functional teams, in accordance with the RBV theory, encourages knowledge transmission between firms that could not otherwise be easily communicated, thereby boosting collaborative problem-solving abilities (Wambua, 2021). Based on the relationships fostered by resource integration, this enables the company to develop goods and services of greater quality and that are more flexible and responsive to consumer needs.

As such, the critical role of supplier integration in differentiating businesses, creating competitive advantage, and enhancing overall SC efficiency has been empirically demonstrated by several researchers (Amin & Zhang, 2012). Therefore, there is a strong positive link between membership in the Toyota supplier association and the efficiency of suppliers. Honda, a Japanese automaker, requires that suppliers be examined firsthand by managers at all levels, all the way up to their presidents, to better understand them (Lee, Kwon, & Severance, 2007).

2.4.3 Customer Integration

The linkage of the consumer to the supply chain is a subject matter that is gaining traction among practitioners and academics alike (Stevens & Johnson, 2016). These supply chains must restructure themselves in much more adaptable and tightly integrated structures as the accelerated rate of change keeps increasing and greater tiers of volatility, global economic integration, new competition, and much more demanding consumers challenge a company's positional play (Christopher, 2016). Throughout the 2000s, numerous researchers began to consciously embrace the core idea of consumer integration into supply chains, so by the early 21st century, both academics and professionals recognized customers' active role in supply chain processes (Martinelli & Tunisini, 2018). As a consequence, the customer-centric model was unavoidable. Consumers were viewed as both the activators and the quintessential end point of the SC's systems (Potter, Towill, & Christopher, 2015). As a result, investigators in the 2010s emphasized the importance of CDSC competing globally.

Because of today's incredible variety as well as variability, specialists emphasized the requirement for a truly innovative supply chain framework that could incorporate consumer integration: the Customer Centric SC (Potter, Towill, & Christopher, 2015). This evolving approach is thought to be more capable of dealing with the altered business setting as well as actively involving the consumer in the supply chains. The framework is inextricably linked to the current services marketing operation (Grönroos & Voima, 2013), as well as the customer is acknowledged as an active participant in these supply chains (Mihardjo, Sasmoko, Alamsyah & Elidjen, 2020). The consumer has control over when, how, and where he or she accesses the product or service (Fattahi, Govindan, & Keyvanshokooh, 2017).

Several studies on the upward physical flow indicate that customer integration is implemented to facilitate JIT delivery as well as postponement strategies (Nammir, Marane, & Ali, 2012). Customer convergence with improved visibility would further allow participation in planning demand; alternatively, there would be massive inefficiencies in customer care due to the lack of data exchange from one end of the supply chain to the other (Elvers & Song, 2016). To enhance customer delivery efficiency, customer integration is arguably necessary. The value discipline of customer proximity may reflect demand-oriented logistics capabilities such as delivery speed, delivery reliability, and target market responsiveness (Madhani, 2011). Customer integration includes the planning, execution, and evaluation of effective supplier-recipient partnerships either upstream or downstream of the supply chain (Song, Ming, & Xu, 2013).

Therefore, management of customer relationships (CRM) focuses not just on incoming customer relationships, but also on outbound SCM customer relationships (Iriandini, 2015). Customer integration is about the ability to interact with the correct invoice delivery of the right goods and services to consumers locally and internationally at the right time, right place, and right quantity (Da Mota-Pedrosa, 2012). Customer integration primarily includes exchanging customer product information, accepting customer orders, communicating with customers to handle demand, providing an order placing system, exchanging customer order status during the order scheduling process, and the delivery phase of the product (He *et al.*, 2014). In many respects, downstream integration plays an important role for manufacturing firms.

It is possible for a firm to increase the reliability of its customer demand data and, as a result, shorten the time needed for product design as well as production planning (Njagi & Muli, 2020). This lowers waste, which improves inventory management and lowers production costs. The RBV theory, which emphasizes resources that give the company a competitive edge as they deliver an offering of products that is sought by consumers, supports integrating customers (Mideva & Moronge, 2019). With the organization's technical investments, information sharing enables quality of goods and services to be upgraded in response to consumer feedback or demand from the marketplace. Birgen's findings from 2021, which claim that customer integration has an impact on quality along with new product adaptability, also lend credence to this.

The company's increasing client interaction gives it the ability to improve items and alter them to meet customer needs. The enhancement of communication and trust between businesses and their clients is made possible by the long-term partnerships that TCE and SET support. By improving governance and lowering opportunism, the organization is able to lower the cost of transactions (Cheruiyot, 2021). Coordination, workflow synchronization, and information exchange are essential components of customer integration (Wambua, 2021). These activities boost supply chain performance, enable timely delivery of services, and enhance satisfaction among consumers. Due to fast information interchange, which enables the business to adapt to changes in consumer needs, flexibility is also improved (Njagi & Muli, 2020).

First, it can help manufacturing firms, especially in markets with increased uncertainties, secure the distribution channels of their goods (Ashenbaum & Maltz, 2017). Second, in the supply chain, it can provide a way to manage productivity gains and cost savings (Ashenbaum & Maltz, 2017). Third, in relation to broad new revenue streams, downstream markets can deliver major advantages (Ashenbaum & Maltz, 2017). Manufacturers have to broaden their concentration from continuous improvement to consumer allegiance and reconsider the significance of vertical integration in order to capture the value downstream (Guan & Rehme, 2012). An unintegrated business is one in which the divisions or departments are not integrated and each has its own information system separate from the others (Misund, 2016). As a prerequisite for external integration, internal or functional integration has also been postulated.

2.4.4 Technology Integration

Different types of innovations have been implemented by various members of the supply chain over the years (Domański, & Gwosdz, 2009). When matched with the strategic objectives of the business, each technology offers the greatest potential for enhancing organizational efficiency and overall company performance (Naway & Rahmat, 2019). Simply put, logistics technology can be described as technology used to enhance the supply chain channel's efficiency, routine operations, and logistical activities (Prajogo & Olhager, 2012). Routine operations handle inventory and ability control, while productivity requires optimization. Although technologies are usually designed to save labor and inventory costs, in incorporating supply chain operations technology, there is a clear reliance on supply chain management techniques (Yee & Oh, 2012). ERP system capabilities have expanded in recent years to include marketing automation, e-commerce, distribution, and supply chain systems (Georgise, Thoben & Seifert, 2014). Currently, the main ERP system applications include financial applications, human resources applications, and manufacturing applications that have various functionalities (Birasnav & Bienstock, 2019).

The ERP framework can handle various functional fields, such as sales, receivable accounts, payable accounts, engineering, inventory control, manufacturing, procurement, quality management, human resources, manufacturing, and logistics planning (Francisco & Swanson, 2018). Basically, from the above-mentioned functional area as well as within the entire supply chain of the organization, the ERP system is capable of integrating, optimizing, and organizing the physical, cash, and information flows (Farooq & O'Brien, 2012). Several ERP system modules have various features and support various company functions such as production, inventory management, staff management, storage management, financial management system, marketing, as well as order processing (Chan & Chong, 2013).

Companies should integrate all diverse functions into the ERP framework, standardize and manage the exchange of knowledge across their entire departments, and then expand it to suppliers and customers in order for suppliers to speed up the distribution of required raw materials and for customers to place orders faster and easier (Shatat & Udin, 2012). Consequently, there are many success stories suggesting that logistics and supply chain integration will boost and enhance the supply chain's efficiency to be successful and competitive in the global business climate (Banerjee, 2018). In addition, Oghazi *et al.*, (2018) found out that ERP device investment increases efficiency and organizational performance and competitiveness. Forslund and Jonsson (2010), found that, within the supply chain, the ERP system is able to enhance operational efficiency. Kandananond (2014), concluded that SCM has long been supported by the ERP method.

2.4.5 Supply Chain Adaptability

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 optimise 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 organisational 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).

2.4.6 Competitive Advantage

The capacity of a firm to achieve consistent advantages over competing companies in the industry is referred to as its competitive advantage (Arseculeratne & Yazdanifard, 2013). Steadily rising competitive advantage in marketing is among the goals that organizations are focusing on as they attempt to transform society's social and mental perceptions (Shakeel & Khan, 2011). Furthermore, Bulankulama, Khatibi, and Herath (2014) define competitive edge as a meritocratic performance potential in one or more ways that competitors find difficult to replicate, either now or in the long run.Kimani (2015) posited that competitive advantage makes reference to organizational resources, characteristics, or capabilities that are difficult to duplicate or surpass and provide a superior or desirable long-term dominance over competitors.

As such, competitiveness is associated with increasingly focused marketplaces; lower barriers to entry or, in general, a greater number of companies may give an industry an advantage when competing with distant adversaries (Gupta, 2015). Furthermore, Lazenby (2018) believes that competitiveness is having something that your competitors do not have—the advantage an organization has over others. Furthermore, competitiveness is portrayed as the thing that distinguishes the organization from competitors and provides it all with a distinct advantage across the commercial center (Varanavicius & Navikaite, 2015). Strategies aligned with providing high-quality goods with reasonable prices and service prices are used by managers involved in the logistics or supply chain process (Mellat-Parast & Spillan, 2014).

These methods should be converted into practical policies that will provide the consumer with products and services. Supply integration is a framework that was designed to boost and improve SC efficiency (Ahmad & Saifudin, 2014). Fierce global rivalry has driven businesses to rethink LI’s significance. LI is known as the enabler for a business to better integrate internal activities and collaborate with vendors, clients, and other stakeholders (Ashenbaum & Maltz, 2017). In literature, several advantages of LI have been published. These advantages include, but are not limited to, the achievement of cost advantages, market and organizational efficiency enhancement, and competitive advantage preservation.

Consequently, to increase their overall efficiency and competitiveness, companies aim to enhance their SC performance and competitiveness (Lee *et al.*, 2009). As a significant inter-company practice, logistics and supply chain integration are considered to contribute to improved results. Facing varying meanings, researchers have come to an understanding that two recurrent concepts involving LI are involved. Interconnectedness as well as simplification are what they are (Prajogo & Olhager, 2011). In order to synchronize the movement of supplies, goods, and information, communication emphasizes the linking of operations both internally between functional units and externally between companies. Connectivity can usually be strengthened by different processes, such as teamwork, communication, cooperation, including interaction (Prajogo & Olhager, 2012).

2.5 Critique of Existing Literature Relevant to the Study

While the literature notes that today's increasingly coveted and dreaded competitors include businesses that integrate their suppliers and customers into tightly integrated networks, earlier studies exhibited a favorable, but very poor, correlation between integration of the supply chain and efficiency of the supply chain (Cheruiyot, 2013). Previous research on logistics, supply chain integration, and the relationship to competition is thus ambiguous. Cheruiyot (2013) provided practitioners with key recommendations in his study on the effect of the integrated supply chain on performance at the Kenya Tea Development Agency to improve supply chain integration inside an enterprise, acknowledging internal, supplier, as well as consumer integration as a key approach towards competitive advantage, because competition today is focused on supply chain integration. Cheruiyot (2013) also recommended that a survey method as well as the design established and evaluated in this study can be used by academicians and educators to comprehend the existence of operational (organizational, supplier, and consumer) integration systems and their impact on the performance of the supply chain in organizations.

In their analysis on the implementation of the integrated supply chain in manufacturing companies in Kenya (Kibera & Orwa, 2015), Bidco Oil Refineries revealed that organizations follow various strategies for business development to enhance business efficiency. They did not, nevertheless, propose theories in which the analysis was anchored towards disclosing relationships between variables. The study employed a mixed research design that outlined the descriptive design of the research and a survey that collected data using research questionnaires. The study showed that many of the workers agreed that supply chain integration increases the capacity of businesses because it offers a structured way to keep up with procedures, offers cost savings, and increases performance. They also pointed out that integration also helps maintain suppliers and forge partnerships; and it is well-known that integrated structures provide support for different languages, international taxation, currencies, shipping laws and financing, and much more. The study suggested that research should also be carried out on how to effectively incorporate the emerging new technology, including ERPs and CRMs, among others.

Although integration internally and externally has been widely discussed in logistics and SCI literature, aspects such as information integration, logistic integration, and buyers-suppliers relationship coordination have been largely overlooked (Wang *et al.*, 2006). Specifically, the authors have shown that the introduction of purchases into the company's strategy-making process, along with the implementation of purchasing or procurement practices, has a major effect on manufacturing efficiency and performance. Prajogo and Olhager (2012), examined logistical integration as a construct involving the integration of materials and information in the supply chain as a practice of supplier management. But this also focuses on internal integration, whereas another main area of convergence is obviously between methods used internally and externally for managing the production-logistics operations. In this context, supply chain integration is supposed to be related to the processes and initiatives carried out at the level of manufacturing.

The significance of researching about this link is illustrated, in particular, by Voss (1995, republished in 2005); in addition, the Supply Chain Operations Reference Model (SCOR, Supply-Chain Council, 2003) supports the need to synchronize and align the planning, sourcing, making, delivering, and returning processes of each member firm in the chain with both consumers and suppliers. It is important to note that previous work has identified a relationship between logistics capabilities and competencies including process integration, alignment, simplification, standardization, adaptability, and responsiveness; and efficiency and performance elements including pre- and post-sales customer support, delivery speed, delivery reliability, responsiveness to target markets, and logistics costs (Alexandru, 2014).

Early studies have had to conceptualize links that flow from strategic standards and policies to institutional support for organizational activities, processes, and operations (Bowersox *et al.*, 2007). To date, however, no empirical research has been done to support the frameworks. The link among logistics competencies, however, is still unclear. Some scholars (Nair *et al.*, 2016; Nair & Reed-Tsochas, 2019; Zhao, Zuo, & Blackhurst, 2019) conclude that the adaptive operating system involves the management and control of the various adaptability dimensions by evaluating the overall adaptability of the system. Improving the adaptability aspect does not automatically contribute to a versatile operating system (Aslam, Blome, Roscoe, & Azhar, 2018). Since adaptability is seen as a solution to environmental and market uncertainty (Feizabadi, Maloni & Gligor, 2019), in a global scenario, not only manufacturing but also supply chain logistics and management can be a significant source of competitive advantage, as material flows have a strong effect on company efficiency and performance.

For example, various logistics networks of the supply chain may be triggered to cope with emergencies such as market demand peaks (Amelec, 2015). Subsequently, the allocation of production orders to factories, the synchronization of transport, and other decisions are crucial factors that can affect the output of a wide variety of goods (Schönsleben, 2016). Nonetheless, contrary to the adaptability of manufacturing processes, which have been thoroughly studied, the lack of adaptability of supply chain research appears to have been evident (Sihn, Florian, & Gommel, 2011). Nevertheless, the anticipated advantage in terms of productivity and efficiency from deeper integration of logistics and transportation in the supply chain is one explanation for the growing attention to this problem.

In their study, Chen *et al.* (2018) noted that in order to achieve superior firm efficiency, firms try to align with their supply chain partners. The study drew on the theory of social capital and supply chain literature to explore how the management relations of top managers affect the integration of the supply chain, which ultimately enhances company efficiency. The study attempted to examine how market volatility moderates the relationship between the managerial links of top managers and supply chain integration. The study noted that the business relations of top managers are positively linked to supply chain integration by using triple-respondent matched data from 176 Chinese manufacturing companies, although their political ties are not. Integration of suppliers and customers leads to firm efficiency. In addition, market volatility negatively moderates the relationship of supply chain integration with business links, but positively and strongly moderates the linkage of supply chain integration with political ties.

Yu *et al.,* (2013) noted in their study that, with growing demand for quality and safe food, some prominent pork processing companies are creating stronger brands through maintaining closer collaboration systems with certain members of the chain and heavily investing in information technology (IT) as well as cold chains. But again, the critical question of whether a higher degree of logistical integration contributes to better efficiency and improved performance remains unanswered. It is also noted that there is a lack of empirical or evidence-based investigations on the integration of logistics and efficiency in the agri-food market.

2.6 Research Gaps

A significant number of contributions to the operations management literature are now focused on how firms should align and integrate their processes, activities and operations with both consumers and suppliers and on how supply chain management strategies should be matched with the corporate strategy (Chirchir, 2022). Nevertheless, businesses are also making a great deal of effort to develop their internal processes by implementing modern manufacturing techniques, strategies, or best practices. Although these strategies and practices, coupled with their relationship with efficiency and performance, have been extensively studied in the past, the relationship between supply chain integration and manufacturing supply chain improvement programs has so far been somewhat overlooked

(Cheruiyot, 2013). Additionally, the recognition of common dynamics in manufacturing and strategies in logistics and managing the supply chain will make it possible to better understand the mutual effects of the two approaches (Kibera & Orwa, 2015).

There are few empirical and evidence-based papers available on the basic topic of the adaptability of the supply chain (Langat *et al.*, 2015; Nyauncho, 2016). Within these studies, the different types of adaptability of the supply chain studied are typically correlated with the corresponding types of flexibility of the manufacturing and production processes. Many scholars also developed analytical models for the adaptability of the supply chain. Furthermore, Omondi (2019), discuss the adaptability or flexibility classification schemes as well as the commonalities of the adaptability paradigms or typologies in order to recognize the cross-enterprise complexity of the adaptability of the supply chain and the need to enhance the adaptability metrics across firms.

Most of the empirical studies that analyze the relationship between SCI and performance show positive results, which is in line with a recent literature review and meta-analysis (Bongei, Ngacho & Kibet, 2020); however, they are quite heterogeneous. They not only show a lack of consensus in their results, but also in measuring both SCI and performance (Omondi, 2022). Nonetheless, the SCI construct is measured using various instruments (unidimensional, multidimensional, and even as a set of practices). Meanwhile, performance measurements show more homogeneity, although they are mainly focused on operational performance (reliability, delivery time, response capability) and, to a lesser extent, on financial performance (return on assets or on investment) (Chaudhuri, Boer, & Taran, 2018). In addition, studies analyzing the relationships among different SCI measures find that internal integration improves external integration. Further, some studies suggest the existence of moderating effects among the SCI measures (Durach & Wiengarten, 2020).

While previous studies addressed the vital function of integrating logistics and supply chains in enhancing the competitiveness of the firm (Mellat-Parast & Spillan, 2014), limited attention has been paid to the strategic significance of the competitiveness of various types of integrating the supply chain in food and beverage manufacturing firms (Odongo, 2017; Njagi & Muli, 2020); especially in the Kenyan context. Despite previous research on supply chain integration (Michael, Odock & Oredo, 2022;), little consistent, systematic, and structured typology has been proposed across the entire logistics and supply chain. According to Bennet and Klug (2012), the lack of clear and consistent criteria coupled with limited scholarly literature on cases involving supply chain integration issues is a convincing argument for further study. At the end of the day, supply chain integration is viewed as an essential inter-company practice that contributes to improved efficiency and enhanced performance (Jayaram, Tan, & Nachiappan, 2010). But supply chain integration remains a problem due to the complexities and participation of several organizations (Chirchir, Stephen & John, 2022).

The issue that was occurring with existing supply chain integration research is the absence of a precise and unified characterization of what is meant by "integration." The terminology is used in a variety of ways by academics and practitioners, which causes confusion and inconsistencies in the literature (Birgen, 2021). It is also challenging to assess the success of integration efforts because there is no agreement on what "successful" integration looks like. Lack of an extensive theoretical framework which explains the means by which integration of supply chains influences performance outcomes is another gap in the literature (Muthoni & Mose, 2020). Although there are a number of theoretical viewpoints on supply chain integration, including the transaction cost theory, organizational learning theory, information theory, porter's value chain theory, the resource advantage approach, network theory, institutional theory, resource-based view theory and the constraints theory, few of them offer a thorough and comprehensive understanding of the way integration functions.

The available literature on integrating supply chains frequently ignores the distinctive qualities of other businesses in favor of concentrating on certain contexts or industries, such manufacturing or retail (Maina, Njehia & Eric, 2020). Furthermore, the literature frequently adopts a Western point of view, omitting the institutional and cultural variables that have an impact on supply chain integration in environments that are not Western

(Chirchir, Stephen & John, 2022). Last but not least, there are a number of methodological inadequacies in the existing supply chain integration study. Longitudinal data are frequently used in studies, which hinders their capacity to prove causality. Besides, it is difficult to track the impacts of integration throughout the years due to the dearth of longitudinal studies.

Many studies also rely on self-reported integrating and performance metrics, which are prone to bias as well as may not adequately reflect the complexity of supply chain integration (Michael, Odock & Oredo, 2022). It will take interdisciplinary cooperation and a concentrated effort to establish a complete and comprehensive framework of theory that can direct future research to address these gaps in the supply chain integration literature. Additionally, in order to adequately investigate the complexity and changing nature of integrating supply chains across many industries and situations, scholars will need to use more rigorous and varied study methodologies.

2.7 Summary

Supply chain integration remains one of the main dynamics shaping the competitiveness of manufacturing firms worldwide today. Firms need to consider the different levels of integration of the supply chain and match them with the adaptability of the supply chain to enhance the competitiveness and improve the efficiency and performance of the supply chain. This chapter presented the systems theory informing functional integration (procurement integration, production integration, distribution and warehousing integration, and marketing integration), the resource-based view theory informing supplier integration (early supplier involvement, vendor managed inventory, supplier relationship management, and supplier development), and the social exchange theory informing customer integration (customer relationship management, early customer involvement, integrated problem solving, and complaint management).

The chapter also presented the relational exchange theory informing technology integration (automatic identification technology integration, advanced planning systems integration, transaction processing systems integration, and data sharing system integration) and the complex adaptive systems theory, which acts as a metaphor to members of the client organization and then facilitates a conversation where participants reflect on possible changes in their organization and individual activity (supply chain adaptability: upside supply chain adaptability, and downside supply chain adaptability). The competitive advantage of food and beverage manufacturing firms was also reviewed, focusing on cost, differentiation, responsiveness, and market share, as anchored on the competitive advantage theory. The study provided a model conceptual framework illustrating the link between study variables and focus constructs. An empirical literature review and critique of current literature on SCI elements, supply chain adaptability, and competitive advantage were also discussed. Lastly, the research gaps were also described.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter sets out the approach that the investigator used to carry out the study. It outlines the design of the research, the study target population, the sampling frame, the sampling technique, and the determination of the size of the sample, the research instruments, the procedures to be used for data collection, and the methods for data processing, analysis, and presentation. Eventually, the chapter also outlined the statistical analysis model that was used for the analysis of the data. The hypotheses tests were also presented.

3.2 Research Design

A research design involves the arrangement of the conditions for the collection and analysis of data in a manner that seeks to combine significance for the research purpose with economics in the process, and thus provides the conceptual framework through which the study is performed as a blueprint for data collection, processing, measurement, plus analysis (Merriam & Tisdell, 2015). To investigate the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya, the research followed a cross-section survey design. Within a cross-sectional survey, the study measures the results and experiences of the sample subjects at the same time (Setia, 2016). This enabled the study to explain the relationship between independent, moderating, as well as dependent variables.

Cross-sectional survey design provides a clear picture of relationships and is useful at a specific time to monitor current research population circumstances, characteristics, and opinions. A cross-sectional survey also describes the prevalence of a given attribute in a specified population at a particular time point. According to Kothari (2017), a cross-sectional survey design aids in the formulation of hypotheses and the testing of relationship analyses among study variables. It was also suitable for this research as it thoroughly tested the relationship analysis among variables. In order to gather information on a sizable and varied sample of firms in a short amount of time, a cross-sectional survey seemed the most practical method. Additionally, the cross-sectional survey gave an overview of the sample's present situation at the point in time of the investigation. Additionally, cross-sectional surveys allowed for comparisons between various groups as well as intervals of time, which can be used to find parallels and contrasts. Other researchers who have successfully utilized a cross-sectional survey design include Wambua, 2017; Somba, 2017; and Nyambura, 2018.

The dissertation primarily used both quantitative and qualitative methodologies. According to Creswell (2013), the two basic methodologies that characterize any research while also complementing each other are the qualitative method and the quantitative method. While the qualitative methodology offers in-depth explanations of the analysis, the quantitative technique offers the hard facts needed to accomplish essential objectives. Furthermore, most investigations employ both quantitative and qualitative methodologies to evaluate the correlation between various factors and also to assess verifiable conceptions (Zikmund *et al.*, 2013).

3.2.1 Research Philosophy

The first task for any study is to examine the research philosophy, which essentially deals with the development of knowledge and an assessment of the nature of that knowledge (Taylor, Bogdan, & DeVault, 2015). The choice made by any study regarding the research philosophy is largely dependent upon the way the researcher views the world. It is because each study views a similar situation in a different manner (Wilson, 2010). Research philosophy focuses on the essence and creation of knowledge (Sefotho, 2015). The study was driven by the philosophy of epistemological science. There are three epistemological perspectives, namely realism, positivism, and interpretivism (Scotland, 2012).

This research followed a positivist study paradigm, which is epistemological. This is because the whole study was focused on objectivity, and so the study was restricted to gathering and analyzing data to ensure that the conclusions are measurable and identifiable (Bisman, 2010). Epistemological work in the positivist paradigm focuses on how to analyze the social system as a natural science (Bisman, 2010). It is indeed possible to make predictions under the research theory of positivism, based on previously experienced, clarified realities and their interrelationships. Moreover, Halfpenny (1987) states that the theory of positivism research can be used to study what actually happens in organizations by scientific measurement of people and system activities, so this research philosophy can be used to examine the relationship between the integration of the supply chain and the competitive advantage of Kenya's food and beverage manufacturing companies.

The selection of the philosophy of research was based on the premise of the hypotheses the study intended to test. In the research philosophy of positivism, it's indeed possible to test hypotheses and make generalizations of the results, in addition to the assertion that the research philosophy of positivism can be used to examine what really happens in firms by scientific measurement and analysis of people plus the system's behavioural patterns (Halfpenny, 1987). However, to validate the hypotheses, it is important to translate those philosophical concepts into observable aspects (Saunders, Lewis, & Thornhill, 2007).

3.3 Target Population

According to Weber (2015), a population is defined as a collection of objects, individuals, entities, or items out of which samples are drawn for analysis. The population of this study was 270 food and beverage manufacturing firms in Kenya (KAM, 2020). The target population refers to the all-inclusive community of individuals, entities, or items with which investigators are concerned in making generalizations through the findings; thus, it typically has different features and is also regarded as the theoretical population (Ayala & Elder, 2011). This study’s target population was 73 food and beverage manufacturing firms in Kenya. The food products sub-sector is the largest contributor to the total contribution or input of the manufacturing sector to GDP (KAM, 2020). In addition, the most affected manufacturing sector by competition in the economy is the food & beverage subsector as a result of shifts in product prices leading to high operating costs (KNBS, 2018). This allowed the study to ascertain food and beverage manufacturing firms that are significantly influenced by the integration of the supply chain. The supply chain managers, procurement managers, operations managers, and finance managers who deal with the day-to-day activities of the firms were the main participants. As such, the manufacturers of food and beverage were the units of analysis, while the cadres mentioned herein were the units of observation.

3.4 Sampling Frame

A sampling frame refers to a list of all objects where a representative sample is taken for research purposes. It has the property that a study can define any single item and include any sample (Saunders & Lewis, 2009). The sampling frame for this study was a list of food and beverage manufacturing firms in Kenya, listed by the Kenya Association of Manufacturers (KAM) (2020). KAM aims to foster the profitability and competitiveness of manufacturing firms in globalized markets. The supply chain managers, procurement managers, operations managers, and finance managers who deal with the day-to-day activities of the firms were the main participants.

3.5 Sample Size and Sampling Technique

Mugenda and Mugenda (2003) describe the sample as a demonstrative population chosen from the accessible population to serve as a representative. Sampling is undertaken to provide a clearer understanding of the salient features of the population as a whole. Kothari (2004) describes a sampling method as a strategy for collecting a sample from a given population and as the method that the study should follow in selecting the sample objects or items. There are only two major forms of sampling: non-probabilistic sampling as well as probabilistic sampling. Each element of the population does have a known likelihood of taking part in the research under probabilistic sampling. Simple random, stratified, multistage, systematic, and cluster sampling methods are examples of probabilistic sampling techniques (Blumberg, Cooper, & Schindler, 2014).

Alternatively, with non-probability sampling, individuals in the sample group are chosen in a non-random way, thus not every individual in the population has the possibility to take part in the research. Purposive, convenience, quota, and snowball sampling techniques are examples of non-probabilistic sampling approaches (Blumberg *et al.*, 2014). Two-stage sampling was used by the study. Food and beverage manufacturing firms from different locations were organized into 15 clusters based on towns and then used to select the study sample units from each cluster sampling technique. Two-stage sampling is described as a procedure of sampling that subdivides participants for research into groups (or clusters).

Important clusters of the chosen individuals are divided into sub-groups at different points throughout that sampling process to make it easier for collection of primary data (Acharya *et al.,* 2013). For effective data collection, control, and analysis, the investigator divides the population into groups at different points called clusters (Acharya *et al.,* 2013). The study population is divided into groups in the two-stage sampling design, such as cluster sampling, however different samples are selected from every cluster sampled in this design. The units to be sampled in the first stage, called main or first sampling units, are the clusters. The components of such clusters are called sub-units, intermediate or second sampling units, are the second-stage units.

When the clusters are large, two-stage sampling is used, making it impossible or costly to observe all the units within them. In the first stage, cluster random sampling was used to select 73 food and beverage manufacturing firms from a list of 270 companies. The Nassiuma formula (2000) was used to obtain the sample size from the study population of 270 food and beverage manufacturing firms in Kenya. In the second stage, purposive sampling was used to select two participants from each of the participating organizations due to the heterogeneity of their respective organizational structures. A non-probability sampling strategy called "purposive sampling" includes choosing cases or participants based on predetermined standards or traits that are pertinent to the research subject. (Acharya, Prakash, Saxena, & Nigam, 2013).

Participants with specific understanding of the integration of supply chains and competitiveness of companies in the food and beverages manufacturing sub-sector were selected through the technique of purposive sampling. Senior supply chain managers, procurement managers, operations managers, and finance managers were derived from the departments of supply chain management, procurement, operations, and finance functions as well as related functions to participate in this study. The reason for selecting these managers is that they have an awareness and understanding of the performance of the departmental operations and functions.

$$n = \frac{N(cv^2)}{Cv^2 + (N-1)\,e^2}$$

Where:

n = Sample Size

N = Population (270)

Cv= Coefficient of Variation (0.5)

e= Tolerance of desired level of confidence (at 95% level of confidence = 0.05)

$$n = \frac{270(0.5^2)}{\{0.5^2 + (270-1)0.05^2\}}$$

$$n = \frac{67.5}{0.9225} = 73.1707$$

n = 73.1707

73.1707 is rounded off to 73

Table 3.1: Sample Size

S/No.	Location	No. of Firms	Formula & Calculation	Sample	No. of Respondents
1.	Athi River	7	(7/270) *73	2	4
2.	Eldoret	7	(7/270) *73	2	4
3.	Kakamega	3	(3/270) *73	1	2
4.	Kericho	3	(3/270) *73	1	2
5.	Kisumu	10	(10/270) *73	3	6
6.	Meru	4	(4/270) *73	1	2
7.	Mombasa	35	(35/270) *73	9	18
8.	Murang’a	4	(4/270) *73	1	2
9.	Nairobi	132	(132/270) *73	35	70
10.	Naivasha	3	(3/270) *73	1	2
11.	Nakuru	8	(8/270) *73	2	4
12.	Nyeri	3	(3/270) *73	1	2
13.	Ruiru	6	(6/270) *73	2	4
14.	Thika	22	(22/270) *73	6	12
15.	Other towns with < 3 Firms	23	(23/270) *73	6	12
	Total	**270**		**73**	**146**

The sample size for the study was 146 respondents from 73 food and beverage manufacturing firms in Kenya.

3.6 Research Instrument

Research instruments refer to the techniques, materials, and resources used in the research to gather information (Zikmund, Carr, & Griffin, 2013). Primary and secondary data was obtained by means of research questionnaires. The questionnaire is a research tool that collects data from a broad sample and tries to turn the research goals into concrete questions, and the answers to each question are generated by the hypotheses test data (Mugenda & Mugenda, 2003). According to Saunders (2011), questionnaires are excellent data collection tools because they permit participants to provide information about their present as well as historical phenomena, dispositions, and perspectives. The investigation utilized both structured and semi-structured questionnaires. The structured (standardized) questionnaires were used to collect quantitative data, and unstructured questions were utilized to characterize participants' responses (Kothari, 2017).

The research questionnaires used for the analysis consisted of both open and closed questions, which captured the independent variables, the moderating variable, and the dependent variable. It tended to reduce subjectivity and help qualitative and quantitative analysis to be done (Wilson, 2010). Nevertheless, the introductory section of the questionnaire contained the demographic attributes of the respondents. The benefit is that they (research questionnaires) are easier to interpret and analyze and also allow for a more in-depth response, whereby the respondents are given responsibility for their own personal response (Gillham, 2000). To obtain interval data, some of the responses in the survey data were assigned numeric values ranging from 1 to 5 on the 5-Piece Likert Scale. This was significant since it allowed for more efficient processing and also consolidated all obtained responses into specified critical data exclusively (Kothari, 2017). The obtained data was then coded as well as compiled in preparation for subsequent analysis.

3.7 Data Collection Procedure

According to Kombo and Tromp (2009), the collection of data is a set of information to represent or to show other evidence. The letter of introduction was obtained from the university as well as a research permit from NACOSTI. Data collection was carried out using the "drop and pick" method. The organizations were contacted first to notify them of the intention to drop the research questionnaires (see Appendix II) to the supply chain, logistics, procurement, finance and operations managers. This was done to make sure that perhaps the study is in a position to make clarifications regarding questions to the participants (respondents) in the case of queries.

Questionnaire (research), as per Sekaran *et al.* (2011), can be self-administered, emailed to participants, or provided in electronic forms. Some of the copies of the questionnaires in this investigation were distributed to the participants individually. Personal administration of research questionnaires to participants is regarded as socially conscious, as participants appreciate face-to-face interaction to minimize suspicions. The one-on-one presentation of research questionnaires is an efficient method of data collection since comprehensive replies can be obtained in a short period of time. Furthermore, any questions from participants can be made clearer quickly. It moreover enables the researchers to clarify the subject of study and encourage participants to provide candid responses.

Mailed questionnaires were also used to minimize one-on-one meetings as a measure of containing the spread of COVID-19 as guided by the Ministry of Health in Kenya. Moreover, mailing questionnaire surveys were also used owing of their low cost, quick dissemination, and responding turnaround. The format for emailing the questionnaire was carefully considered. To address the possibility of non-response for this study, two alternate formats of mail questionnaire surveys were identified: a mailing message with questions attached as well as an email with just a URL incorporated in the messaging urging prospective participants to click on the provided link and then answer the questionnaires. Utilizing emailed questionnaires containing embedded URLs simplifies administration, filling, and sending. Prospective participants can navigate the survey tool by following the URL made available in the emailed invitation. These questionnaires additionally make it easier to transmit the data to an investigator via email.

3.8 Pilot Test

Cooper and Schindler (2011) note that the pilot study is being undertaken to identify flaws in the design, composition as well as to provide proxy data for the selection of the probability sample. In this case, the methods used in the pre-test of the questionnaire should be the same as those used in the actual analysis or data collection. Pilot studies are imperative in detecting vagueness and helping in assessing the types of responses given to assess if they assist the investigator in meeting the objectives laid down for the study (Viechtbauer *et al.*, 2015). The techniques used to pre-test the research questionnaires were similar to those used during the actual collection of data.

According to Mugenda and Mugenda (2003), the pre-test number is expected to be low, around 1 percent to 10 percent of the target population. In this investigation, the research questionnaire was tested on 10 percent of the total sample size of 146. The pilot study included 15 respondents. They were randomly selected from the 15 clusters of food and beverage manufacturing firms in Kenya. To achieve representativeness, one firm was selected from each cluster and one manager working along the supply chain operations will participate per firm.

3.8.1 Reliability of the Research Instrument

According to Bryman and Bell (2015), reliability is accuracy given measurement consistency or measurement reliability over a variety of conditions within which the same results can be obtained. In this research, the internal approach to consistency was followed. The internal consistency approach was adopted because it is more robust than other approaches (Cooper & Schindler, 2011). Internal consistency is measured using the Cronbach Alpha statistic. In order for the test to be internally consistent, Drost (2011) recommends that the reliability figures should be based on the average inter-relationships between all the individual test objects. The value should be above .7 where Cronbach's Alpha coefficient was used for the measure of reliability (Cronbach & Shavelson, 2004; Drost, 2011).

3.8.2 Validity of the Research Instrument

Mugenda and Mugenda (2003) describe validity as the degree to which the study findings accurately reflect the phenomenon under investigation. Validity also refers to how well the system measures what it wants to measure (Mugenda, 2008). The importance of the components of the study also concerns validity. This study evaluated the validity of the content and construct. Bryman and Bell (2015), posited that content validity is a qualitative form of validity where the scope of the definition is made very clear and the analysts or judges decide if the test is entirely within the scope. In essence, there are two methods of determining the validity of the content, i.e., asking a number of questions about the instrument or test and/or asking expert judges in the field for their opinion (Drost, 2011).

Construct validity was ensured by restricting the items in the questionnaire to the operationalized conceptual framework, variables, indicators and guided by the theories utilized along with the literature reviewed. On three levels, content validity was established. The first stage was the researcher's evaluation of the full items one by one to check if they could measure what they were supposed to measure. The instrument was submitted to supervisors as well as research professionals in the department of procurement and logistics at JKUAT at just the second level. The third level took place when the collected data (by the instrument) was statistically analyzed and the content validity index (CVI) was computed. The aggregate of all the item level CVI was used to create the scale level CVI (S-CVI). S-CVI of .83 or above is acceptable (Polit, Beck & Owen 2007). This was used to check the tool's internal validity/content validity.

3.9 Data Analysis and Presentation

Data analysis requires the use of logic to analyze the data collected in order to define specific patterns and summarize the relevant details contained in the sample (Ho, 2006). Kothari (2017) posited that data processing requires the editing, sorting, and tabulation of data obtained in such a way that they can be analyzed. The entry of data transforms information obtained through secondary or primary methods into a tool for viewing and processing. For this study, the quantitative data collected was analyzed by using SPSS version 28 to calculate the response rate using descriptive statistics, including frequencies, percentages, means, and standard deviations.

Qualitative data analysis was conducted using content analysis (computer-aided), where a code is assigned to specific themes and inserted into SPSS version 28 to produce concise statistics. Bruce (2011) poised that in discreet and data from questionnaires, content analysis is highly viable, but is not always analyzable until the data acquired has been simplified and deemed systematically corresponding. Inferential analysis focusing on correlation analysis and regression analysis was done. The results were summarized in this analysis using tables and figures.

3.9.1 Diagnostic Tests

The primary aim of statistical diagnostic testing is really to determine whether or not the researcher can continue to fit the model of regression analysis to the study's findings (Babyak, 2004). For this to be achieved, various regression model assumptions have to be checked and verified to not exist (Hoffmann, 2005). The assumptions as well as their tests are as follows: Data is assumed to be distributed normally and was tested using skewedness and kurtosis. Skewness is a depiction of symmetry, or even more specifically, the lack of symmetry. A distribution, or data collection, is symmetrical if the center point appears the same to the left and to the right. Kurtosis is a statistical metric about whether the dataset is heavily or light-tailed in relation to a normal distribution (Groeneveld & Meeden, 1984). That is, high-kurtosis data collection tends to have strong tails as well as outliers. Low-kurtose data sets tend to always have light tails and a lack of outliers. One extreme case was a uniform distribution.

3.9.2 Normality Test

According to Adhikari (2014), the object of the normality test as a statistical assumption test is to decide whether the data set uses the Shapiro-Wilk test and Kolmogorov tests to be well-modeled by a normal distribution. The research used a 95 percent confidence interval normality test for the mean where the p-value is compared to assess if the null hypothesis should be dismissed, indicating the data will either be normally distributed (>0.05) or not (<0.05).

3.9.3 Multicollinearity

The study also tested for multicollinearity. Martz (2013), poised that multicollinearity is an undesirable phenomenon in which there are high correlations between the independent variables. This research used the Variance Inflation Factor (VIF) to check for multicollinearity. Unless no association occurs between two independent variables, then all VIFs will be 1. If VIF is below or greater than 5 for one of the variables, this variable has multicollinearity associated with it. Any of these variables were, in this case, excluded from the regression model (Cohen *et al.,* 2003).

3.9.4 Homoskedasticity

Homoskedasticity indicates the dispersion of all measurable observations is the same. The condition exists if there is no continuous variation on the error term(s) (Williams, 2015). Also, it alludes to errors having the same variance throughout all values of independent [predictor] variables [factors] (Osborne & Waters, 2002). As poised by Keith (2006), investigators assume all errors are distributed uniformly across variables [factors]; that is, the variability around the line of regression is the same across all predictor [independent] variable values. Homoskedasticity can be assessed through any of the following methods: Goldfeld and Quandt test (1965), Levene or Park tests, or a test of visually inspecting residuals plotted in the line of significance. The Levene test was carried out.

3.9.5 Statistical Models

According to Harrel (2015), statistical modeling includes judging the likelihood that an observable discrepancy between categories is a reliable one or even one that could have arisen in the sample by chance. Regression analysis attempts to establish if a group of study variables together predict a specified dependent variable and thus attempts to significantly boost the estimate's accuracy (Mugenda & Mugenda, 2003). For this study, the linear regression model was (per variable):

H_{01}: Functional integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

$$Y= \beta_0 + \beta_1 X_1 + \varepsilon$$

H_{02}: Supplier integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

$$Y = \beta_0 + \beta_2 X_2 + \varepsilon$$

H_{03}: Customer integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

$$Y = \beta_0 + \beta_3 X_3 + \varepsilon$$

H_{04}: Technology integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

$$Y = \beta_0 + \beta_4 X_4 + \varepsilon$$

For this study, the general linear regression model was:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where; Y= Competitive Advantage

β_0 = Constant

β_i is the coefficient for Xi (i=1, 2, 3, 4)

X_1= Functional Integration

X_2= Supplier Integration

X_3= Customer Integration

X_4= Technology Integration

ε = Error Term

3.9.6 Moderating Effect Analysis

The moderating effect of supply chain adaptability on the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya was further tested using moderated multiple regression (MMR) analysis because the study featured a moderating variable. A moderating variable is a feature that influences the course and intensity of a predictor (independent) variable's relationship with a predicted (dependent) criterion variable (Sharma, Durand, & Gur-Arie, 1981; Aguinis, 2004). This variable can decrease or increase the strength and direction of the relationship between a predictor variable and a predicted variable, or it can change the direction of the relationship from positive to negative between the two variables (Russell & Bobko, 1992; Hayes, 2017). The moderator is supported if there is a substantial correlation between the predictor and the outcome of the dependent variable. In order to evaluate the moderating effect of supply chain adaptability (M) on the relationship between an independent variable and a dependent variable, the study used the moderated multiple regression analysis (step-wise technique).

$$Y= \beta_0 + \beta_i X_i + \varepsilon \text{ …………………. } (i=1, 2, 3, 4)$$

$$Y= \beta_0 + \beta_m M + \varepsilon$$

$$Y= \beta_0 + \beta_m M \beta_{mi} M X_i + \varepsilon$$

Testing the moderating effect for objective one;

$$Y= \beta_0 + \beta_m X_1 M + \varepsilon$$

Testing the moderating effect for objective two;

$$Y= \beta_0 + \beta_m X_2 M + \varepsilon$$

Testing the moderating effect for objective three;

$Y = \beta_0 + \beta_m X_3 M + \varepsilon$

Testing the moderating effect for objective four;

$Y = \beta_0 + \beta_m X_4 M + \varepsilon$

Where; Y= Competitive Advantage

β_0= Constant

β_i is the coefficient for Xi (i=1, 2, 3, 4)

X_1= Functional Integration

X_2= Supplier Integration

X_3= Customer Integration

X_4= Technology Integration

M= Supply Chain Adaptability (Moderating Variable)

ε = Error Term

The general moderated multiple regression model was:

$Y = \beta_0 + \beta_{1M} X_1 M + \beta_{2M} X_2 M + \beta_{3M} X_3 M + \beta_{4M} X_4 M + \varepsilon$

3.9.7 Operationalization and Measurement of Study Variables

The research utilized the following rating scales, i.e., open-ended questions, to allow respondents to include details that may have not been included in the closed-ended questions, as well as the Likert scale developed by Rensis Likert to determine how strongly the participants agreed or disagreed with a statement (Cooper & Schindler, 2011). To measure the study variables, the research must evaluate the measures or metrics of each independent or predictor variable, which then utilizes the ordinal scale of 1-5 [1 = strongly disagree (SD), 2 = disagree (D), 3 = neutral (N), 4 = agree (A), and 5 = strongly agree (SA)]. For this research, the questionnaire was dominated by Likert scales. A Likert scale can be easily tested using standard techniques such as factor analysis (Montgomery, Peck, & Vining, 2001).

Table 3.2: Operationalization of Study Variables

Type of Variable	Name of Variable	Metrics	Scale
Independent Variables	Functional Integration	• Procurement Integration • Production Integration • Distribution & Warehousing Integration • Marketing Integration	• Likert Scale • Likert Scale • Likert Scale • Likert Scale
	Supplier Integration	• Early Supplier Involvement • Vendor Managed Inventory • Supplier Relationship Management • Supplier Development	• Likert Scale • Likert Scale • Likert Scale • Likert Scale
	Customer Integration	• Customer Relationship Management • Early Customer Involvement • Integrated Problem Solving • Complaint Management	• Likert Scale • Likert Scale • Likert Scale • Likert Scale
	Technology Integration	• Automatic Identification Technology Integration • Advanced Planning Systems Integration • Transaction Processing Systems Integration • Data Sharing System Integration	• Likert Scale • Likert Scale • Likert Scale • Likert Scale
Moderating Variable	Supply Chain Adaptability	• Upside Supply Chain Adaptability • Downside Supply Chain Adaptability	• Likert Scale • Likert Scale
Dependent Variable	Competitive Advantage of Food & Beverage Manufacturing Firms	• Cost Advantage • Differentiation • Responsiveness • Market Share	• Likert Scale • Likert Scale • Likert Scale • Likert Scale • Interval Questions

3.9.8 Hypothesis Testing

The researcher used two measures in this analysis to fit into the regression model. The tests were respectively called F-Test, and T-Test. The F-Test, which is a predictive test, was used to check the overall regression model, while the T-Test was used to test whether or not each of the study's independent or predictor variables has a statistically relevant effect on the study's dependent variable. The T-tests for the study's variables were:

Table 3.3: Hypotheses Testing

S/No.	Hypotheses	Hypothesis Test	Decision Rule
1	**H_{01}:** Functional integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a1}:** Functional integration has a positive significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.	T-test/ F-Test	If the P ≤ 0.05, reject Ho_1 and accept Ha_1
2	**H_{02}:** Supplier integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a2}:** Supplier integration has a positive significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.	T-test/ F-Test	If the P ≤ 0.05, reject Ho_2 and accept Ha_2
3	**H_{03}:** Customer integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a3}:** Customer integration has a positive significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.	T-test/ F-Test	If the P ≤ 0.05, reject Ho_3 and accept Ha_3
4	**H_{04}:** Technology integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a4}:** Technology integration has a positive significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.	T-test/ F-Test	If the P ≤ 0.05, reject Ho_4 and accept Ha_4
5	**H_{05}:** Supply chain adaptability does not moderate the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a5}:** Supply chain adaptability moderates the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya.	T-test/ F-Test Testing the variables at 5% or 95% level of significance.	If the P ≤ 0.05 for all independent variables, reject Ho_{5s} and accept Ha_{5s}

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the key findings of the studpy and the results of data analysis. Between December 2020 and January 2021 (pilot test); and between March 2021 and August 2021, data for this research was collected. Both primary and secondary data were collected from the participating food and beverage manufacturing firms in Kenya. The food and beverage manufacturing firms had been categorized into the actual towns where they are located, which gave us 15 groupings. Quantitative data collected was analyzed by using SPSS version 28 to calculate the response rate using descriptive statistics, including frequencies, percentages, means, and standard deviations.

Qualitative data analysis was conducted using content analysis (computer-aided), where a code is assigned to specific themes and inserted into SPSS version 28 to produce concise statistics. Inferential statistics focusing on correlation analysis and regression analysis are also presented. In this chapter, data on the diagnostic tests is presented focusing on normality, multicollinearity, and homoskedasticity. The chapter also presents findings based on fitting statistical models, including regression analysis both per variable and on the general (standard) model. The moderating effect analysis findings are also presented using moderated multiple regression analysis, both the step-wise technique and the general (standard) model. Finally, the findings from hypotheses testing are also captured and discussed.

4.2 Instrument Response Rate

The study targeted supply chain managers and other managers working along the supply chain in the food and beverage manufacturing firms in Kenya who were registered members of the Kenya Association of Manufacturers in the year 2020. The response rate is described as the proportion of respondents whose questionnaires are completed and returned (Dillman *et al.,* 2009). This is calculated as the number of respondents whose questionnaires were completed and returned divided by the total number of respondents in the entire sample, including non-response. One hundred and forty-six (146) research questionnaires were distributed to food and beverage manufacturing firms spread across the 47 counties in Kenya as listed in the KAM directory (2020).

A total of 139 mailed and self-administered questionnaires were adequately filled out of the 146 distributed, yielding a 95.21 percent rate of response. This is because some respondents declined to respond to the questionnaires. This is depicted in table 4.1. The response rate was representative and adequate for analysis for the purpose of making conclusions and generalizing the research's findings. This is in agreement with the postulation of Baruch and Holtom (2008), who posited that in social sciences, a response rate of 50% or more is considered satisfactory. A response rate of 75%, as per Nulty (2011), is sufficient for analysis as well as drawing inferences and conclusions about a population. Furthermore, according to Fincham (2014), a response rate of 60% or more is suitable for the analysis. Similarly, according to Kothari (2012), a response rate of 50 percent should be deemed ordinary, 60 percent to 70 percent should be considered adequate, and above 70 percent should be deemed exceptional.

Table 4.1: Instrument Response Rate

Item	Frequency	Percentage
Distributed Questionnaires	146	100.00
Completed & Returned Questionnaires	139	95.21
Unreturned Questionnaires	7	4.79

4.2.1 Response Per Town

Data for this study was collected from 139 respondents working in various food and beverage manufacturing firms across 15 categories (towns), and their response rate is shown in table 4.2.

Table 4.2: Response Per Town

S/No.	Location	Target Firms	Target Respondents	Response
1.	Athi River	2	4	2
2.	Eldoret	2	4	4
3.	Kakamega	1	2	2
4.	Kericho	1	2	2
5.	Kisumu	3	6	6
6.	Meru	1	2	2
7.	Mombasa	9	18	18
8.	Murang'a	1	2	2
9.	Nairobi	35	70	70
10.	Naivasha	1	2	2
11.	Nakuru	2	4	4
12.	Nyeri	1	2	2
13.	Ruiru	2	4	4
14.	Thika	6	12	12
15.	Other towns with < than three Firms	6	12	7
	Total	**73**	**146**	**139**

4.3 Pilot Test Results

The data for the pilot test was collected between December 2020 and January 2021. The pilot study included 15 respondents. They were randomly selected from the 15 clusters of food and beverage manufacturing firms in Kenya based on location. To achieve representativeness, one firm was selected from each cluster and one manager in the supply chain participated per firm. In this research, the internal approach to consistency was followed. The pilot study respondents were not included in the final data collection as envisioned by Kothari (2017). Since the respondents who took part in the pilot test were still biased, they could not be included in the final survey (Kothari, 2017).

4.3.1 Findings on Reliability of the Research Instrument

The internal consistency approach was adopted because it is more robust than other approaches (Cooper & Schindler, 2011). Internal consistency is measured using the Cronbach Alpha statistic. In order for the test to be internally consistent, Drost (2011) recommends that the reliability figures should be based on the average inter-relationships between all the individual test objects. The value should be above .7 where Cronbach's Alpha coefficient (α) is used for the measure of reliability (Drost, 2011). Table 4.3 displays the outcomes of the reliability test for the research variables in the study.

First, the findings in table 4.3 illustrated that the Cronbach's Alpha value for functional integration which had 10 items was .907. The 10 items were aggregated by taking their average to come out with functional integration, having dropped items (e and j). Second, the findings in table 4.3 illustrated that the Cronbach's alpha value for supplier integration, which had 9 items, was .860. The 9 items were aggregated by taking their average to come out with supplier integration, having dropped items (d, g, and k). Third, the findings in table 4.3 illustrated that the Cronbach's Alpha value for customer integration which had 9 items was .917. The 9 items were aggregated by taking their average to come out with customer integration indicators, having dropped items (b, d, and k).

Fourth, the findings in table 4.3 illustrated that the Cronbach's Alpha value for technology integration which had 10 items was .934. The 10 items were aggregated by taking their average to come out with technology integration, having dropped items (g and k). Fifth, the findings in table 4.3 illustrated that the Cronbach's alpha value for supply chain adaptability, which had 7 items, was .718. The 7 items were aggregated by taking their average to come out with supply chain adaptability, having dropped items (d and h). Fifth, the findings in table 4.3 illustrated that the Cronbach's Alpha value for competitive advantage which had 11 items was .900. The 11 items were aggregated by taking their average to come out with a competitive advantage, having dropped items (a and l). This shows that all the variables in the study had a Cronbach's Alpha value which was above .7, thus indicating adequate convergence or internal consistency.

Table 4.3: Pilot Test Reliability Statistics

S/No	Variables	No of items	Cronbach's Alpha	Comment
1	Functional Integration	10	.907	Accepted
2	Supplier Integration	9	.860	Accepted
3	Customer Integration	9	.917	Accepted
4	Technology Integration	10	.934	Accepted
5	Supply Chain Adaptability	7	.718	Accepted
6	Competitive Advantage	11	.900	Accepted

N=15

4.3.2 Findings on Validity of the Research Instrument

Content and construct validity were both used in this study. Bryman and Bell (2015), posited that content validity is a qualitative form of validity where the scope of the definition is made very clear and the analysts or judges decide if the test is entirely within the scope. In essence, there are two methods of determining the validity of the content, i.e., asking a number of questions about the instrument or test and/or asking expert judges in the field for their opinion (Drost, 2011). Construct validity was achieved by restricting the questions to the conceptualizations of the variables and ensuring that only the predictors of a specific variable fell within the same construct.

Content validity was achieved by designing the questionnaires according to the research variables and their respective indicators of measurement; content validity was achieved by restricting the questions to the conceptualizations of the variables and ensuring that the indicators of a particular variable fall within the same measure. Six experts were responsible for assessing the instrument's validity. Their suggestions were used to improve the questionnaire preceding final data collection. Moreover, the content validity index (CVI) was utilized to assess the research instrument's validity. The aggregate of all the item level CVI was used to create the scale level CVI (S-CVI). The 6 raters' S-CVI was .9277, which was higher than the acceptable S-CVI of .83 as recommended by Polit, Beck, and Owen (2007). This indicates that the tool passed the convergent validity test as presented in table 4.4.

Table 4.4: Content Validity Index

S/No	Variables	No of Items	No of Valid items	CVI
1	Functional Integration	10	10	.9264
2	Supplier Integration	9	9	.9149
3	Customer Integration	9	9	.9514
4	Technology Integration	10	10	.9038
5	Supply Chain Adaptability	7	7	.9289
6	Competitive Advantage	11	12	.9405
	S-CVI			**.9277**

4.4 Demographic Information

Data concerning the demographic information of the respondents from the food and beverage manufacturing firms in Kenya was collected, reviewed, and analyzed. The participants were asked to indicate their period of service, level of management, highest academic level attained, and the department they serve in the food and beverage manufacturing firm. The results are depicted in table 4.5.

4.4.1 Length of Service

The participants were asked to indicate the period they served in the food and beverage manufacturing company. Based on the results as depicted in table 4.5, the majority (45.32%) of the participants had served in the food and beverage manufacturing firms between 4 and 8 years; 31.66% of the participants had served for a period of between 0 and 3 years; 20.14% of the participants had served between 9 and 13 years; and 2.88% of the respondents had served for a period of more than 13 years. These were collected to see whether the study’s participants had been with the company long enough to be familiar with the data the study was looking for. According to Dokko, Wilk, and Rothbard (2009), prior related experience has a beneficial impact on task-relevant expertise and ability, and this effect is related to higher experience levels within the current firm. The majority of the study’s participants had served in the company for more than 4 years, which shows that they have an understanding of supply chain integration and its contribution towards a competitive advantage for the respective firms.

4.4.2 Level of Management

The study's participants were asked to indicate the level of management at which they served in the food and beverage manufacturing company. Based on the results as depicted in table 4.5, the majority (43.88%) of them served in the intermediate level of management, 34.53% of the participants served in the subordinate level of management, 15.83% of the participants served in the senior (top) level of management, and only 5.76% of the participants didn't serve in any of the above levels of management. These were collected to see whether the study's participants were familiar with the strategic nature of supply chain integration in enhancing the competitiveness and performance of food and beverage manufacturing firms in Kenya. The majority of the respondents served at levels of management tasked with strategic decision modeling on supply chain integration and tactical implementation of supply chain integration in a way that could facilitate measurement of its effect on the performance and competitiveness of the food and beverage manufacturing firms.

4.4.3 Academic Level

The study's participants were asked to indicate the highest academic level they had attained. Based on the results as depicted in table 4.5, the majority (63.31%) of the study's participants had attained a bachelor's degree, 19.42% of the participants had attained a master's degree, 15.83% of the participants had attained a diploma, 1.44% of the respondents had attained a certificate, and only 1.5% of the participants had attained a Ph.D. This was to be expected, given that the majority of the respondents worked at levels of management where expertise, experience, and competencies are projected to be high. According to Lau (2010), employee professionalism refers not just to a workforce's level of education, including qualifications, but also to how they deal with issues around their duties and responsibilities. Well-educated study participants meant they were well-informed and provided more detail to this research, which added value. The above was used as a gauge of their understanding of the study's actual subject, and then it was used to draw definitive conclusions and actionable recommendations.

4.4.4 Department Served

Due to the non-uniform organizational structures adopted by the food and beverage manufacturing firms, the study's participants were asked to indicate the departments in which they served in their firms. Based on the results as depicted in table 4.5, the majority (61.15%) of the study's participants served in the supply chain department, 18.71% of the participants served in the procurement department, 11.51% of the respondents served in the operations department, and only 8.63% of the participants served in the finance department. This distribution was essential since it provided a comprehensive participant base for the information that was sought by the study.

Table 4.5: Demographic Information

Main Factor	Factor Level	Frequency	Percentage
Period of Service	0 - 3 years	44	31.66
	4 - 8 years	63	45.32
	9 - 13 years	28	20.14
	Over 13 years	4	2.88
Management Level	Non-Management	8	5.76
	Subordinate Management	48	34.53
	Intermediate Management	61	43.88
	Senior (Top) Management	22	15.83
Academic Level	PhD	2	1.44
	Master's Degree	27	19.42
	Bachelor's Degree	88	63.31
	Diploma	22	15.83
Department	Supply Chain	85	61.15
	Procurement	26	18.71
	Operations	16	11.51
	Finance	12	8.63

4.5 Assumptions of the Model

The basic goal of statistical diagnostic testing is to see if the researcher can continue to fit the regression analysis model to the data of the investigation (Gunst & Mason, 2018).

Various regression model assumptions must be tested and validated that they do not exist in order to achieve this (Bollen, Biemer, Karr, Tueller, & Berzofsky, 2016). The assumptions as well as their tests are as follows: Data is assumed to be distributed normally and was tested using skewedness and kurtosis. Skewness is a depiction of symmetry, or even more specifically, the lack of symmetry. A distribution, or data collection, is symmetrical if the center point appears the same to the left and to the right. Kurtosis is a statistical metric about whether the dataset is heavily tailed or light tailed in relation to a normal distribution (Cain, Zhang & Yuan, 2017). That is, high-kurtosis data collection tends to have strong tails as well as outliers. Low-kurtose data sets tend to always have light tails and a lack of outliers.

4.5.1 Normality Test

The regression model was subjected to a normality test to see whether the observations could have logically come from a normal distribution. The purpose of a normality test is to decide which tests should be performed and to confirm that the assumptions of a normal distribution are not breached. To check for normality, the Kolmogorov-Smirnov and Shapiro-Wilk tests are performed. Kolmogorov-Smirnov is used for big sample sizes, while Shaphiro-Wilk is utilized for small sample sizes (Das & Imon, 2016). In this investigation, the Shaphiro-Wilk test was applied. The p-values for the variables were $< .05$, according to the results of the analysis. The Kolmogorov-Smirnov criterion was used to evaluate the normality test ($p < .05$ for all variables). To detect all deviations from normalcy, the Kolmogorov-Smirnov test is performed. If the significance value is more than .05, the data is assumed to originate from a normal distribution. All of the sample values were $> .05$, as seen in table 4.6.

Table 4.6: Results of Tests of Normality

Item	Kolmogorov-Smirnov[a]			Shaphiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Competitive Advantage	.278	139	.000	.971	139	.134
Functional Integration	.245	139	.000	.973	139	.461
Supplier Integration	.115	139	.000	.970	139	.562
Customer Integration	.198	139	.000	.951	139	.378
Technology Integration	.169	139	.000	.975	139	.113
Supply Chain Adaptability	.209	139	.000	.974	139	.416

a. Lilliefors Significance Correction

Furthermore, the test statistic in a multiple linear regression must reflect a normal probabilistic distribution, as with the normally distributed data. The data residuals can as well be tested for normality to see if they exhibit such an assumption of normality (Siddiqi, 2014). The Sig. value was $< .05$ for each both Kolmogorov-Smirnov; indicating a breach of the normality assumption while the sig. value was $> .05$ and Shapiro-Wilk tests indicating normality of distribution of the data. Julie (2011), confirms that this is extremely typical in larger samples. Nevertheless, as demonstrated in the normal Q plots below, the distribution of the values does not depart significantly from normality. Normal QQ plots also were utilized to determine how the standard errors in the models were distributed. In the conventional Q-Q plot, the line reflecting the exact data distributions closely mirrors the diagonal line, as shown in Figures 4.1 – 4.6. This implies the data analyzed is normal and thus acceptable (Ghasemi & Zahediasl, 2012).

4.5.1.1 Functional Integration (FI)

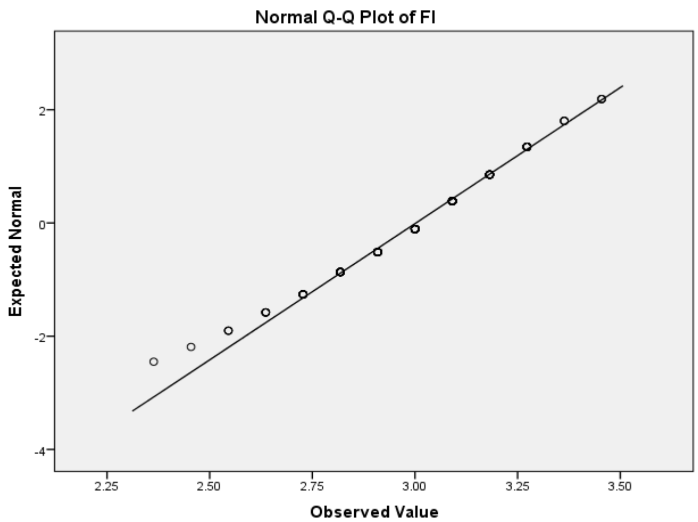

Figure 4.1: Normal Q-Q Plot of Functional Integration (FI)

4.5.1.2 Supplier Integration (SI)

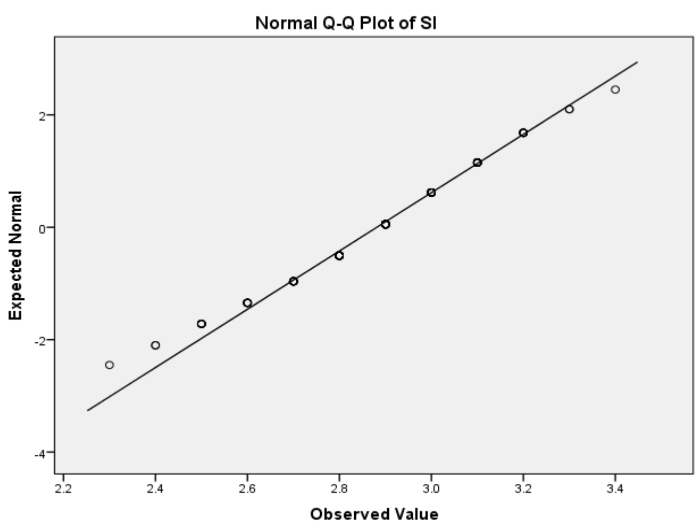

Figure 4.2: Normal Q-Q Plot of Supplier Integration (SI)

4.5.1.3 Customer Integration (CI)

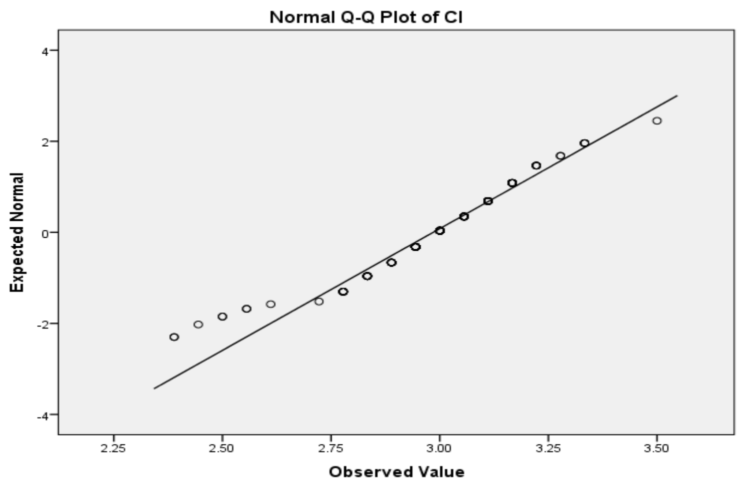

Figure 4.3: Normal Q-Q Plot of Customer Integration (CI)

4.5.1.4 Technology Integration (TI)

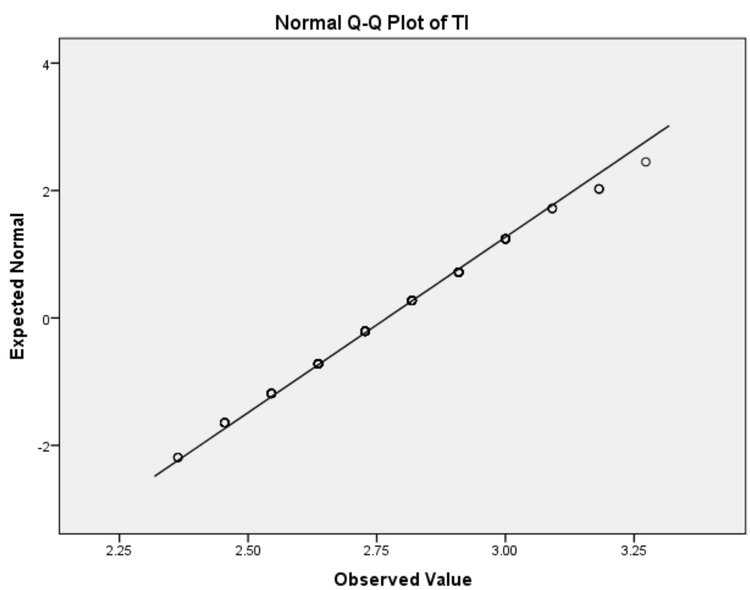

Figure 4.4: Normal Q-Q Plot of Technology Integration (TI)

4.5.1.5 Supply Chain Adaptability (SCA)

Figure 4.5: Normal Q-Q Plot of Supply Chain Adaptability (SCA)

4.5.1.6 Competitive Advantage (CA)

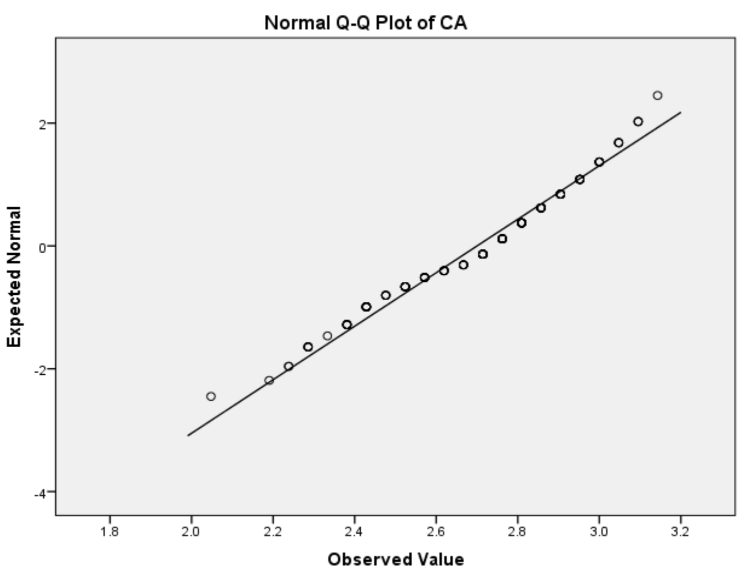

Figure 4.6: Normal Q-Q Plot of Competitive Advantage (CA)

4.5.2 Multicollinearity Test

Multicollinearity is an undesirable scenario in which there are high correlations between the independent variables. Multicollinearity, in other words, bloats the standard errors. As a result, they make certain variables statistically insignificant where they should be significant (Martz, 2013). This research used the Variance Inflation Factor (VIF) to check for multicollinearity. To check for multicollinearity, the Detection Tolerance and Variance Inflation Factor (VIF) approach was utilized (Cooper & Schindler, 2011). A tolerance value of less than 0.20 and a VIF of 5 or 10 and above, according to York (2012), suggests a multicollinearity issue. Relatively low tolerance values and greater VIF values indicate multicollinearity (Thompson, Kim Aloe & Becker, 2017). The Variance Inflation Factor (VIF) findings for the study variables were less than 5, while Tolerance was greater than 0.2, indicating that there was no multicollinearity between predictor (independent) variables, as shown in table 4.7.

Table 4.7: Results of Multicollinearity

	Collinearity Statistic	
Variables	**Tolerance**	**VIF**
Functional Integration	.440	2.273
Supplier Integration	.237	4.224
Customer Integration	.274	3.644
Technology Integration	.228	4.386

a. Dependent Variable: Competitive Advantage

4.5.3 Homoskedasticity

Multiple linear regressions rely on the premise of homoscedasticity. Homoscedasticity refers to the variance of mistakes being consistent across all variables known as independent variables. Heteroscedasticity occurs when there is a violation. It exists when the size of the error term varies among independent variable values. In this study, homoscedasticity was determined using the Levene test. The homoscedasticity of the residuals was investigated in this study. The error term's variance is assumed to be constant or homoscedastic in OLS (Rosopa, Schaffer, & Schroeder, 2013). Heteroscedastic error terms are those that do not have a constant variance.

When this assumption is broken, test statistics and confidence intervals are skewed (Rosopa, Schaffer, & Schroeder, 2013). The Levene test was used to test the null hypothesis that the variance of the dependent variable is identical across cases caused by the independent variable, implying that the variance is homogeneous (Garson, 2012). The Levene statistic and p values in table 4.8 are functional integration (1.509, .103), supplier integration (1.079, .383), customer integration (1.725, .272), technology integration (1.193, .281) and supply chain adaptability (2.779, .201). The probability associated with the Levene statistic in each of the variables, is greater than the .05 level of significance, suggesting that the error terms are homogeneous in variance.

Table 4.8: Results of Test for Homogeneity of Variance

Variable	Levene Statistic	df1	df2	Sig.
Functional Integration	1.509	9	129	.103
Supplier Integration	1.079	9	129	.383
Customer Integration	1.725	9	129	.272
Technology Integration	1.193	9	129	.281
Supply Chain Adaptability	2.779	9	129	.201

4.6 Reliability and Factor Analysis for Study Variables

According to Bollen (1989), reliability is defined as the consistency of measurement, which can also be understood as the stability of measurement across a wide range of conditions in which essentially the same results should be achieved. The method of internal consistency was chosen because it is less susceptible to error compared to the other ways (Bryman, 2012; Cooper & Schindler, 2011). Cronbach's alpha was utilized so that the reliability of the data that was acquired could be determined. Factor analysis refers to a set of statistical approaches for analyzing interrelationships amongst that large number of variables and explaining these variables in terms of their significant predictive properties (factors). The method entails condensing the data found in the original factors into a smaller collection of dimensions (factors) while preserving as much information as possible.

By defining a collection of significant predictive dimensions, known as factors, it solves the problem of analyzing the structure of interrelationships (correlations) among a large number of variables. Factor analysis is an interdependent methodology in which all variables (factors) are analyzed at the same time, each one interconnected with the others. Two indicators were used to assess item factorability: the Kaiser Meyer-Olkin sampling adequacy score and the Barletts test of sphericity (Shrestha, 2021). The adequacy of data for structure detection was determined using the Bartlett test of sphericity (Watson, 2017).

The Kaiser-Meyer-Olkin (KMO) test was used to determine the sampling adequacy of variables. The KMO value varies from 0 to 1, with values closer to 0 indicating that the model may not function well, whereas values closer to 1 indicate that the explanatory effect of factor analysis is stronger. The KMO test statistic should be larger than .5 for an appropriate sample (Hair, Ringle & Sarstedt, 2013). Table 4.9 indicates KMO statistics of .625, which is higher than the traditional probability value of .5 and greater than .6 for a satisfactory sample. This indicates that the sample size is sufficient for factor analysis. Bartlett's test of sphericity was used to determine whether factor analysis was appropriate (Hair, Ringle, & Sarstedt, 2013).

The findings of Bartlett's sphericity test with a p-value of .000 are presented in Table 4.9. The Bartlett's test of sphericity must have a p-value of less than .05 for factor analysis to be preferred (Hadi, Abdullah & Sentosa, 2016). The chi-square of 1247.736 with an accompanying p-value of .000 from Bartlett's test of sphericity is lower than the traditional probability value of .05, hence factor analysis is appropriate.

Table 4.9: Kaiser-Meyer-Olkin and Bartlett's Test Results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin	Measure of Sampling Adequacy.	.625
	Approx. Chi-Square	1247.736
	Df	139
	Sig.	.000

Factor analysis is a multidimensional methodology for determining if the correlations between that set of observed variables are due to their association with one or more underlying variables in the data, each of which is represented by a linear model. Factor extraction was done using Principal Component Analysis (PCA), a descriptive variable reduction statistical approach. With each component, PCA aimed to extract the most variation from the data set (Tabachnick & Fidell, 2013). Quality indicators (constructs) for each independent variable are extracted using Principal Component Analysis, Varimax techniques, and orthogonal rotation (Beavers *et al.*, 2013).

The coefficients of correlation between the occurrences (rows) and factors (columns) were utilized to show the percentage of variance in the indicator variable explained by the factor loadings, also known as component loadings in PCA. According to Hair, Ringle, & Sarstedt (2013), a factor loading of ±0.3 suggests that the item is of minimal value, ±0.4 indicates that it is more relevant, and ±0.5 shows that the factor is significantly substantial. As a result, a threshold factor loading of ±0.5 was chosen in the investigation.

4.6.1 Reliability and Factor Analysis for Functional Integration

Within the scope of this study, a reliability analysis was carried out in order to assess the internal reliability [consistency] of all of the elements that comprised each facet of functional integration. According to Table 4.10, all the statements [items] were able to earn a Cronbach's alpha score of at least .7, which indicates that the questionnaire had a high level of reliability. In addition to this, the validity of the items in the questionnaire was examined during the research. As per Mugenda (2008), the term "construct validity" refers to the degree to which a notion, idea, or behaviour (a construct) is successfully translated or changed into a working and operating reality, which is referred to as the operationalization. Thus, construct validity was attained by limiting the questions [items] to conceptualizations of the study variables while making sure that indicators [measures] of each variable [factor] fell within the appropriate construct. This allowed for the questions to be answered in a manner consistent with the intended research.

This analysis was conducted to guarantee that each metric accurately estimated the construct [indicator] that it was meant to examine. Its objective was to make certain that this was the case. Each of the components in the functional integration model had a factor loading that was both positive and significant. All of these loadings were positive. Findings indicated that the items, despite having been designed from the literature reviewed with a reliance on the context of largely developed countries, converged extremely well with their particular constructs and could be applied to the setting of Kenya.

In all constructs for functional integration, a KMO test statistic more than .5 as well as a Cronbach's alpha score of at least .7 was observed. As shown in the research's findings in table 4.10, the constructs that explained the variance in functional integration were marketing integration (σ^2 = 1.707), distribution & warehousing integration (σ^2 = 2.382), production integration (σ^2 = 11.122), and procurement integration (σ^2 = 84.789). As a result, procurement integration made a significant contribution to the most (84.79%) variability in functional integration and, as a result, a competitive advantage.

Table 4.10: Reliability and Factor Analysis for Functional Integration

Construct	Items	Cronbach's Alpha	Total to Item correlation	KMO	Loadings	Variance Explained
Procurement Integration	FI1	.716	.498	.694	.740	84.789
	FI2		.534		.731	
	FI3		.656		.679	
Production Integration	FI4	.728	.518	.600	.769	11.122
	FI5		.412		.733	
Distribution & Warehousing Integration	FI6	.728	.558	.647	.670	2.382
	FI7		.663		.691	
	FI8		.582		.663	
Marketing Integration	FI9	.752	.687	.600	.660	1.707
	FI10		.578		.659	

4.6.2 Reliability and Factor Analysis for Supplier Integration

The study carried out reliability as well as factor analysis on each and every one of the sub-constructs that constitute supplier integration. Table 4.11 presents the findings obtained from the investigation as shown. In all of the supplier integration statements, the Cronbach's alpha values of factor loading and supplier integration had a greater absolute value than the loading. In all constructs for supplier integration, a KMO test statistic more than .5 as well as a Cronbach's alpha score of at least .7 was observed. As shown in the research's findings in table 4.11, the constructs that explained the variance in supplier integration were supplier development (σ^2 = 1.027), supplier relationship management (σ^2 = 6.463), vendor managed inventory (σ^2 = 14.846), and early supplier involvement (σ^2 = 77.664). As a result, early supplier involvement made a significant contribution to the most (77.66%) variability in supplier integration and, as a result, competitive advantage.

Table 4.11: Reliability and Factor Analysis for Supplier Integration

Construct	Items	Cronbach's Alpha	Total to Item correlation	KMO	Loadings	Variance Explained
Early Supplier Involvement	SI1	.809	.605	.617	.758	77.664
	SI2		.535		.618	
	SI3		.426		.722	
Vendor Managed Inventory	SI4	.803	.658	.600	.701	14.846
	SI5		.447		.692	
Supplier Relationship Management	SI6	.779	.643	.600	.657	6.463
	SI7		.455		.712	
Supplier Development	SI8	.822	.336	.600	.782	1.027
	SI9		.655		.669	

4.6.3 Reliability and Factor Analysis for Customer Integration

As can be seen in table 4.12, reliability as well as factor analysis were performed across the board for the various constructs of customer integration. The loading factor value was more than .5 and statistically significant at $p < .05$ (Kaiser, 1974). The values of Cronbach's alpha value [coefficient] have passed the threshold of .7, which indicates strong dependability [consistency] and verifies the reliability of the data. As indicated in Table 4.12, the coefficients between the items and the constructs [factors] were significantly positive at a level of p less than .05, demonstrating convergent validity. In all constructs for customer integration, a KMO test statistic more than .5 as well as a Cronbach's alpha score of at least .7 was observed. As shown in the research's findings in table 4.12, the constructs that explained the variance in customer integration were complaint management (σ^2 = 1.739), integrated problem solving (σ^2 = 7.247), early customer involvement (σ^2 = 14.218), and customer relationship management (σ^2 = 76.796). As a result, customer relationship management made a significant contribution to the most (76.80%) variability in customer integration and, as a result, competitive advantage.

Table 4.12: Reliability and Factor Analysis for Customer Integration

Construct	Items	Cronbach's Alpha	Total to Item correlation	KMO	Loadings	Variance Explained
Customer Relationship Management	CI1	.772	.522	.600	.707	76.796
	CI2		.623		.771	
Early Customer Involvement	CI3	.752	.567	.600	.555	14.218
	CI4		.745		.723	
Integrated Problem Solving	CI5	.750	.462	.605	.707	7.247
	CI6		.436		.729	
	CI7		.542		.732	
Complaint Management	CI8	.769	.631	.623	.714	1.739
	CI9		.562		.701	

4.6.4 Reliability and Factor Analysis for Technology Integration

All of the measures on technology integration were subjected to a confirmatory factor analysis using the extraction method of principal components. The results showed that loadings [factor] were above .5 and significant at $p < .05$, as displayed in Table 4.13. The values of Cronbach's alpha have met the cutoff of .7, which indicates that there is a strong consistency; this verifies the dependability [reliability] of the data. This indication was looked at by the researcher so that they could evaluate the factorability of the elements (Kaiser Meyer-Olin Measure of Sampling Adequacy). It was discovered that observable variable indicators have KMO Measures of Sampling Adequacy that are more than the cutoff value of .6 for each and every EFA (Kaiser, 1974). In all constructs for technology integration, a KMO test statistic more than .5 as well as a Cronbach's alpha score of at least .7 was observed. As shown in the research's findings in table 4.13, the constructs that explained the variance in technology integration were data sharing systems (σ^2 = .133), transaction processing systems (σ^2 = .893), advanced planning systems (σ^2 = 11.443), and automatic identification technology (σ^2 = 87.531). As a result, automatic identification technology made a significant contribution to the most variability (87.53%) in technology integration and, as a result, competitive advantage.

Table 4.13: Reliability and Factor Analysis for Technology Integration

Construct	Items	Cronbach's Alpha	Total to Item correlation	KMO	Loadings	Variance Explained
Automatic Identification Technology	TI1	.811	.359	.643	.658	87.531
	TI2		.443		.695	
	TI3		.592		.701	
Advanced Planning Systems	TI4	.767	.681	.621	.756	11.443
	TI5		.588		.716	
	TI6		.372		.693	
Transaction Processing Systems	TI7	.782	.535	.600	.750	.893
	TI8		.476		.692	
Data Sharing Systems	TI9	.799	.673	.600	.690	.133
	TI10		.572		.699	

4.6.5 Reliability and Factor Analysis for Supply Chain Adaptability

The study carried out reliability as well as factor analysis on each and every one of the sub-constructs that constitute supply chain adaptability. Table 4.14 presents the findings obtained from the investigation as shown. In all of the supply chain adaptability statements, the Cronbach's alpha values of factor loadings had a greater absolute value than the loading. In all constructs for supply chain adaptability, a KMO test statistic more than .5 as well as a Cronbach's alpha score of at least .7 was observed. As shown in the research's findings in table 4.14, the constructs that explained the variance in supply chain adaptability as a moderator were downside supply chain adaptability (σ^2 = 18.622), and upside supply chain adaptability (σ^2 = 81.379). As a result, upside supply chain adaptability made a significant contribution, having the most variability (81.38%) in supply chain adaptability as a moderator and, as a result, moderating the relationship between supply chain integration facets and the competitive advantage.

Table 4.14: Reliability and Factor Analysis for Supply Chain Adaptability

Construct	Items	Cronbach's Alpha	Total to Item correlation	KMO	Loadings	Variance Explained
Upside Supply Chain Adaptability	SCA1	.869	.625	.659	.715	81.379
	SCA2		.493		.709	
	SCA3		.571		.643	
Downside Supply Chain Adaptability	SCA4	.973	.661	.600	.683	18.622
	SCA5		.436		.702	
	SCA6		.523		.747	
	SCA7		.498		.727	

4.6.6 Reliability and Factor Analysis for Competitive Advantage

The results of a dependability and factor analysis are shown in Table 4.15, which focuses on the competitive advantage that firms that manufacture food and beverage possess. The cost advantage, differentiation, responsiveness, and market share of food and beverage manufacturing companies were used as metrics to determine the overall competitive advantage of these companies. Cronbach's alpha values for items [factors] on the competitive advantage of food and beverage manufacturing companies were found to be greater than .7, as well as the factor loading value was found to be higher than .5. These results indicated that the items should be acceptable. In addition to that, the researcher used the Kaiser Meyer-Olin Measure of Sampling Adequacy to investigate the factorability of the items. It was discovered that observable variables [factors] have KMO

Measures of Sampling Adequacy that are more than the cutoff value of .6 for each and every EFA (Kaiser, 1974).

In all constructs for competitive advantage, a KMO test statistic more than .5 as well as a Cronbach's alpha score of at least .7 was observed. As shown in the research's findings in table 4.15, the constructs that explained the variance in competitive advantage were market share (σ^2 = .631), responsiveness (σ^2 = 5.983), differentiation (σ^2 = 15.428), and cost advantage (σ^2 = 77.958). As a result, cost advantage made a significant contribution with the most variability (77.96%) in the competitive advantage.

Table 4.15: Reliability and Factor Analysis for Competitive Advantage

Construct	Items	Cronbach's Alpha	Total to Item Correlation	KMO	Loadings	Variance Explained
Cost Advantage	CA1	.812	.526	.661	.707	77.958
	CA2		.452		.717	
Differentiation	CA3	.839	.592	.690	.682	15.428
	CA4		.429		.677	
	CA5		.502		.685	
Responsiveness	CA6	.732	.473	.665	.657	5.983
	CA7		.657		.685	
	CA8		.438		.713	
	CA9		.586		.720	
Market Share	CA10	.703	.520	.659	.690	.631
	CA11		.562		.718	
	CA12		.621		.701	

4.7 Statistical Analysis and Discussion of Findings for Competitive Advantage

4.7.1 Descriptive Analysis of Competitive Advantage

The goal of descriptive analysis is for the investigator to be able to use indices or statistics to define a range of metrics or measurements in a significant way. The category of measures or indices used is determined by the parameters in the sample and the scale of measurement. Even so, descriptives are appropriate for continuous variables since they include a description of statistics such as mean, median, as well as standard deviation. This study utilized the mean and standard deviation. The study sought to determine the relationship between supply chain integration and the competitive advantage of food and beverage firms.

Competitive advantage was measured by the following constructs: cost advantage, differentiation, responsiveness, and market share. The study's participants were asked to state the extent to which they agreed with the statements in relation to the competitive advantage of food and beverage manufacturing firms 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 the competitive advantage of food and beverage manufacturing firms, the study used mean averages and standard deviations. According to Margaret (2017), the Likert scale of mean ($\bar{x}$ =4.2 to 5 strongly agree; 3.4 to 4.2 agree; 2.6 to 3.4 undecided; 1.8 to 2.6 disagree; and 1 to 1.8 strongly disagree) was used.

The means and standard deviations are depicted in the descriptive findings of competitive advantage in table 4.16. On cost advantage, the findings illustrated that majority of food and beverage manufacturing firms are not capable of producing goods of higher quality for a lower cost compared to our rivals in the industry. ($\bar{x}$ = 2.355, σ = .4803). 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, the importance of cost reduction in supply chains for cost leadership capacity and the need for strict quality control on operations for quality enhancement at the company level (Sakchutchawan, Hong, Callaway, & Kunnathur, 2011).

Further, the study found out that majority of food and beverage manufacturing firms were not able to give their customers competitive prices attributable to our cost-cutting strategies ($\bar{x}$ = 2.232, σ = .4236). 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, for companies that manufacture food and beverages, cost advantage can be a crucial component in gaining and maintaining competitive advantage (Otchere, Annan & Anin, 2013). Companies can provide competitive pricing, boost the margins of profit, and reinvest in the company to support growth by producing items at cheaper costs. Cost advantages can be attained by implementing efficient cost control strategies. For instance, companies can lower their overall manufacturing costs if they can get raw materials at a reduced cost or if they can streamline their production processes (Mutunga & Minja, 2014). Lower pricing that are then offered to customers as a result of these cost reductions may help the business draw in price-conscious clients and expand its market share. In order to stay competitive as well as effective in the sector, food and beverage production companies may therefore need to work towards a cost advantage.

On differentiation, the findings illustrated that majority of food and beverage manufacturing firms stand out from rival companies in the sector because of their unique product designs and packaging ($\bar{x}$ = 3.512, σ = .4648). 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 Vanpoucke, Vereecke and Wetzels, (2014), who stated that businesses take production capabilities as a source of their competitive advantages in the form of product design and packaging.

In addition, the study found out that majority of food and beverage manufacturing firms' distinctive flavors and ingredients do not distinguish them from other comparable products in the marketplace ($\bar{x}$ = 2.239, σ = .4281). 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' products are not highly differentiated from those of their competitors ($\bar{x}$ = 2.217, σ = .4139). 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 statements. However, Curzi and Olper (2012) stated that differentiated products enhance the performance and competitiveness of a food and beverage manufacturing firm.

On responsiveness, the findings illustrated that majority of food and beverage manufacturing firms value agility and versatility, and this gives them an edge over other firms in the industry ($\bar{x}$ = 3.688, σ = .5895). 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 concur with those of Leuschner, Rogers, and Charvet (2013), who indicated that the responsiveness of a company's supply network will boost the company's ability to quickly launch new products and functionality in the industry (i.e., compete on the basis of product creativity and lead times), as well as boost the company's ability to deliver on time (i.e., increase its delivery reliability).

In addition, the study found out that majority of food and beverage manufacturing firms frequently collected feedback from their customers in order to improve their service and product offerings ($\bar{x}$ = 3.841, σ = .7569). 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. Further, the study established that majority of food and beverage manufacturing firms were capable of responding to fluctuations in demand from consumers rapidly ($\bar{x}$ = 3.638, σ = .8099). 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 agreement with those of Vanathi and Swamynathan (2014), who indicated that, in terms of time and efficiency, a supply chain characterized by rapid customer responsiveness would be competitive. Moreover, Wanja and Achuora (2020) established that a decrease in supply chain response time is caused by a reduction in order cycle time, which is an important measure and a major source of sustainable competitive advantage because it has a direct impact on customer satisfaction. Overall, this could result in a significant decrease in order fulfillment and customer service.

Besides, the study revealed that majority of food and beverages manufacturing firms' brands were widely recognized and preferred by customers in the market ($\bar{x}$ = 3.577, σ = .6022). Moreover, the study findings showed that majority of food and beverages manufacturing firms competitive pricing strategies had enabled them to gain market share from our competitors ($\bar{x}$ = 3.732, σ = .5226). Finally, the study findings poised that majority of the food and beverages manufacturing firms' marketing strategies had helped them gain and maintain a strong market position ($\bar{x}$ = 3.926, σ = .6867). 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 statements. Holding a significant share of the market can give companies that produce food and beverages a major competitive edge (Distanont & Khongmalai, 2020). They could gain price power, strengthen client loyalty, and improve brand recognition. Businesses with a bigger market share may also profit through economies of scale, enabling them to produce and distribute goods at lower prices than competitors (Maury, 2018). Due to their ability to provide competitive pricing, they could prove better able to draw in as well as retain consumers. In order to sustain their competitiveness in the market, manufacturers of food and beverages must focus on growing and maintaining their market share.

Table 4.16: Competitive Advantage Descriptive Statistics

Statements	Mean	Std. Deviation
We produce goods of higher quality for a lower cost compared to our rivals in the industry.	2.355	.4803
We give our customers competitive prices attributable to our cost-cutting strategies.	2.232	.4236
We stand out from rival companies in the sector because of our unique product designs and packaging.	3.512	.4648
Our innovative flavors and ingredients distinguish us from other comparable products in the marketplace.	2.239	.4281
Our products are highly differentiated from those of our competitors.	2.217	.4139
We value agility and versatility, and this gives us an edge over other firms in the industry.	3.688	.5895
We frequently collect feedback from our customers in order to improve our service and product offerings.	3.841	.7569
Our firm responds to fluctuations in demand from consumers rapidly.	3.638	.8099
Our brand is widely recognized and preferred by customers in the market.	3.577	.6022
Our competitive pricing strategies have allowed us to gain market share from our competitors.	3.732	.5226
Our marketing strategies have helped us gain and maintain a strong market position.	3.926	.6867

Similarly, the study's participants were asked to indicate the approximate total operational costs incurred by the company in the financial years from 2016/2017 to 2019/2020 and the findings are presented in table 4.17. From these findings, the study established that the operational costs increased. The increase in operational costs might have been attributed to investing in supply chain integration (Zetterholm, Pettersson, Leduc, Mesfun, Lundgren & Wetterlund, 2018).

Table 4.17: Approximate Operational Cost Percentages

Year	< 100m	100-200m	201-300m	> 300m
2016/2017	18.70%	9.35%	29.50%	42.45%
2017/2018	14.39%	14.39%	23.02%	47.20%
2018/2019	11.51%	15.83%	17.99%	54.68%
2019/2020	8.63%	12.95%	15.11%	63.31%

On the other hand, the study found out that the growth in market share of food and beverage manufacturing firms was attributed to as a result of embracing supply chain integration. According to the study, the increase in market share of food and beverage manufacturing companies was explained on the basis of competitive supply chains through supply chain integration. The findings in table 4.18 are in harmony with those of Maury (2018), who stated that to a firm's inherent internal capabilities, the ability to create and/or utilize an existing competitive advantage to target an increased market share is frequently dependent but also assessed by the scope, growth, and resilience of both the market itself, including the firm's comparative competitiveness and competition with competing companies within the same industry.

Table 4.18: Market Share Percentages

Year	< 10 %	11-20 %	21-30 %	31-40 %	> 40 %
2016/2017	14.38	41.73	33.09	7.92	2.88
2017/2018	11.51	24.46	41.01	15.83	7.19
2018/2019	8.63	30.22	26.62	20.14	14.39
2019/2020	18.71	10.07	52.52	12.95	5.75

Likewise, the respondents were asked to indicate other forms of measuring competitive advantage that are utilized in their respective companies. In table 4.19, the study established that 88.49% of food and beverage manufacturing firms utilize return on investment, 91.37% utilize return on assets, 95.68% utilize sales growth, 97.12% utilize productivity and 100% utilize profitability in rating their competitive advantage. The study established that in addition to cost advantage, differentiation, responsiveness and market share, competitive advantage can also be measured by productivity, return on assets, return on investment, sales growth and profitability.

Table 4.19: Measures of Competitive Advantage Embraced Percentages

Measures of Competitive Advantage	Yes %	No %
Return on Investment	88.49	11.51
Return on Assets	91.37	8.63
Sales Growth	95.68	4.32
Productivity	97.12	2.88
Profitability	100.0	0.00

4.8 Statistical Analysis and Discussion of Findings for Supply Chain Adaptability

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 manufacturing firms in Kenya. The objective was measured by the following constructs; upside supply chain adaptability, and downside supply chain adaptability.

4.8.1 Descriptive Analysis of 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 manufacturing firms 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 4.20. 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, σ = .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, σ = .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, σ = .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 don not have a flexible organizational structure and work support processes ($\bar{x}$ = 2.362, σ = .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, σ = .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, σ = .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, σ = .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 4.20: Supply Chain Adaptability Descriptive Statistics

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

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 4.21, 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.

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 4.21: Supply Chain Adaptability Forms Embraced Percentages

Specific Form of Adaptability	Yes %	No %
Sourcing Adaptability	74.10	25.90
Supply Adaptability	62.59	37.41
Transshipment Adaptability	30.94	69.06
Machine Adaptability	36.69	63.31
Product Adaptability	25.18	74.82
Volume Adaptability	66.91	33.09
Labour Adaptability	35.25	64.75
Delivery Adaptability	61.15	38.85
Distribution Adaptability	66.91	33.09
Process Adaptability	55.40	44.60
System Adaptability	23.74	76.26
Market Adaptability	46.76	53.24
Logistical Adaptability	48.20	51.80
Organizational Adaptability	51.08	48.92

4.8.2 Correlation Analysis for Supply Chain Adaptability

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 4.22. The study revealed that supply chain adaptability had a positive, significant, linear relationship with the competitive advantage of food and beverage manufacturing firms 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 manufacturing firms in Kenya.

Table 4.22: Pearson Product-Moment Correlations between Supply Chain Adaptability (SCA) & Competitive Advantage (CA)

Variable		CA	SCA
CA	Pearson Correlation	1	
	Sig. (2-tailed)		
SCA	Pearson Correlation	.311**	1
	Sig. (2-tailed)	.000	

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

4.9 Statistical Analysis and Discussion of Findings for Functional Integration

The study sought to examine the effect of functional integration on the competitive advantage of food and beverage manufacturing firms in Kenya. The objective was measured by the following constructs: procurement integration, production integration, distribution & warehousing integration, and marketing integration.

4.9.1 Descriptive Analysis of Functional Integration

The study's participants were asked to indicate the extent to which they agreed with the effect of functional integration on the competitive advantage of food and beverage manufacturing firms 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 functional integration, the study used mean averages and standard deviations. According to Margaret (2017), the Likert scale of mean ($\overline{x}$ =4.2 to 5 strongly agree; 3.4 to 4.2 agree; 2.6 to 3.4 undecided; 1.8 to 2.6 disagree; and 1 to 1.8 strongly disagree) was used. The findings are presented descriptively, focusing on means and standard deviations.

The means and standard deviations are depicted in the descriptive findings of functional integration in table 4.23. On procurement integration, findings show that majority of food and beverage manufacturing firms increased involvement of professionals in procurement joint decision making ($\overline{x}$ = 4.000, σ = .5795). 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. Therefore, manufacturing companies must find a way to engage the professionals in the user departments in order to increase purchasing efficiency while reducing overall costs (Mishra, Devaraj, & Vaidyanathan, 2013). The involvement of budget owners or user departments is the most important, and thus they are the most important stakeholders. Besides, upper management participation is always seeking visibility; procurement's role is more than just negotiating cost savings; it is the CPO's (Chief Procurement Officer) responsibility to ensure that management recognizes the value rendered by procurement. More importantly, the value must be expressed in monetary terms.

In addition, the study found observed that procurement integration did not enable majority of food and beverage manufacturing firms to reduce the ordering cycle time ($\bar{x}$ = 2.225, σ = .8373). 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, reduced purchase order cycle time is a critical step more and more towards strategic procurement (Jha, Thakkar & Thanki, 2020). One of the most effective ways to streamline procurement activities is to incorporate a well-thought-out purchase order cycle into your purchasing processes, one that allows firms to plan for expenditures and spending plan for operating costs (Boström & Karlsson, 2013). Reduced purchase-order cycle time is an essential step in streamlining procurement processes and optimizing inventory control. Continuing to improve internal systems will help to reduce cycle time. Purchase order cycle time is often a performance indicator that can be used to assess the efficiency of your procurement function and inventory control activities, allowing you to identify reducing waste prospects and reduce costs.

Further, the findings illustrated that majority of food and beverage manufacturing firms did not reduce data asymmetries thus not providing the firms with optimal value ($\bar{x}$ = 1.732, σ = .7973). Given the five-point scale Likert mean of less than ($\bar{x}$ = 1.8) and an average standard deviation, it is clear that a major section of the respondents disagreed strongly with this statement. However, the effects of information asymmetry are greater for firms with high growth potential. Many corporate decisions, it is generally argued, are influenced by the existence of an information asymmetry between firm managers and their shareholders. Finally, Swink and Schoenherr (2015) demonstrated that integration of procurement into the decision-making phase of the business has a big effect on production efficiency.

On production integration, findings show that majority of the food and beverage manufacturing firms improved the level of coordination across organizational processes and activities ($\bar{x}$ = 3.841, σ = .6861). Given the five-point scale Likert mean of more than ($\bar{x}$ = 3.4) and an average standard deviation, a major section of the respondents agreed with this statement. Therefore, coordination among various production and manufacturing processes and activities aids in enhancing the performance of the supply chain (Singh, 2015). Moreover, failure to coordinate, on the other hand, generally results in inaccurate forecasts, low consumption capacity, high levels of inventory, as well as customer dissatisfaction (Kagira, Kimani, & Githii, 2012).

Further, the study established that majority of the food and beverage manufacturing firms prevented unforeseen problems and streamlined communication with stakeholders ($\bar{x}$ = 2.058, σ = .7425). 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, the significance of correspondence with internal stakeholders as well as external stakeholders cannot be overstated. It is necessary to turn around inadequate communication and ensure supply chain success by taking the right steps and making the necessary changes. Therefore, in order to satisfy the requirements of consumers, it requires integration through divisions and functions under manufacturing control (Mackelprang, Robinson, Bernardes, & Webb 2014).

On distribution and warehousing integration, the findings illustrated that majority of food and beverage manufacturing firm’s distribution and warehousing operations are centrally planned ($\bar{x}$ = 3.775, σ = .8373). 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. Therefore, companies frequently struggle to integrate, plan, and coordinate the entire product-flow interface within and between supply chain participants (Yi, 2013). To deal with such complexities, all supply chain partners must work together to create a unified system and coordinate their efforts (Wanjari, 2020). Amongst the most difficult aspects of distribution as well as warehousing integration is developing the system amongst these various companies involved in the complex product-flow channel.

In addition, the study established that majority of food and beverage manufacturing firm's distribution and warehousing activities are guided by the layout design and flow of operations ($\bar{x}$ = 3.659, σ = .6993). 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. In the modern era, only several warehouses are primarily storage facilities, and the last thing firms want is to just have to expand their facilities or outsource certain activities due to inadequate design requirements (Wanjari, 2020). Designing a functional warehouse layout is a critical process because it has a significant effect on a company's warehouse's efficiency and productivity.

Further, the study established that the majority of food and beverage manufacturing firms' distribution and warehousing networks are not designed to allow for fast pick-to-ship cycle times ($\bar{x}$ = 1.768, σ = .7178). Given the five-point scale Likert mean of less than ($\bar{x}$ = 1.8) and an average standard deviation, it is clear that a major section of the respondents strongly disagreed with the statement. However, the network layout must organize the operations in a logical sequence to help streamline operational activities, increase productivity, and cut costs (Kalaitzidou, Longinidis, Tsiakis & Georgiadis, 2014). Additionally, a well-executed layout design of a network can improve order fulfillment rates by allowing easy access to stored goods, reducing travel time. While meeting deadlines is crucial in logistics, so is controlling costs and delivering quality; timely delivery, well-organized storage and inventory control, quick and precise picking and packaging, and dispatch of the right goods to the right place at the right time are all essential components of an efficient and competitive supply chain (Stolze, Mollenkopf, Thornton, Brusco, & Flint 2018).

On marketing integration, the findings show that for majority of food and beverage manufacturing firms, marketing integration does not enhance faster penetration of new products to the market ($\bar{x}$ = 2.174, σ = .7341). 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, it takes time and planning to develop and market a new product (Jemaiyo, 2013). Several team members may be working in parallel to meet an aggressive deadline. Coordination of efforts necessitates the use of an effective liaison to ensure that supplies are ordered and delivered in time for use in production activities.

Moreover, the study found out that majority of the food and beverage manufacturing firms build rapport with customers and improved their firm’s brand visibility ($\bar{x}$ = 4.123, σ = .8056). 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. Therefore, integrating supply chain visibility has now become smoother simply because information regarding products is passed around the world, which is more a matter of priorities and investment than is the case when sharing published information concerning customers (Hossain, Akter, Kattiyapornpong & Dwivedi, 2020). Manufacturing companies recognized that if they continued on their current path of global expansion, they would need to find new ways to survive in this competitive environment, including increasing supply chain visibility through information sharing and data to monitor and supervise, as well as merging the crucial components of their own industry (Bauer, Rothermel, Tarba, Arslan & Uzelac, 2020). In order to maintain a competitive end-consumer and industry viewpoint across businesses even within the entire network of the supply chain, company-level marketing tactics need to be "infused" into intra-organizational existing systems (Murillo-Oviedo, Pimenta, Hilletofth & Reitsma, 2019).

Table 4.23: Functional Integration Descriptive Statistics

Statements	Mean	Std. Deviation
Our firm increased involvement of professionals in procurement joint decision making.	4.000	.5795
Procurement integration enabled our firm to reduce the ordering cycle time.	2.225	.8373
Our firm reduced data asymmetries thus providing the firm with optimal value.	1.732	.7973
Our firm improved the level of coordination across organizational processes and activities.	3.841	.6861
Our firm prevented unforeseen problems and streamlined communication with suppliers.	2.058	.7425
Our firm’s distribution and warehousing operations are centrally planned.	3.775	.8373
Our firm’s distribution and warehousing activities are guided by the layout design and flow of operations.	3.659	.6993
Our firm’s distribution and warehousing network is designed to allow for fast pick-to-ship cycle times.	1.768	.7178
Marketing integration enhances faster penetration of new products to the market.	2.174	.7341
Our firm build rapport with customers and improved our firm’s brand visibility.	4.123	.8056

Several firms view integration on such a function-by-function premise, relying first on the functions where integration offers the maximum return. Although the emphasis varies by sector, the functions more often integrated are procurement, inventories, inbound logistics, service and product distribution, and manufacturing operations (Da Silva, Poberschnigg, Pimenta & Hilletofth, 2020). All-inclusive techniques comprise everything from the extraction of raw materials to manufacturing and distribution to the consumer as well as return. A well-integrated supply chain must be adaptable in terms of functional shiftability, i.e., the assignment of functional responsibility to members of the supply chain best positioned to perform those functions at the lowest overall cost or in the shortest cycle time (Muñoz, Cossío, Cedeño, Ricardo, Hernández & Crespo, 2020). The realignment of such activities within the supply chain will result in a proportionate turnaround in risks and rewards.

There is no single functional unit in the organization that holds all of the necessary knowledge and skills required for successful completion of activities like developing a new product and sourcing for materials (De Freitas, Pimenta, Hilletofth, Jugend & Oprime, 2020). As a result, it is postulated that cross-functional teamwork, collaboration, and decisions are superior to those rendered by individuals or groups representing just one functional perspective. A product design team comprised of representatives from marketing, engineering, manufacturing, distribution, sales, purchasing, suppliers, customers, and after-sales support functions, for example, is more likely to produce a design that meets the diverse requirements of the various functional areas.

The study's participants were asked to indicate the other forms of functional integration adopted in their firms. In table 4.24, the study established that 2.88% of food and beverage manufacturing firms embrace human resource integration, 7.19% embrace transport integration, 8.63% embrace customer service integration, and 81.30% embrace finance and accounting integration as forms of functional integration. The findings showed that the majority (81.30%) of the food and beverage manufacturing firms embrace finance and accounting as a form of financial integration. Finance department involvement in procurement is aimed at understanding expenditures as well as ensuring effective collaboration to guarantee that the savings that are negotiated are depicted in the company's income statement. The study established that beyond integrating procurement, production, distribution & warehousing, and marketing functions, it is essential to also integrate the functions of finance and accounting, customer service, transportation, and human resources.

Table 4.24: Forms of Functional Integration Embraced Frequencies & Percentages

Form of Functional Integration	Frequency	Percentage
Human Resource Integration	4	2.88%
Transport Integration	10	7.19%
Customer Service Integration	12	8.63%
Finance & Accounting Integration	113	81.30%
Total	**139**	**100.00%**

4.9.2 Correlation Analysis for Functional Integration

For this investigation, the Pearson Product Moment Correlation was used to determine the strength and direction of the linear relationship between the independent variable (functional integration) and the dependent variable (competitive advantage), and the results are summarized in table 4.25. The study found that functional integration had a positive, significant, linear relationship with the competitive advantage of food and beverage manufacturing firms in Kenya, with a Pearson correlation coefficient of .991 at .01 level of significance. This implied that there was a positive correlation between functional integration and the competitive advantage of food and beverage manufacturing firms in Kenya. The findings are inconsistent with those of Otchere, Annan, and Anin (2013), who established a negative relationship between internal integration and the competitive advantage. However, the findings are also consistent with those of Sukati, Hamid, Baharun, Alifiah, and Anuar (2012), who established a positive relationship between internal firm integration and the competitive advantage.

Table 4.25: Pearson Product-Moment Correlations between Functional Integration (FI) & Competitive Advantage (CA)

Variable		CA	FI
CA	Pearson Correlation	1	
	Sig. (2-tailed)		
FI	Pearson Correlation	.991**	1
	Sig. (2-tailed)	.000	

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

4.9.3 Regression Analysis for Functional Integration

Regression analysis attempts to establish if a group of study variables together predict a specified dependent variable and thus attempts to significantly boost the estimate's accuracy (Uyanık & Güler, 2013).

H_{01}: Functional integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

OLS Model: $Y = \beta_0 + \beta_1 X_1 + \varepsilon$

The ordinary least square regression model was used. Model 1 results are shown in Table 4.26. Functional integration and the competitive advantage have a positive relationship (R = .991, R^2 = .981) and F (1,137) = 7203.647, p = .000, according to the findings in the table below (table 4.26). The independent variables can explain the variations in the dependent variable using the R^2. Functional integration can account for 98.1 percent of the variability in the competitive advantage of food and beverage manufacturing firms in Kenya, according to an R^2 of .981.

Table 4.26: Model Summary for Functional Integration (FI)

Model	R	R^2	Adjusted R Square	Std. Error of the Estimate	Change R^2 Change	Statistics F Change	Df1	Df2	Sig. F Change
1	.991[a]	.981	.981	.12288	.981	7203.647	1[a]	137	.000
2	.846[b]	.716	.714	.47968	.716	344.725	1[b]	137	.000

a. Predictor (Constant), Functional Integration (FI)
b. Predictor (Constant), Functional Integration*Supply Chain Adaptability (FI*SCA)

The results in table 4.27 showed that the F-ratio was 7203.647, with a P value of .000 being .05 in model 1 and F-ratio was 344.725, with a P value of .000 is < .05 in model 2. This indicates that the regression model used in the investigation has a high degree of goodness of fit.

Table 4.27: ANOVA for Functional Integration (FI)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	108.775	1	108.775	7203.647	.000[a]
	Residual	2.069	137	.015		
	Total	110.843	138			
2	Regression	79.320	1	79.320	344.725	.000[b]
	Residual	31.523	137	.230		
	Total	110.843	138			

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

4.9.4 Testing the moderating effect for objective one

H_{01i}: Supply chain adaptability has no significant moderating effect on the relationship between functional integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

MMR Model: $Y = \beta_0 + \beta_m X_1 M + \varepsilon$

The model 2 results as shown in the table (table 4.26) after the moderator interaction (functional integration*supply chain adaptability) was included in the model. With ($R = .846$, $R^2 = .716$) and $F(1,137) = 344.725$, $p = .000$, the results revealed a positive and significant relationship between functional integration*supply chain adaptability, and the competitive advantage of food and beverage manufacturing firms. Functional integration*supply chain adaptability accounts for 71.6 percent of the variations in competitive advantage in food and beverage manufacturing firms, according to an R^2 of .716. The adjusted R^2 is a variant of R^2 that has been tweaked to account for the number of predictors in the model. Only when the additional term improves the new model does the adjusted R^2 increase, and it is always lower than the R^2.

The study found that the moderator helped us enhance our model. The introduction of the moderating variable culminated in an R^2 change of .716, indicating that the moderating effect accounts for 71.6% of the variability in competitive advantage, well beyond that which is accounted for by functional integration. The findings revealed that supply chain adaptability has a strong moderating effect on the relationship between functional integration and the competitive advantage in Kenyan food and beverage manufacturing firms.

Table 4.28 shows the significance of test results for functional integration and the competitive advantage. The results of Model 1 revealed a positive and significant relationship between functional integration and the competitive advantage ($b1 = 1.042$, $p = .000$, $\beta = .991$). Competitive advantage is anticipated to grow by 1.042 for every unit increase in functional integration.

OLS Model: Competitive Advantage = - 0.014 + 1.042FI ………………. ***Equation 1***

This indicates that when there is improved functional integration, food and beverage production companies gain a competitive advantage. At the 95 percent significance level, the null hypothesis that functional integration had no significant effect on the competitive advantage of Kenyan food and beverage manufacturing firms was rejected.

The results of model 2 demonstrate that supply chain adaptability had a positive and significant moderating effect on the relationship between functional integration and the competitive advantage of food and beverage manufacturing firms in Kenya ($b2 = 1.237$, $p = .000$, $\beta = .846$). Equation 2 depicts the regression model with the moderator included. On the premise that supply chain adaptability remains constant, the equation predicts a change in competitive advantage of 1.237 for every unit increase in functional integration. As a result, the null hypothesis is rejected at the 95% level of significance, and it is inferred that supply chain adaptability moderates the relationship between functional integration and the competitive advantage.

MMR Model: Competitive Advantage = - 0.785 + 1.237FI*SCA .... ***Equation 2***

Table 4.28: Significance of Test Results for Functional Integration (FI)

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	- .014	.044		- .308	.758
	Functional Integration	1.042	.012	.991	84.874	.000
2	(Constant)	- .785	.241		- 3.255	.001
	FI*SCA	1.237	.067	.846	18.567	.000

a. Dependent Variable: Competitive Advantage (CA)
b. Predictor Variable: Functional Integration (FI)
c. Predictor Variables: Functional Integration*Supply Chain Adaptability (FI*SCA)

4.10 Statistical Analysis and Discussion of Findings for Supplier Integration

The study sought to analyze the effect of supplier integration on the competitive advantage of food and beverage manufacturing firms in Kenya. The objective was measured by the following constructs: early supplier involvement, vendor-managed inventory, supplier relationship management, and supplier development.

4.10.1 Descriptive Analysis for Supplier Integration

The study's participants were asked to indicate the extent to which they agreed with the effect of supplier integration on the competitive advantage of food and beverage manufacturing firms 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 supplier integration, the study used mean averages and standard deviations. According to Margaret (2017), the Likert scale of mean ($\bar{x}$ =4.2 to 5 strongly agree; 3.4 to 4.2 agree; 2.6 to 3.4 undecided; 1.8 to 2.6 disagree; and 1 to 1.8 strongly disagree) was used.

The means and standard deviations are depicted in the descriptive findings of supplier integration in table 4.29. On early supplier involvement: the study found out that majority of food and beverage manufacturing firm's suppliers do not know and do not understand about firms' manufacturing needs ($\bar{x}$ = 2.348, σ = .6904). 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, early supplier involvement enables suppliers to learn about and understand customer needs (Van Weele, 2018).

Moreover, the study established that majority of food and beverage manufacturing firms did not enhance resource deployment, did not reduce supply instability, as well as did not boost consumer value ($\bar{x}$ = 1.899, σ = .4725). 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. Nevertheless, early supplier involvement allows suppliers to become acquainted with and comprehend the decision-making processes that contribute to better resource allocation (Saunders, Kleiner, McCoy, Lingard, Mills, Blismas & Wakefield, 2015).

Further, the study established that majority of food and beverage manufacturing firms did not minimize design and production costs plus did not reduce time to market ($\bar{x}$ = 2.449, σ = .5137). 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 findings did not mirror those of Suurmond, Wynstra, and Dul (2020), who established that early supplier involvement accelerates the development of new products, reduces design and manufacturing costs, allows for a more streamlined manufacturing process, reduces time to market, and enhances product manufacturability, thus boosting competitive advantage.

On vendor managed inventory the findings showed that majority of the food and beverage manufacturing firms eliminated stock shortages plus the high distribution costs of delivering expedited orders ($\bar{x}$ = 3.522, σ = .5014). 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. Therefore, once vendors are unable to meet demand requests from existing inventory, the deficit should be filled through expediting, which mostly incurs per-unit as well as setup costs. Moreover, overtime manufacturing, which mostly takes place at the end of the scheduled production period and accrues relatively high production costs, or premium freight shipments, which involve building products at the beginning of the period they are needed and shipping them very quickly with relatively high shipping costs, are some of the examples of expediting (Amirjabbari & Bhuiyan, 2014).

Moreover, the study established that majority of food and beverage manufacturing firms did not reduce wastage, non-value adding factors and obsolete stock ($\bar{x}$ = 2.406, σ = .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. However, one of the objectives of integrating suppliers is to focus on efficiency, reducing or eliminating waste, including all non-value-adding factors (Prosman & Wæhrens, 2019). Buyers and suppliers can collaborate to create new and innovative products, increasing revenue and profits for both actors. Participants can take a comprehensively integrated approach to optimize the supply chain, reconfiguring their operations collaboratively to reduce or even eliminate waste and redundant effort, or buying raw materials jointly (Mafini, Dhurup, & Madzimure, 2020).

Over the last few decades, vendor managed inventory (VMI) has become a competitive supply chain management technique used by retailers, suppliers, and manufacturers to minimize inventory management costs (Beheshti, Clelland & Harrington, 2020). Moreover, in vendor-managed inventory, the burden of inventory management is shifted to the seller, who pushes inventory down to buyers in relation to current demand. As a result, vendor-managed inventory programs give the vendor full access and management of her client's inventory portfolio. This guarantees that the vendor or company selling to the final consumer does have the correct quality of items needed, the correct quantity of inventory, and accurate, timely delivery (Njagi & Muli, 2020). Aside from the financial benefit to the customer, there is also the manufacturing of high-quality finished products. Reduced vendor redundancy can lower the costs of products, increase production levels at remaining suppliers, and lower supply chain management costs (Rad, Razmi, Sangari, & Ebrahimi, 2014). Though that might increase vendor investment as well as management burdens, delegating authority and responsibility to firms closer to the action can lead to better decision-making, as long as proficient information sharing is sustained all across the supply chain.

On supplier relationship management, the findings illustrated that majority of food and beverage manufacturing firms merged internal core competencies with externally available capabilities and technologies ($\bar{x}$ = 3.768, σ = .7764). 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. Nevertheless, a company's business stakeholders are critical to gaining a competitive edge by utilizing the firm's internal resources, capacities, and competitive capabilities (Hitt, 2015).

Also, the study established that majority of food and beverage manufacturing firms do not have the advantage of low business rick ($\bar{x}$ = 2.232, σ = .7477). 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, supplier integration will provide producers with the advantage of low business risks through joint research and development or joint technology investment, reduced inventories through the sharing of sales estimates or production schedules, improved quality of products and expertise through co-designing goods, and long-term relationships leading to more reliable supply prices (Smith & Rupp, 2013).

In today's dynamic and competitive climate, supplier relationship management is critical for manufacturing companies since it ensures the supply of reliable and frequent deliveries (Onyango, 2020). There really are numerous benefits to developing strong buyer and supplier relationships over time, including increased commitment from both organizations, more room for discount coupons, and trust between both customers and suppliers that develops over time, which might also allow for information sharing, forecasts, knowledge, and potential clients between the purchaser and supplier (Adesanya, Yang, Iqdara & Yang, 2020). Essentially, supply chain collaborations can be created between companies to provide such a degree of stability as well as to promote long-term commitment from various parties to accomplishing goals (O'Brien, 2018). Thus, recognizing prospective opportunities that would arise from a working relationship, selecting the appropriate participants, and fulfilling your demands as a partner are three important elements of supply chain partnerships. Most firms would have a mix of long and short-term relationships with their consumers and sellers (Oghazi, Rad, Zaefarian, Beheshti, & Mortazavi, 2016). This compromise can include some of the advantages of both while decreasing the number of related risks and potential challenges.

On supplier development, the findings indicated that majority of food and beverage manufacturing firms did not map key supplier capabilities, did not identify their deficiencies and did not address them ($\bar{x}$ = 2.341, σ = .5602). 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, supplier development is a strategic initiative that is implemented as part of a firm's corporate competitive strategy. In order to maximize a firm's corporate strategic and supply chain competitiveness, this strategic approach combines internal core competencies with externally available capabilities and technologies (Rotich, Aburi, & Kihara, 2014). To accomplish this, an interactive program should be launched to solve supplier issues, eliminate inefficiencies, and establish an open relationship that involves real-time feedback as well as the sharing of information. Such a program typically includes progressive, systematic vendor development as well as integration, such as collaborative projects, skills development, stock alignment, incentive schemes, and compensations (Nyaberi, 2020).

Further, the study established that majority of food and beverage manufacturing firms made significant improvements in quality and on-time delivery ($\bar{x}$ = 4.507, σ = .5018). Given the five-point scale Likert mean of more than ($\bar{x}$ = 4.2) and an average standard deviation, it is clear that a major section of the respondents strongly agreed with the statement. Add to that the fact that companies are increasingly competing on a global supply chain level while entrusting an ever-increasing share of their added value to suppliers, including suppliers that offer outsourcing services, plus companies have complexities that were unimaginable only a decade earlier (Wachiuri, Waiganjo, & Oballah, 2015).

Suppliers have already evolved into a means of gaining market-leading competitive advantages or allowing competitors to exploit those advantages to the detriment of firms. Manufacturers must accelerate their integration with suppliers on a strategic level, transforming their suppliers into an extension of themselves, regarded as equally, if not more, important than their own operational capabilities of value creation (Wabombaba, 2018). Moreover, supplier integration is the driving force behind the greatest competitiveness. It assists in reducing manufacturing effort and shortening cycle times, allowing clients to introduce products to the market quickly and reduce potential risks. All of them are correlated with overall cost savings.

Table 4.29: Supplier Integration Descriptive Statistics

Statements	Mean	Std. Deviation
Our firm's suppliers know and understand about our manufacturing needs.	2.348	.6904
Our firm's enhanced resource deployment, reduced supply instability, as well as boosted consumer value.	1.899	.4725
Our firm minimized design and production costs plus reduced time to market.	2.449	.5137
Our firm eliminated stock shortages plus the high distribution costs of delivering expedited orders.	3.522	.5014
Our firm reduced wastage, non-value adding factors and obsolete stock.	2.406	.4928
Our firm merged internal core competencies with externally available capabilities and technologies.	3.768	.7764
Our firm has the advantage of low business risks.	2.232	.7477
Our firm mapped key supplier capabilities, identified their deficiencies and addressed them.	2.341	.5602
Our firm made significant improvements in quality and on-time delivery.	4.507	.5018

The study's participants were asked to indicate the other forms of supplier integration in their firms. From the findings in table 4.30, the study established that 4.3% of food and beverage manufacturing firms embrace financial flow integration, 14.5% embrace material flow integration, 20.3% embrace supplier compliance management, and 60.9% embrace outsourcing as forms of supplier integration. Therefore, the study found that while focusing on early supplier involvement, vendor managed inventory, supplier relationship management, and supplier development when integrating with suppliers, it is also essential to include the elements of outsourcing, supplier compliance management, material flow integration, and financial flow integration.

Table 4.30: Supplier Integration Forms Embraced Frequencies & Percentages

Form of Supplier Integration	Frequency	Percentage
Financial Flow Integration	6	4.32%
Material Flow Integration	20	14.39%
Supplier Compliance Management	28	20.14%
Outsourcing	85	61.15%
Total	**139**	**100.0**

4.10.2 Correlation Analysis for Supplier Integration

For this investigation, the Pearson Product Moment Correlation was used to determine the strength and direction of the linear relationship between the independent variable (supplier integration) and dependent variable (competitive advantage), and the results are summarized in table 4.31. The study established that there was a positive linear relationship between supplier integration and the competitive advantage of food and beverage manufacturing firms in Kenya as shown by the correlation coefficient of .541 at .01 level of significance. This implied that there is a strong relationship between supplier integration and the competitive advantage of food and beverage manufacturing firms in Kenya. The findings are also consistent with those of Sukati, Hamid, Baharun, Alifiah, and Anuar (2012), who established a positive relationship between integration with suppliers and the competitive advantage.

Table 4.31: Pearson Product-Moment Correlations between Supplier Integration (SI) & Competitive Advantage (CA)

Variable		CA	SI
CA	Pearson Correlation	1	
	Sig. (2-tailed)		
SI	Pearson Correlation	.541**	1
	Sig. (2-tailed)	.000	

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

4.10.3 Regression Analysis for Supplier Integration

Regression analysis for supplier integration was carried out.

H_{02}: Supplier integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

OLS Model: $Y = \beta_0 + \beta_2 X_2 + \varepsilon$

The findings of Model 1 demonstrated that supplier integration and the competitive advantage have a positive relationship ($R = .541$, $R^2 = .293$) and $F(1,137) = 56.836$, $p = .000$. The R^2 measures how well the independent factors [variables] can explain fluctuations in the dependent variable. Supplier integration can account for 29.3 percent of the variability in the competitive advantage of food and beverage manufacturing firms, according to an R^2 of .293.

Table 4.32: Model Summary for Supplier Integration (SI)

					Change	Statistics			
Model	**R**	**R^2**	**Adjusted R Square**	**Std. Error of the Estimate**	**R^2 Change**	**F Change**	**Df1**	**Df2**	**Sig. F Change**
1	.541[a]	.293	.288	.75620	.293	56.836	1[a]	137	.000
2	.452[b]	.205	.199	.80226	.205	35.220	1[b]	137	.000

a. Predictor (Constant), Supplier Integration (SI)
b. Predictor (Constant), Supplier Integration*Supply Chain Adaptability (SI*SCA)

The results in table 4.33 showed that the F-ratio was 130.060, with a P value of .000 being < .05 in Model 1, and the F-ratio was 35.220, with a P value of .000 being < .05 in Model 2. This indicates that the regression model used in the investigation has a high degree of goodness of fit.

Table 4.33: ANOVA for Supplier Integration (SI)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	32.501	1	32.501	56.836	.000[a]
	Residual	78.342	137	.572		
	Total	110.843	138			
2	Regression	22.668	1	35.841	35.220	.000[b]
	Residual	88.175	137	.644		
	Total	110.843	138			

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

4.10.4 Testing the moderating effect for objective two

H_{02ii}: Supply chain adaptability has no significant moderating effect on the relationship between supplier integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

MMR Model: $Y = \beta_0 + \beta_m X_2 M + \varepsilon$

Model 2's findings revealed the outcomes when the moderator's interaction (supplier integration*supply chain adaptability) was included in the model. With (R = .452, R^2 = .205) and F (1,137) = 35.220, p = .000, the results revealed a positive and significant relationship between supplier integration*supply chain adaptability, and the competitive advantage of food and beverage manufacturing firms. Supplier integration*supply chain adaptability accounts for 61.8% of the differences in competitive advantage of food and beverage manufacturing firms, according to an R^2 of .205. The introduction of the moderating variable culminated in an R^2 change of .205, indicating that the moderating effect accounts for 20.5% of the variability in competitive advantage beyond that which is accounted for by supplier integration. The findings reveal that supply chain adaptability has a significant moderating effect on the relationship between supplier integration and the competitive advantage for Kenyan food and beverage manufacturing firms.

Table 4.34 shows the significance of test results for supplier integration and the competitive advantage. The results of Model 1 showed a positive and significant relationship between supplier integration and the competitive advantage ($b_1 = .730$, $p = .000$, $\beta = .541$). Model 1's regression equation is shown in Equation 3. Competitive advantage is predicted to improve by .541 for every unit increase in supplier integration.

OLS Model: Competitive Advantage = 1.290 + 0.730SI …………………… ***Equation 3***

This implied that as supplier integration improves, food and beverage manufacturing companies will gain a competitive advantage. At the 95 percent significance level, the null hypothesis that supplier integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya was rejected.

Model 2 revealed a positive and significant moderating effect of supply chain adaptability on the relationship between supplier integration and the competitive advantage of Kenyan food and beverage manufacturing firms ($b_2 = .663$, $p =.000$, $\beta = .452$). Equation 4 illustrates the regression equation with the moderator included. Given that supply chain adaptability remains constant, the equation predicts a change in competitive advantage of .663 for every unit increase in supplier integration. As a result, the rejection of the null hypothesis at a 95% confidence level, and it is concluded that supply chain adaptability moderates the relationship between supplier integration and the competitive advantage of food and beverage manufacturing firms.

MMR Model: Competitive Advantage = 1.360 + 0.663SI*SCA .... ***Equation 4***

Table 4.34: Significance of Test Results for Supplier Integration (SI)

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	1.290	.317		4.074	.000
	SI	.730	.097	.541	7.539	.000
2	(Constant)	1.360	.388		3.504	.001
	SI*SCA	.663	.112	.452	5.935	.000

a. Dependent Variable: Competitive Advantage (CA)
b. Predictor Variable: Supplier Integration (SI)
c. Predictor Variable: Supplier Integration*Supply Chain Adaptability (SI*SCA)

4.11 Statistical Analysis and Discussion of Findings for Customer Integration

The study sought to assess the effect of customer integration on the competitive advantage of food and beverage manufacturing firms in Kenya. The objective was measured by the following constructs: customer relationship management, early customer involvement, integrated problem solving, and complaint management.

4.11.1 Descriptive Analysis of Customer Integration

The study's participants were asked to indicate the extent to which they agreed with the effect of customer integration on the competitive advantage of food and beverage manufacturing firms 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 exhibit the key findings of customer integration, the study used mean average and standard deviations. According to Margaret (2017), the Likert scale of mean ($\bar{x}$ =4.2 to 5 strongly agree; 3.4 to 4.2 agree; 2.6 to 3.4 undecided; 1.8 to 2.6 disagree; and 1 to 1.8 strongly disagree) was used.

The means and standard deviations are depicted in the descriptive findings of customer integration in table 4.35. On customer relationship management, the findings showed that the number of customers refereed to majority of food and beverage manufacturing firms' products has increased by at least 50% in the last three years ($\bar{x}$ = 3.529, σ = .5009). 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 consistent with those of Nyambura (2018), who established that manufacturing firms in Kenya saw an increase in the number of customers who were referred to others. Moreover, majority of food and beverage manufacturing firms kept consumers satisfied by supplying a sensitive team of sales and support professionals ($\bar{x}$ = 3.500, σ = .5018). 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. This implied that food and beverage manufacturing firms focused on ensuring that customer relationships improved through a sensitive team of sales and support professionals, which translates to customer loyalty.

These findings show that customer relationship management has a greater effect on the competitive advantage of food and beverage manufacturing firms. These findings mirror those of Ringim, Abdullahi, and Kura (2020), who established that for food and beverage manufacturing companies, implementing customer relationship management to improve the order process, better manage prospecting and new customer integration, and better manage scheduling and projects is one strategy to gain a competitive advantage.

On early customer involvement, the findings show illustrated that majority of food and beverage manufacturing firms are more responsive to dynamic customer needs ($\bar{x}$ = 3.504, σ = .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. These findings are consistent with those of Martinez (2014), who noted that as companies are becoming more adept at leveraging technology infrastructure across partners, suppliers, and customers, the stakes for competitive differentiation have risen higher than ever. As a result, simply automating the flows within and between participants in a supply chain is no longer sufficient. Eventually, one way for companies to clearly distinguish themselves would be through exceptional management of the customer experience.

In addition, the study established that majority of food and beverage manufacturing firms developed new products fitting consumer preferences ($\bar{x}$ = 3.326, σ = .4705). Given the five-point scale Likert mean of less than ($\bar{x}$ = 3.4) and an average standard deviation, it is clear that a major section of the respondents was undecided on the statement. The findings are consistent with those of Dunk (2012), who posited that strategies of integrating customers can significantly improve a firm's knowledge base for new product development in order to gain a competitive edge, especially when tacit customer knowledge can be incorporated.

These findings mirror those of Feng, Sun, and Zhang (2010), who established that quality of the product, delivery dependability, process flexibility, as well as customer service all benefit from early customer involvement. As a result, it creates a mechanism for seamless relationships with customers, improves the transference of sophisticated, ambiguous, and unique information, and enhances the amount and range of information available to manufacturers in order to improve product quality (Tardivo, Thrassou, Viassone, & Serravalle, 2017). Moreover, customer involvement is a strategy that may be used by food and beverage manufacturing firms to source innovation through collaboration and reporting, resulting in increased competitiveness and improved consumer responsiveness (Mulongo & Aigbavboa, 2020).

On integrated problem solving, the findings show that majority of the food and beverage manufacturing firms did not develop routines for problem solving that allow for joint efforts ($\bar{x}$ = 2.362, σ = .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. These findings are inconsistent with those of Kumar, Banerjee, Meena, and Ganguly (2017), who posited that solving problems jointly is crucial in building a culture of collaboration and carrying out effective planning; as a result, it influences both core and non-core customer collaboration activities.

Additionally, the study established that majority of food and beverage manufacturing firms improved on customer analysis and segmentation ($\bar{x}$ = 3.541, σ = .4756). 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 strongly agreed with the statement. The findings are consistent with those of Macharia, Collins, and Sun (2013), who posited that customer analysis and segmentation enable supply chain managers to address the issue of demand variability. Thus, properly designed consumer and product segmentation policies can mitigate the effect of variability in demand. In addition, the goal of segmentation is to maximize customer service and company profitability by implementing different supply chain strategies for serving different customers associated with different channels and different products, based on their value to the firm.

Further, the study established that majority of food and beverage manufacturing firms tracked customer's activities and managed their needs ($\bar{x}$ = 2.210, σ = .5048). 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 inconsistent with those of Evtodieva, Chernova, Ivanova, and Wirth (2020), who hypothesized that several product lines within an investment may be served through an efficient supply chain in order to maximize sales and profits, whereas others may be fulfilled via responsive supply chain capabilities provided by tracking customer activities as well as managing their needs. Moreover, these findings mirror those of Elvers & Song (2016), who noted that integrated problem solving is critical and collaborating with clients will minimize the risk of bad design in this development phase. In addition, knowing consumer expectations will help businesses gain fresh ideas about solutions (He, Lai, Sun & Chen, 2014), thus increasing the likelihood of new product growth and success.

On complaint management, the findings established that the number of complaints by customers has reduced by at least 70% in the last three years in majority of the food and beverage manufacturing firms ($\bar{x}$ = 4.225, σ = .4836). 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 mirrored those of Nyambura (2018), who established that in manufacturing firms, the number of customer complaints had decreased. Furthermore, a company's success is dependent on its supply chain partners' ability to focus on its customer.

Moreover, the study established that majority of the food and beverage manufacturing firms do not have an efficient way to keep track of an issue raised by consumers over time ($\bar{x}$ = 2.268, σ = .4446). 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 findings are inconsistent with those of Wangui (2018), who established that when a company develops close relationships with its customers by managing their complaints, it can differentiate its goods and services from its rivals, improve customer loyalty, and dramatically expand value for customers.

If a company wants to gain leverage over distribution networks in its sector, it will use customer integration (Mondragon, Lalwani & Mondragon, 2011). Control is critical for businesses operating in industry sectors with a scarcity of competent distribution companies or in situations where distributors charge exorbitant fees (Guan & Rehme, 2012). Control over channels of distribution ensures a company's strategic independence from third-party companies. A firm that successfully integrates its customers may gain a competitive advantage over its competitors (Martinelli & Tunisini, 2019). Lowering costs and gaining more leverage over industrial sector channels of distribution can be critical to gaining a competitive edge. Vertical integration of companies ahead of the firm's production enhances its position in the market and creates barriers for potential competitors.

Table 4.35: Customer Integration Descriptive Statistics

Statements	Mean	Std. Deviation
The number of customers refereed to our products has increased by at least 50% in the last three years.	3.529	.5009
Our firm kept consumers satisfied by supplying a sensitive team of sales and support professionals.	3.500	.5018
Our firm is more responsive to dynamic customer needs.	3.504	.4618
Our firm developed new products fitting consumer preferences.	3.326	.4705
Our firm developed routines for problem solving that allow for joint efforts.	2.362	.4824
Our firm improved on customer analysis and segmentation.	3.541	.4756
Our firm tracked customer's activities and managed their needs.	2.210	.5048
The number of complaints by customers has reduced by at least 70% in the last three years.	4.225	.4836
Our firm has an efficient way to keep track of an issue raised by consumers over time.	2.268	.4446

The study's participants were asked to indicate the other forms of customer integration in their firms. From the findings in table 4.36, the study established that 10.07% of food and beverage manufacturing firms embrace customer tracking, 15.83% embrace customer retention and loyalty programs, and 74.10% embrace customer data integration as forms of customer integration. The findings showed that the majority (74.10%) of the food and beverage manufacturing firms embrace customer data integration as a form of customer integration. Thus, the study established that while focusing on customer relationship management, early customer involvement, integrated problem solving, and complaint management, it is crucial to implement the facets of customer data integration, customer retention & loyalty programs, and customer tracking while executing customer integration.

Table 4.36: Customer Integration Forms Embraced Frequencies & Percentages

Form of Customer Integration	Frequency	Percentage
Customer Tracking	14	10.07%
Customer retention & loyalty programs	22	15.83%
Customer Data Integration	103	74.10%
Total	**139**	**100.0**

The study's participants were asked to indicate the number of complaints registered by the food and beverage manufacturing company from 2017-2020. From the findings in table 4.37, the study established that in 2017, a majority of food and beverage manufacturing firms registered an average number of customer complaints. The percentage of registered complaints has decreased over the years, from 2017 to 2020, implying that food and beverage manufacturing firms in Kenya minimized customer complaints.

Table 4.37: Complaints Registered Percentages

Year	< 10 %	11-20 %	21-30 %	> 30 %
2020	21.58%	34.53%	26.62%	17.27%
2019	14.39%	19.42%	38.85%	27.34%
2018	5.76%	10.07%	43.88%	40.29%
2017	2.88%	11.51%	35.97%	49.64%

The study's participants were asked to indicate the number of complaints solved by the food and beverage manufacturing company from 2017-2020. The findings in table 4.38 indicated that majority of the food and beverage manufacturing firms ensured timely solving of customer complaints. The percentage number of complaints solved by food and beverage manufacturing firms compared to the percentage number of complaints registered in the aforementioned years was at equilibrium. This implied that majority of the complaints raised by customers were solved by food and beverage manufacturing companies, thus improving their customer service levels.

Table 4.38: Complaints Solved Percentages

Year	< 10 %	11-20 %	21-30 %	> 30 %
2020	23.02%	29.50%	21.58%	25.90%
2019	15.83%	21.58%	38.13%	24.46%
2018	10.07%	12.95%	41.01%	35.97%
2017	7.19%	15.83%	31.65%	45.32%

4.11.2 Correlation Analysis for Customer Integration

For this investigation, the Pearson Product Moment Correlation was used to determine the strength and direction of the linear relationship between the independent (customer integration) and dependent variable (competitive advantage), and the results are summarized in table 4.39. The study revealed that customer integration had a positive, significant, linear relationship with the competitive advantage of food and beverage manufacturing firms in Kenya, as illustrated by a Pearson correlation coefficient of .363 at .01 level of significance. This implied that there was a weak positive relationship between customer integration and the competitive advantage of food and beverage manufacturing firms in Kenya. The findings are consistent with those of Sukati, Hamid, Baharun, Alifiah, and Anuar (2012), who established a positive relationship between integration with customers and the competitive advantage.

Table 4.39: Pearson Product-Moment Correlations between Customer Integration (CI) & Competitive Advantage (CA)

Variable		CA	CI
CA	Pearson Correlation	1	
	Sig. (2-tailed)		
CI	Pearson Correlation	.363**	1
	Sig. (2-tailed)	.000	

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

4.11.3 Regression Analysis for Customer Integration

H_{03}: Customer integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

OLS Model: $Y = \beta_0 + \beta_3 X_3 + \varepsilon$

The results of Model 1 reveal that customer integration and the competitive advantage have a positive relationship ($R = .363$, $R^2 = .132$) and ($F(1,137) = 20.747$, $p = .000$). Customer integration accounted for 13.2% of the variability in competitive advantage of food and beverage manufacturing firms, according to an R^2 of .132.

Table 4.40: Model Summary for Customer Integration (CI)

					Change Statistics				
Model	**R**	**R^2**	**Adjusted R Square**	**Std. Error of the Estimate**	**R^2 Change**	**F Change**	**Df1**	**Df2**	**Sig. F Change**
1	.363[a]	.132	.125	.83825	.132	20.747	1[a]	137	.000
2	.359[b]	.129	.123	.83953	.129	20.266	1[b]	137	.000

a. Predictor (Constant), Customer Integration (CI)
b. Predictor (Constant), Customer Integration*Supply Chain Adaptability (CI*SCA)

The results in table 4.41 showed that the F-ratio was 110.233 with a P value of .000 being < .05 in Model 1, and the F-ratio was 20.266 with a P value of .000 being < .05 in Model 2. This indicates that the regression model used in the investigation has a high degree of goodness of fit.

Table 4.41: ANOVA for Customer Integration (CI)

Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	14.578	1	14.578	20.747	.000[a]
	Residual	96.265	137	.703		
	Total	110.843	138			
2	Regression	14.284	1	14.284	20.266	.000[b]
	Residual	96.560	137	.705		
	Total	110.843	138			

a. Predictor: (Constant), Customer Integration (CI)
b. Predictors: (Constant), Customer Integration (CI*SCA)
c. Dependent Variable: Competitive Advantage (CA)

4.11.4 Testing the moderating effect for objective three

H_{03iii}: Supply chain adaptability has no significant moderating effect on the relationship between customer integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

MMR Model: $Y = \beta_0 + \beta_m X_3 M + \varepsilon$

With ($R = .359$, $R^2 = .129$) and $F(1,137) = 20.266$, $p = .000$, the results of Model 2 revealed a positive relationship between customer integration*supply chain adaptability, and the competitive advantage in food and beverage manufacturing firms. Customer integration*supply chain adaptability accounts for 12.9 percent of the variability in competitive advantage of food and beverage manufacturing firms, according to an R^2 of .129. The introduction of the moderating variable culminated in an R^2 change of .129, indicating that the moderating effect accounts for 12.9 percent of the variation in competitive advantage beyond that which is accounted for by customer integration. Supply chain adaptability has a significant moderating effect on the relationship between customer integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

Table 4.42 shows the significance of results for customer integration and the competitive advantage. Model 1 revealed a positive and significant relationship between customer integration and the competitive advantage ($b1 = .359$, $p = .000$, $\beta = .363$). Equation 5 depicts the regression equation for model 1, which predicts a .359 gain in competitive advantage for every unit increase in customer integration.

OLS Model: Competitive Advantage = 2.352+ 0.359CI ………………….. ***Equation 5***

This indicates that as customer integration improves, food and beverage manufacturing firms will gain a competitive advantage. At the 95 percent significance level, the null hypothesis that customer integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya was rejected. As a result, the study fails to reject the alternative hypothesis and concludes that customer integration has a significant effect on food and beverage manufacturing firms' competitive advantage in Kenya.

Model 2 revealed a positive and significant moderating effect of supply chain adaptability on the relationship between customer integration and the competitive advantage of Kenyan food and beverage manufacturing firms ($b2 = .443$, $p = .000$, $\beta = .359$). Equation 6 depicts the regression equation with the moderator included (supply chain adaptability). Given that supply chain adaptability remains constant, the equation predicts a change in competitive advantage of .443 for every unit increase in customer integration. As a result, the null hypothesis is rejected at a 95% confidence level, and it is inferred that supply chain adaptability moderates the relationship between customer integration and the competitive advantage of Kenyan food and beverage manufacturing firms.

MMR Model: Competitive Advantage = 1.122 + 0.779CI*SCA …………. ***Equation 6***

Table 4.42: Significance of Test Results for Customer Integration (CI)

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	2.352	.289		8.144	.000
	CI	.359	.079	.363	4.555	.000
2	(Constant)	2.034	.361		5.634	.000
	CI*SCA	.443	.098	.359	4.502	.000

a. Dependent Variable: Competitive Advantage (CA)
b. Predictor Variable: Customer Integration (CI)
c. Predictor Variables: Customer Integration*Supply Chain Adaptability (CI*SCA)

4.12 Statistical Analysis and Discussion of Findings for Technology Integration

The study sought to evaluate the effect of technology integration on the competitive advantage of food and beverage manufacturing firms in Kenya. The objective was measured by the following constructs: automatic identification technology, advanced planning systems, transaction processing systems, and data sharing systems.

4.12.1 Descriptive Analysis of Technology Integration

The study's participants were asked to indicate the extent to which they agreed with the effect of technology integration on the competitive advantage of food and beverage manufacturing firms 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 exhibit the key findings of technology integration, the study used the mean average and standard deviations.

The means and standard deviations are depicted in the descriptive findings of technology integration in table 4.43. On automatic identification technology, the findings showed that majority of the food and beverage manufacturing firms tracked materials change from production to end-user supply chain and monitoring packages ($\bar{x}$ = 3.681, σ = .7248). 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 results are in contrast with those of Mejjaouli and Babiceanu (2015), who established that to optimize material movements and material tracking throughout the supply chain, RFID-based solutions can monitor the automation of all processes. RFID tracking solutions, for example, enable automatic linkage of machine routes to a high-shelf warehouse system as well as automatic truck loading from the warehouse system (Alyahya, Wang & Bennett, 2016).

Moreover, the study established that majority of the food and beverage manufacturing firms accounted for goods in transit easily and collect data about them ($\bar{x}$ = 2.558, σ = .4984). 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 inconsistent with those of Wang, Tsai, He, Liu, Li, and Deng (2019), who poised that RFID transceivers, also known as "electronic labels," detect various types of goods throughout the logistics chain. They are also used to locate the routes of individual products by identifying and storing production data.

Further, the study established that majority of the food and beverage manufacturing firms identified precisely where commodities are at all times ($\bar{x}$ = 2.502, σ = .6677). 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 inconsistent with those of Ghashghaee (2016), who posited that automatic identification technologies' transceivers such as RFID have evolved into an integral control element in logistical chains as well as manufacturing processes. Furthermore, RFID firm diester sensor can be integrated directly into materials that are flexible, providing information quickly and accurately during the manufacturing process (Kerry, 2014). For this reason, firms must track materials as they shift from manufacturing to end-user supply chains and track packages, account for items in transit conveniently and gather data concerning them, and identify precisely where commodities are at all times to increase product flow efficiency and stay competitive (Nainaar & Masson, 2018).

On advanced planning systems: the findings illustrated that majority of the food and beverage manufacturing firms did not standardize and manage the exchange of knowledge within of cross-functional departments ($\bar{x}$ = 2.493, σ = .5018). 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 Njagi and Muli (2020), who noted that technology acts as a coordinating mechanism for connecting departments within the business and through supply chain manufacturing companies.

In addition, the study established that majority of food and beverage manufacturing firms improved the accuracy of demand forecasting to ensure inventory cost is minimized ($\bar{x}$ = 3.642, σ = .4325). 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 agree with those of Gligor and Holcomb (2014), who noted that the technologies were developed to save capital and labor costs. Through greater coordination between the supply chain members, better customer support and inventory cost savings were achieved by producing companies.

Further, the study found out that majority of food and beverage manufacturing firms did not reduce the bottlenecks between internal processes and external suppliers ($\bar{x}$ = 2.457, σ = .4999). 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 disagreement with those of Bell, Bradley, Fugate, and Hazen (2014), who noted that organizational technologies encourage tighter internal alignment and cooperation among logistics and supply chain organizations. It is the establishment of efficient internal IT-enabled collaborative efforts that enables the firm to extend collaborative activities beyond its own borders to include organizations throughout the supply chain (Prajogo & Olhager, 2012). As such, an advanced planning system allows companies to manufacture things more effectively than their competitors, resulting in higher profit margins and a significant competitive advantage (Madushika, Fasana & Perera, 2019). This is accomplished through enhanced production and performance, as well as more effective scheduling and inventory management.

On transaction processing systems, the findings showed that majority of the food and beverage manufacturing firms did not avail key details on load preparation, freight invoicing, optimized routes & tender actions ($\bar{x}$ = 2.348, σ = .4780). 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 Mellat-Parast and Spillan (2014), who posited that by providing reliable information about goods in almost real time, these collaborations minimize inventory and increase the quality of their communications.

Further, the study found out that majority of the food and beverage manufacturing firms utilized warehouse management systems to process, handle and store inventory ($\bar{x}$ = 3.435, σ = .4975). 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 mirror those of Mutunga and Minja (2014), who established that to boost performance and competitiveness, the companies utilize transaction processing systems that manage enormous amounts of data to provide crucial information on load preparation, freight invoicing, optimum routes, among other functions performed through the WMS. Consequently, additional modifications and improvements for transaction processing systems led to the reinvention of the supply chain, which improved the accuracy of the customer demand forecast and revolutionized the way transactions across supply chain partners were carried out (Nettsträter, Geißen, Witthaut, Ebel & Schoneboom, 2015).

On data sharing systems, the findings illustrated that majority of the food and beverage manufacturing firms ensured transactions are performed between partners in real time ($\overline{x}$ = 3.443, σ = .4483). Given the five-point scale Likert mean of more than ($\overline{x}$ = 3.4) and an average standard deviation, it is clear that a major section of the respondents agreed with the statement. As such, integrated data sharing systems can boost a company's competitiveness while discouraging new entrants (Subramanian, Abdulrahman, & Zhou, 2014).

In addition, the study established that majority of the food and beverage manufacturing firms did not streamline all modes of interaction plus communication among our firm and partners ($\overline{x}$ = 2.428, σ = .4965). Given the five-point scale Likert mean of less than ($\overline{x}$ = 2.6) and an average standard deviation, it is clear that a major section of the respondents disagreed with the statement. The findings are inconsistent with those of Naway and Rahmat (2019), who established that streamlining all modes of interaction as well as communication among supply chain partners is accomplished through the coordination of business process providers and consumers, knowledge sharing, and collaborative planning. Because of the collaborative approach to developing shared understanding, it strengthens understanding of customer requirements.

As such, data sharing systems including EDI have been a key enabler of just-in-time (JIT) logistics, which means that holding limited stocks was only possible because communication between trading partners was quick and real-time, allowing manufacturers to react quickly to their customers' emerging material needs, giving them a competitive advantage (Munizu, 2015). Notwithstanding the degree of integration, top management in manufacturing firms must lead the way in implementing digital technology and software solutions within their organizations to improve decision-making systems (Fu, 2017). They must therefore supervise technological changes, invest now in basic capabilities, plan for future investment opportunities to boost their competitiveness, and examine how or when to align their technologies with those of other members of the supply chain.

The goals of implementing these new technologies should go beyond enterprise-wide compatibility and reliability (Chinomona, 2013). Material resource planning has become a much more simple and strategic process in proper resource management as technology has advanced. Because of technological advancements, manufacturers can now manage resources visually and automatically through production scheduling (Nettsträter, Geißen, Witthaut, Ebel & Schoneboom, 2015). Production lines that want to take their production to the next level and create a much more efficient production and resource flow must prioritize resource planning. As requirements for supply chain integration and the demand for new technologies continue to develop, a manufacturing firm should consider establishing modern infrastructure with user-friendly platforms that will ensure integrated supply chains in order to reduce redundant inventory levels and surplus manufacturing capacity, saving financial resources for other investment opportunities.

Table 4.43: Technology Integration Descriptive Statistics

Statements	Mean	Std. Deviation
Our firm tracked materials change from production to end-user supply chain and monitoring packages.	3.681	.7248
Our firm accounted for goods in transit easily and collect data about them.	2.558	.4984
Our firm identified precisely where commodities are at all times.	2.502	.6677
Our firm standardized and managed the exchange of knowledge within of cross-functional departments.	2.493	.5018
Our firm improved the accuracy of demand forecasting to ensure inventory cost is minimized.	3.642	.4325
Our firm reduced the bottlenecks between internal processes and external suppliers.	2.457	.4999
Our firm availed key details on load preparation, freight invoicing, optimized routes, & tender actions.	2.348	.4780
Our firm utilizes warehouse management systems to process, handle and store inventory.	3.435	.4975
Our firm ensured transactions are performed between partners in real time.	3.433	.4483
We streamlined all modes of interaction plus communication among our firm and partners.	2.428	.4965

The study's participants were asked to indicate the other forms of technology integration in their firms. From the findings in table 4.44, the study found out that 15.83% of food and beverage manufacturing firms embraced advanced weighing technology, 17.27% embraced the Internet of Things, and 66.91% embraced transport management systems as other forms of technology integration. The study established that while focusing on automatic identification technology, advanced planning systems, transaction processing systems, and data sharing systems when executing technology integration, it is crucial for food and beverage manufacturing firms to consider implementation of transport management systems, the internet of things, and advanced weighing technologies to improve competitiveness.

Table 4.44: Technology Integration Forms Embraced Frequencies & Percentages

Form of Technology Integration	Frequency	Percentage
Advanced Weighing Technology	22	15.83
Internet of Things	24	17.27
Transport Management System	93	66.91
Total	**139**	**100.00**

4.12.2 Correlation Analysis of Technology Integration

For this investigation, Pearson Product Moment Correlation was used to determine the strength and direction of the linear relationship between the independent (technology integration) and dependent variable (competitive advantage), and the results are summarized in table 4.45. The study established that technology integration had a positive, significant linear relationship with the competitive advantage of food and beverage manufacturing firms in Kenya, as shown by a Pearson correlation coefficient of .647 at .01 level of significance. This inferred that there was a strong positive relationship between technology integration and the competitive advantage of food and beverage manufacturing firms in Kenya. The findings contradict Zu'bi, Tarawneh, Abdallah, and Fidawi (2015), and Njagi and Muli (2020), who established a low correlation between technology integration and the performance of the organization.

Table 4.45: Pearson Product-Moment Correlations between Technology Integration (TI) & Competitive Advantage (CA)

Variable		CA	TI
CA	Pearson Correlation	1	
	Sig. (2-tailed)		
TI	Pearson Correlation	$.647^{**}$	1
	Sig. (2-tailed)	.000	

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

4.12.3 Regression Analysis for Technology Integration

H_{04}: Technology integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

OLS Model: $Y = \beta_0 + \beta_4 X_4 + \varepsilon$

The results of Model 1 reveal that technology integration and the competitive advantage have a positive relationship ($R = .647$, $R^2 = .419$) and $F(1,137) = 18.802$, $p = .000$). Technology integration can account for 41.9% of the variability in the competitive advantage of food and beverage manufacturing firms, according to an R^2 of .419.

4.12.4 Testing the Moderating Effect for Objective Four

H_{04iv}: Supply chain adaptability has no significant moderating effect on the relationship between technology integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

MMR Model: $Y = \beta_0 + \beta_m X_4 M + \varepsilon$

The results of Model 2 were seen after the moderator's interaction (supply chain adaptability) was included in the model. With ($R = .665$, $R^2 = .442$) and $F(1,137) = 3.854$, $p = .000$, the results revealed a positive relationship between technology integration*supply chain adaptability, and the competitive advantage of food and beverage manufacturing firms. Technology integration*supply chain adaptability can account for 44.2 percent of the changes in competitive advantage of food and beverage manufacturing firms, by an R^2 of .442. The introduction of the moderating variable resulted in an R^2 change of .442, indicating that the moderating effect accounts for 44.2% of the variability in competitive advantage beyond that accounted for by technology integration. Supply chain adaptability has a significant moderating effect on the relationship between technology integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

Table 4.46: Model Summary for Technology Integration (TI)

					Change	Statistics			
Model	**R**	**R^2**	**Adjusted R Square**	**Std. Error of the Estimate**	**R^2 Change**	**F Change**	**Df1**	**Df2**	**Sig. F Change**
1	.647[a]	.419	.415	.89844	.419	.319	1[a]	137	.003
2	.665[b]	.442	.420	.88710	.442	3.854	1[b]	137	.002

a. Predictor (Constant), Technology Integration (TI)
b. Predictor (Constant), Technology Integration*Supply Chain Adaptability (TI*SCA)

The results in table 4.47 showed that the F-ratio was 18.800, with a P value of .000 being < .05 in Model 1, and the F-ratio was 3.854, with a P value of .000 being < .05 in Model 2. This indicates that the regression model used in the investigation has a high degree of goodness of fit.

Table 4.47: ANOVA for Technology Integration (TI)

Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
	Regression	.258	1	.258	.319	.000[a]
1	Residual	119.585	137	.807		
	Total	110.843	138			
	Regression	3.033	1	3.033	3.854	.002[b]
2	Residual	107.811	137	.787		
	Total	110.843	138			

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

Table 4.48 shows the significance of test results for technology integration and competitive advantage. Model 1's findings showed a positive and significant relationship between technology integration and competitive advantage (b1 = .580, p = .000, β = .647). Equation 7 presents the regression equation for model 1, which predicts a .580 gain in competitive advantage for every unit increase in technology integration.

OLS Model: Competitive Advantage = 2.432+ 0.580TI ………………… ***Equation 7***

This posits that when technology integration improves, food and beverage manufacturing companies gain a competitive advantage. At the 95 percent significance level, the null hypothesis that technological integration has no significant effect on the competitive advantage was rejected. As a result, the study fails to rule out the alternative hypothesis, concluding that technology integration has a significant effect on the competitive advantage among Kenyan food and beverage manufacturing firms.

The results of Model 2 revealed that supply chain adaptability had a positive and significant moderating effect on the relationship between technology integration and the competitive advantage of Kenyan food and beverage manufacturing firms ($b2 = .609$, $p = .000$, $\beta = .665$). Equation 8 depicts the regression equation with the moderator included (supply chain adaptability). Given that supply chain adaptability remains constant, the equation predicts a change in competitive advantage of .665 for every unit increase in technology integration. As a result, the rejection of the null hypothesis at a 95% confidence level, and it is concluded that supply chain adaptability moderates the relationship between technology integration and the competitive advantage of Kenyan food and beverage manufacturing firms.

MMR Model: Competitive Advantage = 2.935 + 0.609TI*SCA …………. ***Equation 8***

Table 4.48: Significance of Test Results for Technology Integration (TI)

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.478	.274		12.687	.000
	TI	.580	.062	.647	8.848	.000
2	(Constant)	2.935	.361		8.138	.000
	TI*SCA	.609	.106	.665	6.963	.002

a. Dependent Variable: Competitive Advantage (CA)
b. Predictor Variable: Technology Integration (TI)
c. Predictor Variables: Technology Integration*Supply Chain Adaptability (TI*SCA)

4.13 Overall Correlation Analysis

Correlation coefficients, according to Saunders *et al.* (2009), allow a researcher to evaluate the strength of a linear link between two or more variables. The degree of relatedness between variables is measured by correlation (Ken, 2010). The measure of how closely two variables are related is called correlation. The Pearson Correlation (officially known as the Pearson Product Moment Correlation or PPMC) is the most commonly used statistical measure of correlation, which depicts the linear relationship between two variables. There are several correlation measures to choose from, and the one you choose is mostly determined by the amount of data you're looking at. Spearman's rank correlation (r) can be used to examine the degree of relationship between two continuous variables for ordinal-level or ranked data. The Pearson product-moment correlation coefficient r necessitates at least an interval level of data observation (Ken, 2010).

According to Pallant (2010), correlation is utilized to investigate the link between a group of variables, which aids in multicollinearity testing. When the correlation coefficients are not near 1 or -1, it means that the components involved do not adequately measure the different variables (Farndale, Hope-Hailey, & Kelliher, 2010). The direction and strength of a linear association (relationship) between two variables are summarized numerically by correlation coefficients. The range of Pearson correlation coefficients (r) is -1 to +1. The symbol at the front specifies whether the association (relationship) is positive or negative. The magnitude of the absolute value gives insight into the relationship's strength. A rating of 0 indicates that the variables are absolutely independent, meaning there is no relationship between them, whereas a value of +1 indicates a perfect positive correlation and a value of -1 indicates a perfect negative correlation (Saunders *et al.,* 2009). As poised by Rubin and Babbie (2010), the value [size] of the absolute value indicates the degree [strength] of correlation whereby (r = .1 to .29 Low; r = .30 to .49 Moderate; r = .5 to 1.0 Large). For this investigation, Pearson product moment correlation was used to determine the strength and direction of the linear relationship between the independent and dependent variables, and the results are summarized in Table 4.49.

The correlation between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya, plus the moderating variable of supply chain adaptability, was investigated using the Pearson product-moment correlation coefficient. There was positive correlation between the dependent and the set of independent and moderating variables ($r > .3$, $p < .001$ in all cases). The strength of the relationship between the independent variables [supply chain integration (SCI) elements of functional integration (FI), supplier integration (SI), customer integration (CI), and technology integration (TI)], the moderating variable (supply chain adaptability), and the dependent variable (competitive advantage of food and beverage manufacturing firms) was strong. This was shown by functional integration ($r = .991$, large), supplier integration ($r = .541$, large), customer integration ($r = .363$, moderate), technology integration ($r = .647$, large), and supply chain adaptability ($r = .311$, moderate).

Table 4.49: Pearson Product-Moment Correlations Between Study Variables

Variables		CA	FI	SI	CI	TI	SCA
CA	Pearson Correlation	1					
	Sig. (2-tailed)						
	N						
FI	Pearson Correlation	.991**	1				
	Sig. (2-tailed)	.000					
	N	139					
SI	Pearson Correlation	.541**	.469**	1			
	Sig. (2-tailed)	.000	.000				
	N	139	139				
CI	Pearson Correlation	.363**	.338**	.346**	1		
	Sig. (2-tailed)	.000	.000	.000			
	N	139	139	139			
TI	Pearson Correlation	.647**	.217**	.410**	.498**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
	N	139	139	139	139		
SCA	Pearson Correlation	.311**	.302**	.303**	.307**	.305**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	139	139	139	139	139	

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

4.14 Overall Regression Models

H_{O5}: Supply chain integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.

OLS Model: $Y= \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$

Regression analysis attempts to establish if a group of study variables together predict a specified dependent variable and thus attempts to significantly boost the estimate's accuracy (Uyanık & Güler, 2013). The relationship between competitive advantage and the independent variables under supply chain integration (functional integration, supplier integration, customer integration, and technology integration) was examined using multiple regression analysis as shown in Table 4.50. The findings of Model 1 revealed that supply chain integration and competitive advantage have a positive relationship (R = 658, R^2 = .433, 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 variables [supply chain integration (SCI) elements of functional integration (FI), supplier integration (SI), customer integration (CI), and technology integration (TI)] 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, which includes supplier, internal, and customer integration, can improve competitive advantage.

H_{05v}: Supply chain adaptability has no significant moderating effect on the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

MMR Model: $Y= \beta_0 + \beta_{1M}X_1M + \beta_{2M}X_2M + \beta_{3M}X_3M + \beta_{4M}X_4M + \varepsilon$

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 manufacturing firms 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 variables [supply chain integration (SCI) elements of functional integration (FI), supplier integration (SI), customer integration (CI), and technology integration (TI)] 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 4.50: Overall Model Summary

					Change Statistics				
Model	**R**	**R^2**	**Adjusted R Square**	**Std. Error of the Estimate**	**R^2 Change**	**F Change**	**Df1**	**Df2**	**Sig. F Change**
1	.658[a]	.433	.429	.07867	.443	4443.754	4[a]	134	.000
2	.849[b]	.721	.717	.18099	.656	812.427	4[b]	134	.000

a. Predictor (Constant), Functional Integration (FI), Supplier Integration (SI), Customer Integration (CI) and Technology Integration (TI)

b. Predictor (Constant), Functional Integration*Supply Chain Adaptability (FI*SCA), Supplier Integration*Supply Chain Adaptability (SI*SCA), Customer Integration (CI*SCA) and Technology Integration*Supply Chain Adaptability TI*SCA

The results in table 4.51 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 4.51: Overall ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	110.014	4	27.503	4443.754	.000[a]
	Residual	.829	134	.006		
	Total	110.843	138			
2	Regression	106.453	4	26.613	812.027	.000[b]
	Residual	4.390	134	.033		
	Total	110.843	138			

a. Predictors: (Constant), Functional Integration (FI), Supplier Integration (SI), Customer Integration (CI), Technology Integration (TI)
b. Predictor (Constant), Functional Integration*Supply Chain Adaptability (FI*SCA), Supplier Integration*Supply Chain Adaptability (SI*SCA), Customer Integration*Supply Chain Adaptability (CI*SCA), Technology Integration*Supply Chain Adaptability (TI*SCA)
c. Dependent Variable: Competitive Advantage (CA)

4.14.1 Overall Significance Test Results

Table 4.52 shows the overall significance of test results featuring the independent and dependent variables.

OLS Model: Competitive Advantage = 0.179 + 1.010FI + 0.472SI + 0.132CI + 0.189TI ……………………………………………………………………….. ***Equation 9***

At the 95 percent level of significance, the relationship between all explanatory factors was positive and statistically significant. The results were validated by standard p-values of less than .05. This indicates that supply chain adaptability has a significant moderating effect on the relationship between the predictor variables and the competitive advantage of Kenyan food and beverage manufacturing firms. This shows that supply chain integration parameters are crucial in determining a company's competitive advantage in the food and beverage industry.

MMR Model: Competitive Advantage = 0.198 + 1.962FI*SCA + 0.394SI*SCA + 0.129CI*SCA + 0.690TI*SCA …………………………………………… ***Equation 10***

Table 4.52: Overall Significance of Test Results

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	.179	.035		5.106	.000
	Functional Integration (FI)	1.010	.012	.960	85.201	.000
	Supplier Integration (SI)	.472	.021	.372	2.470	.003
	Customer Integration (CI)	.132	.014	.133	9.336	.000
	Technology Integration (TI)	.189	.016	.183	11.713	.000
2	(Constant)	.198	.094		2.112	.037
	FI*SCA	1.962	.054	1.342	36.159	.000
	SI*SCA	.394	.093	.269	4.214	.000
	CI*SCA	.129	.066	.105	4.963	.000
	TI*SCA	.690	.073	.547	9.506	.000

a. Dependent Variable: Competitive Advantage CA

b. Functional Integration*Supply Chain Adaptability (FI*SCA), Supplier Integration*Supply Chain Adaptability (SI*SCA), Customer Integration*Supply Chain Adaptability (CI*SCA), Technology Integration*Supply Chain Adaptability (TI*SCA)

4.15 Findings on Testing of Hypotheses

The overall model 1 in table 4.52 demonstrated that the OLS model forecasts a. 960 competitive advantage gain for every unit increase in functional integration. Thus, functional integration's influence on competitive advantage was rejected at the 95% significance level. Thus, the study fails to reject the alternative hypothesis and concludes that functional integration enhanced Kenyan food and beverage manufacturers' competitiveness. A significant t = 85.201 supports this. Supplier integration increases competitive advantage by.372, according to the OLS model. Thus, at 95% significance, the null hypothesis that supplier integration has no significant effect on competitive advantage was rejected. The study concludes that supplier integration has a considerable impact on Kenyan food and beverage manufacturers' competitive advantage. A significant t = 2.470 supports this.

For every unit of customer integration, the OLS model forecasts a .133 competitive advantage gain. Thus, at 95% significance, the null hypothesis that customer integration had no meaningful influence on competitive advantage was rejected. The study concludes that customer integration has a major impact on Kenyan food and beverage manufacturing enterprises' competitive advantage. A significant t = 9.336 supports this. Technology integration increases competitive advantage by .183 units, according to the OLS model. Thus, at the 95% significance level, the null hypothesis that technology integration does not affect competitive advantage was rejected. Thus, the study fails to reject the alternative hypothesis and concludes that technology integration enhanced Kenyan food and beverage manufacturers' competitiveness. A significant t = 11.713 supports this.

Model 2 in table 4.52 showed that supply chain adaptability positively and significantly moderated the association between functional integration and Kenyan food and beverage manufacturing enterprises' competitive advantage. For every unit of functional integration, the MMR model forecasts a 1.342 increase in competitive advantage, when supply chain adaptability remains constant. Supply chain adaptability moderates the connection between functional integration and Kenyan food and beverage manufacturing enterprises' competitive advantage, rejecting the null hypothesis at 95% confidence. A significant t = 36.159 supports this. Supply chain adaptability positively and significantly moderated the association between supplier integration and Kenyan food and beverage manufacturing enterprises' competitive advantage. For every unit of supplier integration, the MMR model forecasts a .269 improvement in competitive advantage, when supply chain adaptability remains constant. Thus, supply chain adaptability moderates the association between supplier integration and Kenyan food and beverage manufacturing enterprises' competitive advantage at a 95% confidence level. A significant t = 4.214 supports this.

Supply chain adaptability positively and significantly moderated the relationship between customer integration and Kenyan food and beverage manufacturing enterprises' competitive advantage. For every unit of customer integration, the MMR model predicts a .105 improvement in competitive advantage, when supply chain adaptability remains constant. Thus, supply chain adaptability moderates the association between customer integration and Kenyan food and beverage manufacturing enterprises' competitive advantage at a 95% confidence level. A large significant (4.963) t value supports this. Finally, supply chain adaptability positively and significantly moderated the relationship between technology integration and Kenyan food and beverage manufacturers' competitive advantage. The MMR model forecasts a .547 improvement in competitive advantage per unit of technology integration when supply chain adaptability remains constant. Thus, supply chain adaptability moderates the association between technology integration and Kenyan food and beverage manufacturing enterprises' competitive advantage at a 95% confidence level. 9.506 is a significant t value which supports this. Table 4.53 shows hypotheses testing results:

Table 4.53: Hypotheses Testing Results

S/No	Hypotheses	Decision Rule	T -Test & P – Value	Deduction
1	**H_{01}:** Functional integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a1}:** Functional integration has a positive significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.	If the $P \leq 0.05$, we reject Ho_1 and accept Ha_1	85.201 & .000	Reject Ho_1 **Accept H_{a1}**
2	**H_{02}:** Supplier integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a2}:** Supplier integration has a positive significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.	If the $P \leq 0.05$, we reject Ho_2 and accept Ha_2	2.470 & .003	Reject Ho_2 **Accept H_{a2}**
3	**H_{03}:** Customer integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a3}:** Customer integration has a positive significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.	If the $P \leq 0.05$, we reject Ho_3 and accept Ha_3	9.336 & .000	Reject Ho_3 **Accept H_{a3}**
4	**H_{04}:** Technology integration has no significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a4}:** Technology integration has a positive significant effect on the competitive advantage of food and beverage manufacturing firms in Kenya.	If the $P \leq 0.05$, we reject Ho_4 and accept Ha_4	11.713 & .000	Reject Ho_4 **Accept H_{a4}**
5	**H_{05}:** Supply chain adaptability does not moderate the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya. **H_{a5}:** Supply chain adaptability moderates the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya.	If the $P \leq 0.05$ for all independent variables, we reject Ho_{5s} and accept Ha_{5s}	36.159 4.214 4.963 9.506 & .000	Reject Ho_{5s} **Accept H_{a5s}**

4.16 Optimal Model

Table 4.52 regression findings Model 2, the ideal model, was modified conceptually. All significant variables were retained. Functional integration, supplier integration, customer integration, and integration of technology predicted competitive advantage in order of significance. Figure 4.7 shows the optimal model's modified conceptual framework. The MMR model predicted functional integration (marketing integration, distribution & warehousing integration, production integration, and procurement integration), supplier integration (supplier development, supplier relationship management, vendor managed inventory, and early supplier involvement), customer integration (complaint management, integrated problem solving, early customer involvement, and customer relationship management), and technology integration (data sharing systems, transaction processing systems, advanced planning systems, and automatic identification technology). The sequence of variables has maintained, but the constructs used to quantify them are now different. Figure 4.7 shows the ideal MMR model's modified conceptual framework. Moderated multiple regression was optimal. The optimal moderated multiple regression model was;

Optimal MMR Model: Competitive Advantage = 0.198 + 1.962FI*SCA + 0.394SI*SCA + 0.129CI*SCA + 0.690TI*SCA ………………………………………… ***Equation 11***

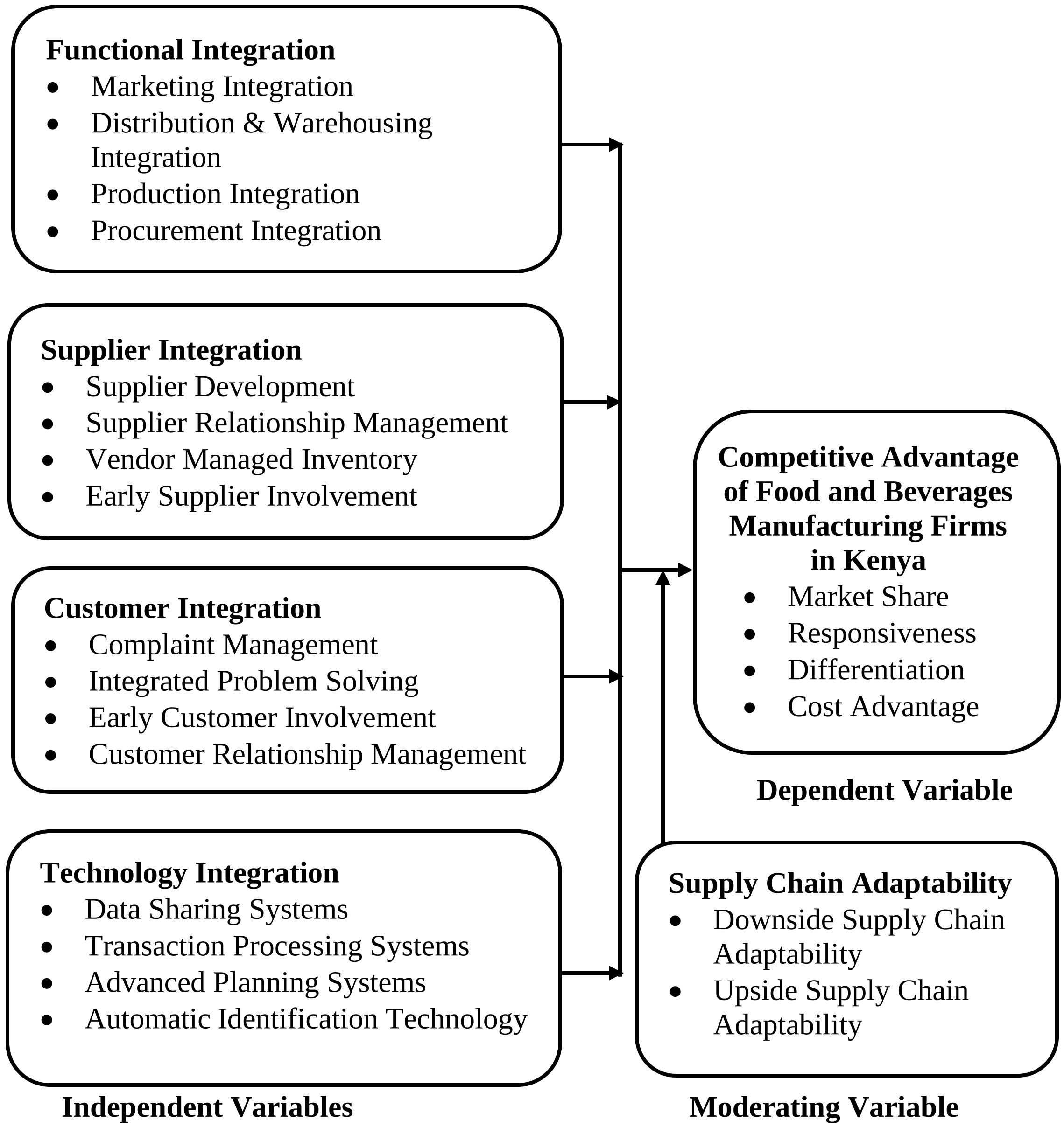

Figure 4.7: Optimal MMR Model Conceptual Framework

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the research findings based on the research objectives, as well as a conclusion, recommendations, and suggestions for future studies. The main purpose of this study was to determine the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya. The specific objectives were to examine the effect of functional integration on the competitive advantage of food and beverage manufacturing firms in Kenya; to analyze the effect of supplier integration on the competitive advantage of food and beverage manufacturing firms in Kenya; to assess the effect of customer integration on the competitive advantage of food and beverage manufacturing firms in Kenya; to evaluate the effect of technology integration on the competitive advantage of food and beverage manufacturing firms in Kenya; and to establish the moderating effect of supply chain adaptability on the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

5.2 Summary of Findings

The study's summary is presented in this section, focusing on determining the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms in Kenya per a specific objective.

5.2.1 Functional Integration and the Competitive Advantage

The first specific objective sought to examine the effect of functional integration on the competitive advantage of food and beverage manufacturing firms in Kenya. A majority of food and beverage manufacturing firms increased the involvement of procurement professionals in joint decision making, but procurement integration did not enable most food and beverage manufacturing firms to reduce the ordering cycle time or reduce data asymmetries, thus not providing the firms with optimal value. According to the study, most food and beverage manufacturing firms enhanced the level of coordination across organizational processes and activities, and most food and beverage manufacturing firms avoided unexpected difficulties and improved communication with stakeholders.

Research found that the majority of food and beverage manufacturing firms plan their supply chain operations centrally, the majority of food and beverage manufacturing firms' supply chain operations are guided by the layout design and flow of operations, and the majority of food and beverage manufacturing firms' supply chain network is not designed to allow for fast pick-to-ship. The majority of food and beverage manufacturing enterprises found that marketing integration does not speed the introduction of new items to the market, but it helps establish customer rapport and raises the visibility of the company's products. Functional integration and competitive advantage had a significantly positive correlation, according to the results. The study also discovered that functional integration and the competitive advantage of food and beverage manufacturing enterprises in Kenya had a positive and statistically significant relationship.

5.2.2 Supplier Integration and the Competitive Advantage

The second specific objective sought to analyze the effect of supplier integration on the competitive advantage of food and beverage manufacturing firms in Kenya. The majority of food and beverage manufacturing firms have not improved resource deployment, reduced supply instability, increased consumer value, or enlisted the help of their suppliers early enough, and the majority of these firms have not reduced design and production costs or reduced the amount of time required. Food and beverage manufacturers who use vendor-managed inventory say they've reduced waste, non-value-adding elements, and obsolete material while eliminating stock shortages and the high distribution costs of expedited deliveries.

Rather than relying solely on their own in-house capabilities and technologies, most food and beverage manufacturing companies have opted to combine their internal core strengths with externally available capabilities and technologies. Food and beverage production enterprises lacked a thorough understanding of their suppliers' capabilities, failed to identify their weaknesses, and failed to correct them, resulting in considerable improvements in quality and delivery. The study also established that there was a positive and statistically significant relationship between supplier integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

5.2.3 Customer Integration and the Competitive Advantage

The third specific objective sought to assess the effect of customer integration on the competitive advantage of food and beverage manufacturing firms in Kenya. In the last three years, the number of customers referred to the products of the majority of food and beverage manufacturing companies has increased by at least 50%, and the majority of food and beverage manufacturing companies have kept customers satisfied by providing a sensitive team of sales and support professionals. Food and beverage manufacturers are more responsive to changing client demands and have developed new goods that meet the preferences of their customers when it comes to early customer involvement.

When it comes to integrated problem solving, the majority of food and beverage production companies did not build procedures for problem solving that allowed for cooperative efforts. However, the majority of these companies increased customer analysis and segmentation. Many food and beverage manufacturers have reduced the number of complaints by customers by at least 70% over the last three years, and many of these companies do not have an efficient mechanism to track the issue highlighted by consumers over time. The findings showed that there was a positive, significant correlation between customer integration and the competitive advantage of food and beverage manufacturing firms in Kenya. The study also established that there was a positive and statistically significant relationship between customer integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

5.2.4 Technology Integration and the Competitive Advantage

The fourth specific objective sought to evaluate the effect of technology integration on the competitive advantage of food and beverage manufacturing firms in Kenya. Automated identification technology was used by the majority of food and beverage manufacturing firms to track materials from production to the end-user supply chain; to account for goods in transit and collect data on them; and to know precisely where commodities are at all times. Food and beverage manufacturing firms have not standardized or managed the exchange of knowledge between cross-functional departments, improved demand forecasting accuracy, or reduced bottlenecks between internal processes and external suppliers.

The majority of food and beverage manufacturing companies did not provide key information on load preparation, freight invoicing, optimized routes, and tender actions; and the majority of food and beverage manufacturing companies used warehouse management systems to process, handle, and store inventory. It is common for food and beverage production firms to use real-time data sharing platforms; nevertheless, the majority of these organizations do not simplify all modes of communication within our own firm, with our partners, and with other parties. The findings showed that there was a positive and significant correlation between technology integration and the competitive advantage of food and beverage manufacturing firms in Kenya. The study also established that there was a positive and statistically significant relationship between technology integration and the competitive advantage of food and beverage manufacturing firms in Kenya.

5.2.5 Moderating effect of Supply Chain Adaptability on the Relationship Between Supply Chain Integration and the Competitive Advantage of Food and Beverage Manufacturing Firms in Kenya

The fifth specific objective 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 manufacturing firms in Kenya. This objective was tested under four hypotheses, namely;

***H_{01i}*:** *Supply chain adaptability has no significant moderating effect on the relationship between functional integration and the competitive advantage of food and beverage manufacturing firms in Kenya.*

The results revealed a positive and significant relationship between functional integration and the competitive advantage of food and beverage manufacturing firms after the moderator interaction (functional integration*supply chain adaptability) was included in the model.

***H_{02ii}*:** *Supply chain adaptability has no significant moderating effect on the relationship between supplier integration and the competitive advantage of food and beverage manufacturing firms in Kenya.*

The results revealed a positive and significant relationship between supplier integration and the competitive advantage of food and beverage manufacturing firms after the moderator interaction (supplier integration*supply chain adaptability) was included in the model.

***H_{03iii}*:** *Supply chain adaptability has no significant moderating effect on the relationship between customer integration and the competitive advantage of food and beverage manufacturing firms in Kenya.*

The results revealed a positive and significant relationship between customer integration and the competitive advantage of food and beverage manufacturing firms after the moderator interaction (customer integration*supply chain adaptability) was included in the model.

H_{04iv}: *Supply chain adaptability has no significant moderating effect on the relationship between technology integration and the competitive advantage of food and beverage manufacturing firms in Kenya.*

The results revealed a positive and significant relationship between technology integration and the competitive advantage of food and beverage manufacturing firms after the moderator interaction (technology integration*supply chain adaptability) was included in the model.

5.3 Conclusion

Herein are the conclusions drawn from the study:

5.3.1 Functional Integration and the Competitive Advantage

The study concluded that the competitive advantage is anticipated to grow for every unit increase in functional integration. This indicated that when there is improved functional integration, food and beverage production companies gain a competitive advantage. Further, the study concluded that food and beverage manufacturing firms have integrated internally through procurement integration, production integration, distribution and warehousing integration, and marketing integration to improve their competitiveness. Moreover, the study concluded that food and beverage manufacturers in Kenya had already adopted functional integration for achieving improved organizational performance and enhanced competitiveness.

The study came to the conclusion that the length of time it takes to order goods or services from suppliers did not significantly decrease as a result of the integration of procurement processes throughout the company. This could be caused by a number of things, including ineffective supplier management, lack of automation, or inefficient procurement procedures. The investigation came to the additional conclusion that the company's distribution and warehousing systems were not designed for quick pick-to-ship cycle times. This can be the result of issues with the warehouse's automation, ineffective picking and packaging procedures, or bad inventory management techniques. The study's final finding was that the time it takes to introduce new items to the market did not significantly improve as a result of unifying marketing processes across the organization. This could be caused by a number of things, including a dearth of market research, inefficient product development procedures, or inadequate marketing campaign implementation.

5.3.2 Supplier Integration and the Competitive Advantage

The study concluded that the competitive advantage is predicted to improve for every unit increase in supplier integration. This implied that as supplier integration improves, food and beverage manufacturing companies will gain a competitive advantage. Further, the study concluded that food and beverage manufacturing firms have integrated with their suppliers as evidenced by early supplier involvement, vendor managed inventory, supplier relationship management, and supplier development to improve their competitiveness. Additionally, the study concluded that food and beverage manufacturers in Kenya had already adopted supplier integration to achieve improved organizational performance and enhanced competitiveness. It is clear from the results that the majority of food and beverage production companies have not significantly advanced in a number of operationally related areas. The use of resources, supply stability, consumer value, supplier relationships, design and production costs, and turnaround time are some of these aspects. The findings also imply that these companies have not taken the necessary actions to enhance quality and delivery because they lack a deep understanding of the strengths and limitations of their suppliers.

5.3.3 Customer Integration and the Competitive Advantage

The study concluded that a gain in competitive advantage for every unit increase in customer integration is predicted. This indicated that as customer integration improves, food and beverage manufacturing firms will gain a competitive advantage. Further, the study concluded that food and beverage manufacturing firms have integrated with customers as evidenced through customer relationship management, early customer involvement, integrated problem solving, and complaint management to improve their competitiveness. Likewise, the study concluded that food and beverage manufacturers in Kenya had already adopted customer integration for achieving improved organizational performance and enhanced competitiveness. According to the results, it could be concluded that most food and beverage production organizations lack integrated problem-solving techniques that encourage teamwork. This means that these businesses can find it difficult to recognize and address complex issues that call for the participation and coordination of numerous teams or departments. Processes for solving problems that are not effective might result in lost production, higher expenses, and worse customer satisfaction.

5.3.4 Technology Integration and the Competitive Advantage

The study concluded that a gain in competitive advantage for every unit increase in technology integration is predicted. This research posited that when technology integration improves, food and beverage manufacturing companies gain a competitive advantage. Further, the study concluded that food and beverage manufacturing firms have embraced technology integration using automatic identification technologies, advanced planning systems, transaction processing systems, and data sharing systems to improve their competitiveness. Furthermore, the study concluded that food and beverage manufacturers in Kenya had already adopted technology integration for improved organizational performance and enhanced competitiveness.

According to the results, the study concluded that there are significant deficiencies in knowledge management and communication in the food and beverage manufacturing industries. These firms' cross-functional departments do not manage or standardize knowledge sharing, which can lead to inaccuracies in demand forecasts and bottlenecks involving internal operations and outside suppliers. Furthermore, these companies don't offer crucial data on load optimization, freight invoicing, route optimization, and tender actions. Despite the widespread use of warehouse management systems by food and beverage manufacturing enterprises, there is a lack of uniformity in communication and knowledge sharing within the company, with partners, and with outside parties.

5.3.5 Supply Chain Adaptability

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 manufacturing firms. Thus, the supply chain integration parameters of functional integration, supplier integration, customer integration, and technology integration are 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.

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.

5.3.6 Competitive Advantage

The results lead to the conclusion that many food and beverage production companies are not successfully matching their operating expenses with the quality of their products and services. This implies that these businesses might be making compromises that could affect the quality and safety of their products, or they might be missing chances to boost productivity and cut costs without compromising quality. A further indication that they may be losing out on potential customers who are prepared to pay different prices for different levels of quality or features is the fact that the majority of food and beverage businesses do not differentiate pricing to increase their market share. Their potential to grow and become profitable may be constrained by this lack of pricing distinction. Additionally, the discovery that the majority of food and beverage manufacturing companies do not provide premium pricing items to niche customers raises the possibility that they are passing up chances to increase their revenue from clients who are ready to pay more for specialized or premium products. These businesses may be losing money by neglecting to serve these clients and underutilizing their potential market.

5.4 Recommendations

The recommendations outlined below are suggested by the study:

5.4.1 Functional Integration

According to the research, food and beverages manufacturing firms should assess and improve their procurement procedures in order to make them more effective. Some recommendations include leveraging automation, putting in place a stronger supplier management system, or changing their procurement procedures altogether. The study suggests that in order to decrease pick-to-ship cycle times, the logistics infrastructures of the food and beverages manufacturing firms encompassing the distribution as well as warehousing networks, should be improved. More market research should be done, according to the report, to better understand consumer wants and preferences. This would enable the food and beverages manufacturing firms to create better goods and run more successful marketing campaigns. Additionally, the business should enhance its marketing implementation by creating campaigns that are more successful and utilizing superior marketing channels for reaching target customers.

5.4.2 Supplier Integration

In order to increase their competitive advantage, the study suggests that food and beverage manufacturers should improve supplier integration. Also, management should take a balanced approach when designing links with their suppliers to promote uninterrupted intra-organizational interactions while emphasizing the integration of internal operations with supplier activities. Management can also develop policies and procedures to help organizations maintain stronger and better ties with their vendors. Consequently, food and beverage manufacturing firms should enhance supplier integration to boost their competitive advantage. According to the research, food and beverages manufacturing firms should determine where they can use their resources more effectively and efficiently in order to cut costs and boost output. This can entail making investments in cutting-edge technology or optimizing operations. The study further advises that in order to recognize potential risks and create contingency strategies to manage them, food and beverages manufacturing firms should collaborate closely with their suppliers. By doing so, it is possible to lessen disruptions in the supply chain and guarantee that goods are delivered on schedule and in the desired condition. The study also recommends that food and beverages manufacturing firms should maintain tight relationships with their suppliers in order to gain a better grasp of their strengths and shortcomings. This can encourage greater cooperation and point out areas that need development.

5.4.3 Customer Integration

The study further recommends that managers of food and beverage manufacturing firms should build procedures and policies that link to a superior understanding of the customer in order to meet their expectations. This will result in improved market visibility, more accurate and timely projections, and the capacity to predict and respond to consumer requirements with greater responsiveness as well as versatility. Moreover, developing and implementing such procedures does, in fact, enhance turnover by increasing sales as well as customer loyalty. Consequently, food and beverage manufacturing firms should enhance their customer integration to boost their competitive advantage. The report advises food and beverage manufacturing businesses to form a cross-functional team with representatives from various departments or teams. This will guarantee that all viewpoints are taken into account while finding and fixing complex customer complaints. The study also recommends that businesses create standardized problem-solving processes that encourage teamwork and offer a precise framework for recognizing and resolving complicated problems. All staff members should be informed of these protocols, which should also be periodically updated.

5.4.4 Technology Integration

A system for the management of knowledge should be purchased by food and beverage production companies, according to the report, in order to standardize and oversee the sharing of knowledge amongst cross-functional departments. Additionally, in order to increase communication with logistics partners and cut down on supply chain delays, these companies should also provide crucial information on load preparation, freight invoicing, optimum routes, and tender activities. Additionally, food and beverage production companies ought to standardize their channels of communication in order to streamline communication among employees, with collaborators, and with other parties. Finally, despite the fact that the majority of food and beverage manufacturing businesses employ warehouse management systems, there are still gaps in communication and knowledge-sharing standards. These companies should upgrade their warehouse management systems to incorporate real-time sharing of data platforms that make it easier for departments to communicate and share information.

5.4.5 Supply Chain Adaptability

According to the study, food and beverages manufacturing firms 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 manufacturing firms need also invest in the tools and capabilities necessary to do so. The study also suggests that the food and beverages manufacturing firms 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 manufacturing firms should adopt mechanisms for minimizing the number of days required to accomplish such deliveries if demand for deliveries rises. Additionally, the food and beverages manufacturing firms 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.

5.4.6 Competitive Advantage

This study suggests carefully examining operational expenditures of the food and beverages manufacturing firms. These firms should evaluate their operating expenses and pinpoint areas where expenses might be cut without sacrificing quality or safety. This can entail reassessing suppliers, striking better terms, or improving production procedures. The research also suggests strengthening quality control procedures of the food and beverages manufacturing firms. To make sure that their products adhere to industry standards and are suitable for consumption, the food and beverages manufacturing firms should put strong quality control methods in place. This could entail making investments in quality assurance tools, hiring more staff for quality control, or enhancing employee training initiatives.

5.4.5 Managerial Recommendations

The study also recommends the implementation of the facets of supply chain integration in the order of functional integration [marketing integration, procurement integration, distribution & warehousing integration, and production integration]; supplier integration [supplier relationship management, vendor managed inventory, supplier development and early supplier involvement]; customer integration [customer relationship management, early customer involvement, integrated problem solving, and complaint management]; and technology integration [advanced planning systems, data sharing systems, automatic identification technology, and transaction processing systems]; plus the moderator supply chain adaptability [downside supply chain adaptability, and upside supply chain adaptability]; to the food and beverage manufacturing firm in Kenya, which may not have implemented fully.

5.4.6 Policy Recommendations

Finally, the study recommends that the food and beverage industry regulators devise policies that would allow food and beverage manufacturers to integrate supply chains and thus help avoid losses that impact the efficiency of these businesses and eventually the economy as a whole. The study suggests that the government takes a more systematic approach to ensuring the growth and development of supply chain integration in Kenyan food and beverage manufacturing firms in order to maintain a competitive edge with the support of supply chain adaptability.

5.4.7 Contribution to New Knowledge

The purpose of this study was to determine whether or not there is a connection between the integration of supply chains and the degree to which food and beverage manufacturing companies in Kenya have a competitive advantage. This is due to the fact that the integration of supply chains plays a significant role in increasing the competitive advantage of a firm. When looking at the four different dimensions of functional integration, supplier integration, customer integration, and technological integration, there was a significant indication that both together have a significant effect on the company's level of competitiveness. According to the most recent studies in this field of study, the subject matter of supply chain integration encompasses a number of different facets.

The vast majority of available research points in the direction of a connection between SCI and performance. In addition, the research made an effort to operationalize the previously indicated topology of supply chain integration and competitive advantage within the perspective of an emerging or developing country. In addition to this, the study pointed researchers in new avenues for further research on supply chain integration for developing nations. Not only did this study give fresh insights on this subject matter for developing or emerging countries, however, it also contributed to knowledge on the moderation of SCI and competitive edge by supply chain adaptability, and it is a field in which there is scarce previous research. This is because the study focused on a developing country, Kenya.

5.4.8 Theoretical Implications

This study contributes to the advancement of supply chain integration (SCI) literature by examining the extent to which a manufacturer collaborates strategically with its supply chain partners and collaboratively manages intra- and inter-organizational processes in order to achieve effective and efficient flows of goods and services, knowledge, money, and decisions in order to provide maximum value to the consumer and thus increase competitiveness. Prior research on the association between SCI and competitiveness is inconsistent, and relatively few studies have focused on competitiveness. This study's theoretical contribution would be that it would improve overall knowledge of the relationship between supply chain integration and the competitive advantage in the domain of manufacturing enterprises. The link between supply chain integration adoption and competitive advantage has long been a subject matter that supply chain management scholars have endeavoured to describe.

The research intends to throw new light on supply chain management studies by exploring this link via the perspective of supply chain adaptability. The ideas proposed and evaluated in this study will serve as a foundation for the development of theory in supply chain integration and enhanced competitive advantage. The utilization of supply chain integration for company competitiveness is seen to be a highly significant but underresearched issue in Kenya. This is due to the sluggish implementation of SCI among Kenyan enterprises. The research [study] extends investigations on SCI-stimulated competitiveness with the intervention of supply chain adaptability in a single production [manufacturing] subsector context to multiple production [manufacturing] subsector contexts by utilizing the correlational and moderating techniques to model and develop a framework for SCI integration adoption as well as implementation in food and beverage manufacturing supply chains.

5.5 Areas of Further Research

Although the findings of the study bring us closer to the reality of supply chain integration, supply chain adaptability, and the competitive advantage of food and beverage manufacturing firms in Kenya, the complexity of their implementation remains ambiguous. The study narrowed to a literature review exclusively suggesting functional integration, supplier integration, customer integration, and technology integration, plus the constructs and theories supporting these variables. As a result, empirical research that essentially validates the complete integration of a supply chain goes beyond the reach of each of the four constructs defined in the study. For this reason, there is a need for a deeper dissection to help obtain more information to help comprehend the rationale of supply chain integration facets beyond the four constructs reviewed in the literature, including relationship integration, measurement integration, material integration, and service integration.

Undoubtedly, the study provides considerable information and patterns of desirable expectations of food and beverage manufacturing firms in their quest to enhance their competitive advantage. Whilst supply chain adaptability clearly represents an important way to contribute to the relationship between supply chain integration and the competitive advantage of food and beverage manufacturing firms, there are multiple moderators of this relationship that can be explored. These moderators include value stream mapping, supply chain dynamic capabilities, supply chain ambidexterity, and supply chain complexity. Moreover, empirical research needs to be conducted to establish the effect of supply chain integration on the competitive advantage of other sub-sectors of manufacturing in the economy, including building, mining, and construction, leather and footwear, metal and allied industries, motor vehicles and accessories, paper and board, pharmaceutical and medical equipment, plastic and rubber, textiles and apparel, timber, wood, and furniture subsectors. The research's cross-sectional design made it challenging to identify cause and effect connections or track changes over time. As a result, future studies can be carried out utilizing a longitudinal approach in order to identify cause-and-effect linkages and track changes over time. To determine the competitive advantage of the participating companies over competitors in the subsector of food and beverage producers, future research should take into account a comparative study.

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APPENDICES

Appendix I: Letter of Introduction

Conrad Ochego Mogaka

24th November 2020

Dear Respondent,

RE: DATA COLLECTION

I am a Ph.D. candidate at Jomo Kenyatta University of Agriculture and Technology, pursuing supply chain management. ***"Supply Chain Integration and the Competitive Advantage of Food and Beverage Manufacturing Firms in Kenya,"*** is the title of my research.

Your firm has been nominated to partake in this study. Please spare some time and fill the attached research questionnaire appropriately to support the study. The data acquired will be preserved with maximum confidentiality. For any queries, you can reach me directly. Thank you for your readiness to participate in this study and your support in advance.

Yours Faithfully,

Conrad Ochego Mogaka

Appendix II: Research Questionnaire

PART A: DEMOGRAPHIC INFORMATION

1. What is the name of your company?

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2. How long have you worked for your company?

0 - 3 years	[ ]
4 - 8 years	[ ]
9 - 13 years	[ ]
Over 13 years	[ ]

3. Kindly indicate your management level in your company.

Non-Management	[ ]
Subordinate Management	[ ]
Intermediate Management	[ ]
Senior (Top) Management	[ ]

4. Kindly indicate the academic level you have attained.

PhD	[ ]
Masters	[ ]
Degree	[ ]
Diploma	[ ]

5. Please indicate the department in which you work in your company.

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PART B: FUNCTIONAL INTEGRATION

6. Using the five-point Likert scale below, indicate the extent to which you agree with the effect of functional integration on the competitive advantage of food and beverage manufacturing firms in Kenya. 5= [SA] Strongly Agree, 4= [A] Agree, 3= [N] Neutral, 2= [D] Disagree, 1= [SD] Strongly Disagree) Please tick [✓] in the appropriate box.

	Statements	**SA**	**A**	**N**	**D**	**SD**
FI a	Our firm increased involvement of professionals in procurement joint decision making.					
FI b	Procurement integration enabled our firm to reduce the ordering cycle time.					
FI c	Our firm reduced data asymmetries thus providing the firm with optimal value.					
FI d	Our firm improved the level of coordination across organizational processes and activities.					
FI e	Our firm prevented unforeseen problems and streamlined communication with stakeholders.					
FI f	Our firm's distribution and warehousing operations are centrally planned.					
FI g	Our firm's distribution and warehousing activities are guided by the layout design and flow of operations.					
FI h	Our firm's distribution and warehousing network is designed to allow for fast pick-to-ship cycle times.					
FI i	Marketing integration enhances faster penetration of new products to the market.					
FI j	Our firm build rapport with customers and improved our firm's brand visibility.					

7. Kindly indicate the other forms of functional in your firm.

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PART C: SUPPLIER INTEGRATION

8. Using the five-point Likert scale below, indicate the extent to which you agree with the effect of supplier integration on the competitive advantage of food and beverage manufacturing firms in Kenya. 5= [SA] Strongly Agree, 4= [A] Agree, 3= [N] Neutral, 2= [D] Disagree, 1= [SD] Strongly Disagree) Please tick [✓] in the appropriate box.

	Statements	**SA**	**A**	**N**	**D**	**SD**
SI a	Our firm's suppliers know and understand about our manufacturing needs.					
SI b	Our firm's enhanced resource deployment, reduced supply instability, as well as boosted consumer value					
SI c	Our firm minimized design and production costs plus reduced time to market.					
SI d	Our firm eliminated stock shortages plus the high distribution costs of delivering expedited orders.					
SI e	Our firm reduced wastage, non-value adding factors and obsolete stock.					
SI f	Our firm merged internal core competencies with externally available capabilities and technologies.					
SI g	Our firm has the advantage of low business risks.					
SI h	Our firm mapped key supplier capabilities, identified their deficiencies and addressed them.					
SI i	Our firm made significant improvements in quality and on-time delivery.					

9. Kindly indicate the other forms of supplier integration utilized in your firm.

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PART D: CUSTOMER INTEGRATION

10. Using the five-point Likert scale below, indicate the extent to which you agree with the effect of customer integration on the competitive advantage of food and beverage manufacturing firms in Kenya. (5= [SA] Strongly Agree, 4= [A] Agree, 3= [N] Neutral, 2= [D] Disagree, 1= [SD] Strongly Disagree) Please tick [✓] in the appropriate box.

	Statements	**SA**	**A**	**N**	**D**	**SD**
CI a	The number of customers refereed to our products has increased by at least 50% in the last three years.					
CI b	Our firm kept consumers satisfied by supplying a sensitive team of sales and support professionals.					
CI c	Our firm is more responsive to dynamic customer needs.					
CI d	Our firm developed new products fitting consumer preferences.					
CI e	Our firm developed routines for problem solving that allow for joint efforts.					
CI f	Our firm improved on customer analysis and segmentation.					
CI g	Our firm tracked customer's activities and managed their needs.					
CI h	The number of complaints by customers has reduced by at least 70% in the last three years.					
CI i	Our firm has an efficient way to keep track of an issue raised by consumers over time.					

11. Kindly indicate the number of customer complaints registered by the company and solved of managed in the following years.

Year	**Number of complaints registered**	**Number of complaints solved**
2020		
2019		
2018		
2017		

12. Kindly indicate the other forms of customer integration in your firm.

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PART E: TECHNOLOGY INTEGRATION

13. Using the five-point Likert scale below, indicate the extent to which you agree with the effect of technology integration on the competitive advantage of food and beverage manufacturing firms in Kenya. 5= [SA] Strongly Agree, 4= [A] Agree, 3= [N] Neutral, 2= [D] Disagree, 1= [SD] Strongly Disagree) Please tick [✓] in the appropriate box.

	Statements	**SA**	**A**	**N**	**D**	**SD**
TI a	Our firm tracked materials change from production to end-user supply chain and monitoring packages.					
TI b	Our firm accounted for goods in transit easily and collect data about them.					
TI c	Our firm identified precisely where commodities are at all times.					
TI d	Our firm standardized and managed the exchange of knowledge within of cross-functional departments.					
TI e	Our firm improved the accuracy of demand forecasting to ensure inventory cost is minimized.					
TI f	Our firm reduced the bottlenecks between internal processes and external suppliers.					
TI g	Our firm availed key details on load preparation, freight invoicing, optimized routes, & tender actions.					
TI h	Our firm utilizes warehouse management systems to process, handle and store inventory.					
TI i	Our firm ensured transactions are performed between partners in real time.					
TI j	We streamlined all modes of interaction plus communication among our firm and partners.					

14. Kindly indicate the other forms of technology integration utilized in your firm.

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PART F: SUPPLY CHAIN ADPATABILITY

15. Using the five-point Likert scale below, indicate the extent to which you agree with the moderating effect of supply chain adaptability on the relationship between supply chain integration and competitive advantage of food and beverage manufacturing firms in Kenya. 5= [SA] Strongly Agree, 4= [A] Agree, 3= [N] Neutral, 2= [D] Disagree, 1= [SD] Strongly Disagree) Please tick [✓] in the appropriate box.

	Statements	**SA**	**A**	**N**	**D**	**SD**
SCA a	Our firm reduced the quantity of days to complete an unforeseen sustainable percentage increase in quantities delivered.					
SCA b	Our firm utilizes tools and capabilities to quickly identify changes in demand.					
SCA c	Our firm has a contingency plan of dealing with variable demand and supply chain efficiency.					
SCA d	Our firm has a flexible organizational structure and work support processes.					
SCA e	Our firm developed capacity to change vehicular distribution lines (trucks).					
SCA f	Our firm promotes real time information sharing throughout the supply chain increasing supply chain adaptability.					
SCA g	Our firm cultivates a high degree of willingness for all key members of the supply chain to link their information systems.					

16. We utilize supply chain adaptability to do the following in amplifying supply chain integration to enhance the competitive advantage of our firm. Tick (√) all that apply. (SCA viii)

Sourcing Adaptability [ ]
Supply Adaptability [ ]
Transshipment Adaptability [ ]
Machine Adaptability [ ]
Product Adaptability [ ]
Volume Adaptability [ ]
Labour Adaptability [ ]
Delivery Adaptability [ ]
Distribution Adaptability [ ]
Process Adaptability [ ]
System Adaptability [ ]
Market Adaptability [ ]
Logistical Adaptability [ ]
Organizational Adaptability [ ]

PART G: COMPETITIVE ADVANTAGE OF FOOD AND BEVERAGE MANUFACTURING FIRMS

17. Using the five-point Likert scale below, state the extent to which you agree with these statements in relation to competitive advantage of food and beverage manufacturing firms in Kenya. 5= [SA] Strongly Agree, 4= [A] Agree, 3= [N] Neutral, 2= [D] Disagree, 1= [SD] Strongly Disagree) Please tick [✓] in the appropriate box.

	Statements	**SA**	**A**	**N**	**D**	**SD**
CA a	We produce goods of higher quality for a lower cost compared to our rivals in the industry.					
CA b	We give our customers competitive prices attributable to our cost-cutting strategies.					
CA c	We stand out from rival companies in the sector because of our unique product designs and packaging.					
CA d	Our innovative flavors and ingredients distinguish us from other comparable products in the marketplace.					
CA e	Our products are highly differentiated from those of our competitors.					
CA f	We value agility and versatility, and this gives us an edge over other firms in the industry.					
CA g	We frequently collect feedback from our customers in order to improve our service and product offerings.					
CA h	Our firm responds to fluctuations in demand from consumers rapidly.					
CA i	Our brand is widely recognized and preferred by customers in the market.					
CA j	Our competitive pricing strategies have allowed us to gain market share from our competitors.					
CA k	Our marketing strategies have helped us gain and maintain a strong market position.					

18. Please suggest other ways your firm rates its competitive advantage.

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19. Kindly indicate percentage (%) you associate with growth of market due to supply chain integration for the last four years in your food and beverage manufacturing firm.

Year	**Percentage Growth in Market Share**				
%	**< 10 %**	**11-20 %**	**21-30 %**	**31-40 %**	**> 40 %**
2016/2017					
2017/2018					
2018/2019					
2019/2020					

20. Kindly indicate the total approximate operational costs incurred by the company in the following financial years.

Financial Year	**Total Approximate Operational Costs (Ksh.)**
2019/2020	
2018/2019	
2017/2018	
2016/2017	

Thank You.

Appendix III: List of Food and Beverage Manufacturing Firms in Kenya

1. Afribon (K) Limited
2. African Coffee Roasters
3. Agri Pro-Pak Ltd
4. Almasi Bottlers Limited
5. Alpha fine foods
6. Alpine Coolers Ltd
7. Aquamist Ltd
8. Arkay Industries Limited
9. Bakers Corner Ltd
10. Bdelo LTD.
11. Belfast Millers Ltd
12. Bidco Africa
13. Broadway Bakery Ltd
14. Brookside Dairy Ltd
15. Butali Sugar Mills
16. Buuri Millers Enterprises
17. Capwell Industries Ltd
18. Centrofood Industries Ltd
19. Chai Trading Company Limited
20. Coastal Bottlers Limited
21. Coca-Cola Juices (K) Ltd
22. Cornbelt Flour Mill Limited
23. Crofts Ltd.
24. Deylin Ultimate springs limited
25. Dormans Coffee
26. East African Seed Co. Ltd
27. Eldoret Grains Ltd
28. Equator Bottlers Ltd
29. Excel Chemicals Ltd
30. Farmer's Choice Co. LTD
31. Foods By Likii
32. Fresha
33. Gold Crown foods
34. Halisi Maize Mills Limited
35. Highlands Drinks Limited
36. Isinya Feeds
37. James Finlays Kenya Limited
38. Jungle nuts EPZ
39. Kamili Packers Ltd
40. Kapa Oil Refineries Ltd
41. Kenya Highland Seed Co. Ltd
42. Kenya Sweets Ltd

43. Keroche Industries Ltd
44. Ketepa tea
45. Kevian Kenya Ltd
46. Kibos Dairy & Farm Produce
47. Kenya Wine Agencies Limited
48. Kilimanjaro Biscuits Limited
49. Kinangop Dairy Limited
50. Kirinyaga Flour Mills Ltd
51. Kitui Flour Mills
52. L.A.B International Kenya ltd
53. Mace Foods
54. Mafuko Industries Ltd
55. Manji Food Industries Limited
56. Menengai Oil Refineries Limited
57. Mombasa Maize Millers Ltd
58. Morani LTD
59. Mwanga Millers
60. Mzuri Sweets Limited
61. Nairobi Bottlers Ltd
62. New Kenya Co-Operative Creameries Ltd
63. Nicey Maize Millers Ltd
64. Njoro Canning Factory (Kenya) Ltd
65. Norda Industries Ltd
66. Ochard juice Ltd
67. Olivado EPZ Limited
68. Patco Industries Ltd
69. Pembe Flour Mills Ltd
70. Premier Flour Mills Ltd
71. Proctor and Allan EA ltd
72. Pwani Oil Products Ltd
73. Savannah Brands Co. Ltd
74. Scrumptious Eats Ltd
75. Sky Foods Limited
76. Sunbake Enterprises Ltd
77. Top Food (EA) Ltd
78. Trufoods Ltd
79. Unga Group Ltd
80. United Millers
81. Upfield Kenya
82. Victory Farms
83. Vinepack Ltd
84. West Kenya Sugar Company Ltd

Source: KAM, 2020

Appendix IV: Research Permit

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Ref No: **910872** Date of Issue: **02/March/2021**

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