EFFECTS OF SUPPLY CHAIN MANAGEMENT PRACTICES ON COMPETITIVE ADVANTAGE AND ORGANIZATIONAL PERFORMANCE OF THE DAIRY PROCESSING FIRMS IN KENYA

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DECLARATION

I declare that this thesis is my original work and has not been presented for the award of a degree in any other university or any other award.

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I commit this work to the God Almighty, the Creator of Heaven and earth; the Fountain of Knowledge and Widom

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LIST OF ABBREVIATIONS AND ACRONYMS

AMOS	Analysis of moment structure
AVE	Average variance extracted
CA	Competitive advantage
CFA	Confirmatory factor analysis
CFI	Comparative Fit Index
CI	Confidence interval
CRM	Customer relationship management
EFA	Exploratory factor analysis
FAO	Food and agricultural organisation
GDP	Gross domestic product
GoF	Goodness of fit
GoK	Government of Kenya
ICT	Information and communication technology
KAAA	Kenya agribusiness & agroindustry alliance
KDB	Kenya dairy board
KIPPRA	Kenya institute of public policy analysis
KNBS	Kenya national bureau of statistics
LISREL	Linear structural relation
LM	Logistics management
MLR	Multiple regression analysis
MoALF	Ministry of agriculture, livestock and fisheries
NFI	Normed fit index
OP	Organisational performance
PLS	Partial least squares
PMS	Performance management systems
RBV	Resource-based view
RMSEA	Root Mean Square Error of Approximation
SC	Supply chain
SCM	Supply chain management
SD	Supplier development
SEM	Structural equation modeling
SMEs	Small and medium enterprises
SPSS	Statistical package for social scientists
SRMR	Standardized Root Mean Square Residual
SS	Strategic sourcing
TLI	Tucker-Lewis index
USAID	United states agency for International Development
VAF	Variance accounted for

ABSTRACT

Under capacity, utilization has profound effects on the efficiency, flexibility and responsiveness of the dairy processing firms in Kenya. Further, under capacity utilization has negatively impacted the competitiveness (cost/price, quality and delivery dependability) of processed dairy products from the Kenyan processing firms in local and regional markets. There is a need to promote globally competitive and high performing dairy processing firms in Kenya. Thus, this study aimed to analyse the effects of SCM practices (supplier development, logistics management practices, CRM, ICT, and strategic sourcing) on the competitive advantage (CA) (quality, cost, delivery dependability) and OP (efficiency, flexibility and responsiveness) in the dairy processing firms in Kenya. Specifically, the study analysed the effects of SCM practices on the organisational performance in the dairy processing firms: Examine the effects of SCM practices on the CA in the dairy processing firms in Kenya: Determine the effects of CA on the organisational performance in Kenya: Evaluate the mediation role of CA in the relationship between organisational performance. The study's conceptual framework was hinged on the resource-based view (RBV) theory of a firm that links SCM practices with a high competitive advantage and enhanced organisational performance. Consequently, this study conceptualized supply chain management (SCM) practices (Supplier development, strategic sourcing, logistics management, ICT and CRM) as valuable resources that can drive competitive advantage and organisational performance of the dairy processing firms in Kenya. Structural equation modeling (SEM) techniques were applied to examine the relationships among the study variables. Additionally, multiple linear regression techniques were used to establish individual independent variables' contribution to dependent variables. A census survey was undertaken targeting 150 milk processing firms licensed by the Kenya Bureau of Standards (KEBS). The survey instruments' validity and reliability were examined through a pilot study and confirmatory factor analysis (CFA). Data reduction and the constructs' underlying structure were examined with exploratory factor analysis (EFA). Statistical Package for Social Sciences (SPSS9) version 20 and analysis of moment structure (AMOS) version 25 software were used for data analysis. The results revealed that SCM practices (supplier development practices, logistics management practices, CRM practices, ICT practices and strategic sourcing practices) significantly predicted both organisational performance $B = 0.96$, 95% CI [0.95, 0.98], and competitive advantage B = 0.95, 95% CI [0.93, 0.97]. Additionally, competitive advantage significantly predicted organizational performance, $B = 0.98$, 95% CI [0.97, 0.99]. Moreover, the results confirmed that competitive advantage has a mediating role in the relationship between SCM practices and organisational performance. In conclusion, SCM practices first generate a competitive advantage and, in turn, the competitive advantage enhance organizational performance. Based on these results, managers should consider adopting effective SCM practices to secure competitive advantage and enhance their companies' organisational performance. Moreover, policies should promote the adoption of SCM practices by the processing firms. Academically, this study enriches the literature in SCM practices and provides a conceptual framework for understanding the relationship between SCM practices, CA and organisational performance in Kenya's dairy processing firms.

CHAPTER ONE:INTRODUCTION

1.1 Introduction

This study aimed to explore the effects of SCM practices on the competitive advantage and organisational performance of Kenya's dairy processing firms. Chapter one covers the background to the study, statement of the problem, research objectives and hypothesis, and justification. Moreover, the chapter covers the theoretical and conceptual framework, operational definition of variables, scope and limitations of the study, and the entire organisation of the thesis.

1.2 Background

Globalisation and liberalisation of trade and rising domestic demand for processed foods provide new market opportunities for agri-food enterprises, particularly in developing countries. However, the situation has exposed domestic agri-food firms in developing countries to heightened competition in domestic and international markets (Silva, Baker, Shepherd, Jenane, & Miranda-da-Cruz, 2009). Simultaneously, the focus of the competition is moving from a firm against firm to competition among supply chains (SC). Hence, food processing firms are continuously engaged in searching for new ways to "achieve competitive advantage and enhance their organisational performance" Gorane & Kant, (2015), relative to the competition to survive in the new market environment.

Proponents of the resource-based view (RBV) asserts that "resources owned and controlled by a firm are the fundamental sources and drivers of competitive advantage and superior performance" (Rose, Abdullah, & Ismad 2010). Thus, "organisations must seek to comprehend the relationship between their resources and capabilities and their

likely effects on their firm's competitive advantage and organisational performance" (Ismail, Rose, Abdullah, & Uli, 2010).

Organisations must construct effective SCM practices (SCM practices) to acquire competitive advantage and gain organisational performance sustainably (Sundram, Ibrahim, & Govindaraju, 2011). The SCM practices' strategic nature explains the twofold purpose of SCM, which is to enhance an individual organisation's performance and improve the entire supply chain's performance (Govindaraju, Sundram, & Muhammad, 2016).

Past studies show that effective SCM can attain competitive advantage (CA) and enhance organisational performance (Tahoon, Bahi, Elsehily, & Nasreldeen, 2017). However, the literature shows mixed results since the "linkage between SCM practices and organisational performance could be, on the one hand, direct or indirect, and on the other hand, sequential, non-sequential, intra-dependent or reverse" (Okongwu, Brulhart, & Moncef, 2015). Hence, business organisations need to comprehend the potential role of SCM practices on CA and OP (Sundram *et al*., 2011).

1.2.1 SCM Practices

SCM practices are a "set of approaches utilised to integrate suppliers, manufacturers, logistics effectively, and customers to improve its long-term performance and the supply chain" (Veera Pandiyan Kaliani Sundram, Ibrahim, & Govindaraju, 2011; S. Li, Ragu-Nathan, Ragu-Natahn, & Subba Rao, 2006). Accordingly, these practices link downstream and upstream activities of a focal firm such as production, processing, distribution, and retailing to gain the competitive advantage required to survive global

competition (Chojar, 2009). Therefore, SCM "practices are practices designed to manage and coordinate the entire supply chain's activities from the origin of raw materials to the end customer in a seamlessly integrated manner" (Abebe, Beyecha, & Gemeda, 2020).

Although the literature presents SCM practices as a multidimensional construct from various perspectives, it lacks consensus on its scope (Tatoglu *et al.*, 2016). Li *et al*. (2006) identified six SCM practices components: "strategic supplier partnership, customer relationship, information sharing, information quality, internal lean practices, and postponement". However, these components are considered generic SCM practices, especially in the manufacturing industry. Therefore, Kumar (2016) identified the following practices relevant to the dairy supply chain; "Information and Communication Technology Practices, Supplier Relationship Practices, Supply Chain Manufacturing Practices, Inventory management system, Warehousing Management System, Transportation Management System, Customer Relationship Management (CRM)". The current study adopts CRM practices, ICT practice, Logistics management (LM) practices, Strategic sourcing (SS) practices, and Supplier Development (SD) practices. These SCM practices link upstream and downstream dairy supply chain activities with the dairy processing firm's internal operations.

1.2.2 Competitive Advantage

Competitive advantage results from crucial managerial decisions enabling an organisation to create a defensive position and distinguish itself from the competition (Banerjee & Mishra 2015). Thus, CA comprises distinctive attributes such as "lower prices, higher quality, higher reliability, and shorter delivery times" Rakhman,

Surachman, Rahayu, & Sumiati, (2016) that distinguish an organisation from its competitors in the marketplace. Previous studies indicate CA's various dimensions, such as "price, quality, delivery, product innovation, and time to market" (Sundram et al., 2011). Moreover, Anatan (2014) conceptualised CA as “price, quality, delivery, product innovation, and time to market”. Nik, Masdek, & Othman (2014) considered “premium pricing, value-to-customer quality, dependable delivery, and product innovation” as measures of CA. This study conceptualised CA as a multidimensional construct comprising price, quality, and dependability.

1.2.3 Organisational Performance

According to Singh, Sandhu, Metri, & Kaur (2010), SCM's main focus is operational cost, response time, customer services, profitability or margins, improvement in service levels, and reduced costs to improve OP. However, the literature shows a lack of agreement on a criterial for measuring OP due to the construct's complexity (Wong & Wong 2011). According to Beamon (1999), a “performance measurement system (PMS) consisting of a single measure is inadequate and non-inclusive, but it ignores the interactions among important supply chain characteristics and critical aspects of organisational strategic goals”.

The organisational performance measures are designed from different perspectives such as “operational, financial, and market performance”(Beamon, 1999). Dikshit & Trivedi (2012) conceptualised “demand management, Customer Satisfaction, and Stakeholder Satisfaction” as organisational performance measures. Arham (2014) highlighted five performance measures: “accounting measures, operational measures, market-based

measures, survival measures, and economic value measures". Beamon (1999) presented a framework for manufacturing supply chains and classified PMS into three types; "resources (R), output (O), and flexibility (F)" for better organisational performance.

In recognition of the unique characteristics of agricultural food chains, Aramyan (2007) developed a PMS conceptual framework consisting of the following measures: "efficiency, flexibility, responsiveness, and food quality". As a result, this study adopts efficiency, responsiveness, and flexibility to measure organisational performance. Although this study focuses on dairy processing firms, these measures provide a "common set of performance evaluation across all dairy supply chain members (Aramyan, Oude Lansink, Van der Vorst, & Van Kooten, 2007).

According to Aramyan, Lansink, & Kooten (2005), flexibility measures how SC responds to a "changing environment and extraordinary customer requests such as volume and delivery flexibility, reduced number of backorders, and lost sales". On the other hand, efficiency includes "production costs, profit, return on investment, and inventory," measuring how well resources are utilised in an organisation (Aramyan *et al.*, 2007). Responsiveness measures how quickly the rate at which an organisation meets customer requests in terms of lead-time, "fill rate, product lateness, customer response time, shipping errors, and customer complaints" (Qrunfleh & Tarafdar, 2013).

1.2.4 Performance of dairy processing firms in Kenya

The formal milk sector handles 30% of the marketed milk in Kenya, which is processed into various milk products such as "pasteurized milk, UHT, yoghurt, cultured milk, cream, butter, ghee, ice cream, and milk powder" (KDB, 2016). According to

government records, the "total milk processing capacity is approximately 3.75 million litres per day, with only 46% of this capacity being utilized" (KDB, 2019). Additionally, only about 10% of milk reaching the formal market is processed to various dairy products (KNBS, 2019).

The market share for processed milk and other dairy products is highly concentrated, with 85 per cent being controlled by the five large processors (USAID, 2015). These dominating five large-scale processors are "Brookside Dairy Ltd (38%), New Kenya Cooperative Creameries (23%), Githunguri Dairy Farmers Cooperative Society (14%), Sameer (4%) and Buzeki Dairy (4%)"(KIPPRA, 2018).

According to EADD (2008), raw milk accounts for over 50% of "ex-factory price", making it the most significant cost category in dairy processing firms. Thus, the availability of quality raw milk hurts dairy processing firms' efficiency and responsiveness. The availability of raw milk for dairy processing firms is exacerbated by the stiff competition from the informal market, estimated to control 80% of milk sold in Kenya (GoK, 2013b).

Moreover, other challenges facing dairy processing firms in Kenya include "seasonal fluctuations in raw milk supply, and high milk production and processing costs, among others" (Nassiuma & Nyoike, 2013). These challenges constrain the competitiveness and organisational performance of the dairy processing firms in Kenya, hampering their survival in the market of processed milk and other dairy products (Rademaker, Bebe, Lee, Kilelu, & Tonui, 2016). The seasonality in milk production affects the dairy processors' efficiency by lowering their throughput and capacity utilisation (MoALF,

2018). Besides, delays in delivering milk from the farm to processing plants affect the milk processing firms' responsiveness to their customers' needs, leading to substantial financial losses and wastage (USAID, 2015).

Additionally, variation in milk quality increases downstream processing and marketing costs, resulting in loss of competitiveness of processed milk and dairy products (USAID, 2015). The quality of milk supplied is important since it "affects milk processing, shelf life and overall profitability" (Njiru, 2018). According to MoALF (2018), milk marketed through formal and informal channels "does not meet the national quality standards set by the Kenya Dairy Board". This calls for the need to build competitive and high performing dairy processing firms to seize the growing market for high-quality milk and assorted dairy products locally and globally (Rademaker *et al*., 2016).

1.3 Statement of the Problem

The demand for processed milk and dairy products in Kenya is expected to escalate at 15% per annum for the next ten years (KAAA, 2019). However, dairy processing firms in Kenya lack a competitive advantage and have low efficiency, flexibility, and responsiveness to dynamic customer needs. The consumer price of pasteurised milk has always been high compared to imported milk from neighbouring countries, especially Uganda, by as much as 30% (KBD, 2018). Additionally, the processors cannot absorb all the milk available during high production, while their production capacity remains idle when production diminishes during dry spells (KIPPRA, 2018).

As a result, dairy processors could not meet the local demand for processed milk leading to the continued growth in the selling of 'hawked' milk; despite grave consequences to

consumers' health (GoK, 2013a). Simultaneously, the number of active milk processing companies has been declining due to insolvency, mergers and acquisitions as dairy firms strive to survive market turbulence in the industry (Nassiuma & Nyoike, 2013). Thus, there is a need to promote competitive, efficient, flexible and responsive dairy processing firms in Kenya to survive in the current competitive and dynamic market (Nassiuma & Nyoike, 2013).

Adopting effective SCM practices could address the lack of competitiveness and diminishing organisational performance in Kenya's dairy processing firms. However, there is a paucity of empirical literature on the effects of SCM practices on the CA and OP of Kenya's dairy processing firms. Most of the available literature on SCM practices in Kenya focused on non-agri-food supply chains. For instance, a study by Memia (2018) examined the influence of supply chain practices on Kenya's large manufacturing firms' performance. Additionally, Apopa (2018) examined the influence of SCM practices on the performance of government ministries in Kenya using organisational culture as the moderating variable. Barasa (2016) also assessed the role of SCM practices on the performance of Steel Manufacturing companies in Kenya.

There is a need for an empirical study linking SCM practices, competitive advantage and organisational performance of the Kenyan dairy processing firms to bridge this knowledge gap.

1.4 Research Objectives

This study's overall objective was to examine the effects of supply chain management practices' effects on the competitive advantage and organisational performance of the dairy processing firms in Kenya.

1.4.1 Specific Objectives

i. To examine the effects of SCM practices on the organisational performance of the dairy processing firms in Kenya

ii. To assess the effects of SCM practices on the competitive advantage of dairy processing firms in Kenya.

iii. To analyse the effects of competitive advantage on the organisational performance of the dairy processing firms in Kenya

iv. To explore the mediation role of competitive advantage on the relationship between SCM practices and organisational performance of the dairy processing firms in Kenya.

1.5 Research Hypothesis

The above objectives were realized by analysing the following null hypotheses

1) H_0: SCM practices do not significantly affect the organisational performance of dairy processing firms in Kenya.
2) H_0: SCM practices do not significantly affect the competitive advantage of dairy processing firms in Kenya.
3) H_0: Competitive advantage does not significantly affect organisational performance in the dairy processing industry in Kenya

4) H_0: Competitive advantage does not mediate SCM practice's effects on organisational performance in the dairy processing firms in Kenya.

1.6 Justification of the Study

Kenya's dairy industry is inevitably key to "food security, rural development, and industrial transformation" (KIPPRA, 2018). Government reports show that the dairy industry "contributes an estimated 4% of national GDP, 14% of agricultural GDP, and 44% of livestock". Additionally, the industry is a livelihood source to "1.8M smallholder dairy farmers and an estimated 750,000 direct jobs and 500,000 indirect jobs" GDP (KDB, 2019). As such, the dairy processing industry is crucial to the attainment of "Vision 2030" and the "Big Four" agenda of increasing food security and industrialization (KIPPRA, 2018). However, Kenya is yet to realize the dairy processing industry's full potential despite numerous investments to improve its competitiveness and performance. Therefore, the study provides valuable insights and information to practitioners, academicians, and policymakers. The study provides knowledge of the SCM practices that can enhance firms' performance and competitiveness to practitioners. Additionally, this study points at policy intervention areas for CA and OP improvements in the dairy processing firms in Kenya. Moreover, the results enrich the literature of SCM practices applicable to the dairy processing firms in Kenya and provide a conceptual framework showing the linkage between SCM practices, CA and OP.

1.7 Theoretical Framework

Various theories ranging from "industrial organisation, resource-based and resource-dependency theory, competitive strategy, and social-political perspective have offered

insights on SCM" (Dikshit & Trivedi, 2012). The current study hinges on the resource-based view (RBV), which stems from the work of Edith Penrose (1959) and later popularized by Wernerfelt (Rugman & Verbeke, 2002). Proponents of this theory argue that the "fundamental sources and drivers to firms' competitive advantage and superior performance are mainly associated with the attributes of their resources and capabilities, which are valuable and costly-to-copy" (Rose *et al*., 2010). The choice of RBV theory in this study is informed by its ability to link an organisation's resources or capabilities to CA and OP, as illustrated in **Figure 1**.

Figure 1: Theoretical framework

Source: Barney (1991)

Thus, its success mainly lies in its internal tangible and intangible resources, such as resources and capabilities (Hameed, Basheer, Iqbal, Anwar, & Ahmad, 2018). However, these resources must be "valuable, rare, inimitable, and non-substitutable capabilities" to generate a competitive advantage (Narasimhan & Schoenherr, 2012). According to Yew Wong & Karia (2010), resources that are valuable (useful in exploiting opportunities or neutralising threats from the environment) and rare (unique) would attain a CA and enjoy an improved organisational performance in the short term. SCM-related activities and "practices are considered essential resources for improving operational performance" (Chae, Olson, & Sheu, 2014). Nonetheless, mere possession of resources does not

"guarantee competitive advantage; thus, firms must process raw resources to make them useful" (Newbert, 2007). Therefore, capabilities to combine resource allocation can generate a competitive advantage and enhance the efficiency of processing and ensure a steady supply of products from the ultimate consumers in the "right quantity and quality and affordable price" (Nik *et al*., 2014).

According to Raduan, Jegak, Haslinda, & Alimin (2009), "resources and capabilities must be heterogeneous and imperfectly mobile between firms in an industry to generate a competitive advantage and enhance performance". A resource is a tangible or intangible factor of production owned and controlled by an organisation (Barney, Wright, & David J. Ketchen 2001). On the other hand, capabilities are "complex bundles of individual skills, assets, and accumulated knowledge exercised through organisational processes that enable firms to perform a coordinated set of tasks to achieve a particular result" (Olavarrieta & Ellinger, 1997). Therefore, the difference in market performance is an outcome of the unique combination of resources and capabilities (Wu, Yeniyurt, Kim, & Cavusgil, 2006).

The current study conceptualises SD Practice, SS practices, LM practices, CRM practices, and ICT practices as valuable organisational resources and capabilities that will secure competitive advantage and enhance organisational performance. These dimensions of SCM practices will expand the theory of SCM in the dairy industry since they encompass both upstream and downstream supply chain activities.

1.8 Conceptual Framework

This study has one exogenous and two endogenous variables. The SCM practices represent exogenous variables, while CA and OP are the two endogenous variables. As an exogenous variable, SCM practices have a direct relationship with both CA and OP. Besides, CA has a direct relationship with OP. Furthermore, SCM practices have an indirect relationship with organisational performance through competitive advantage. The conceptual framework in **Figure 2** illustrates the relationships between these three variables.

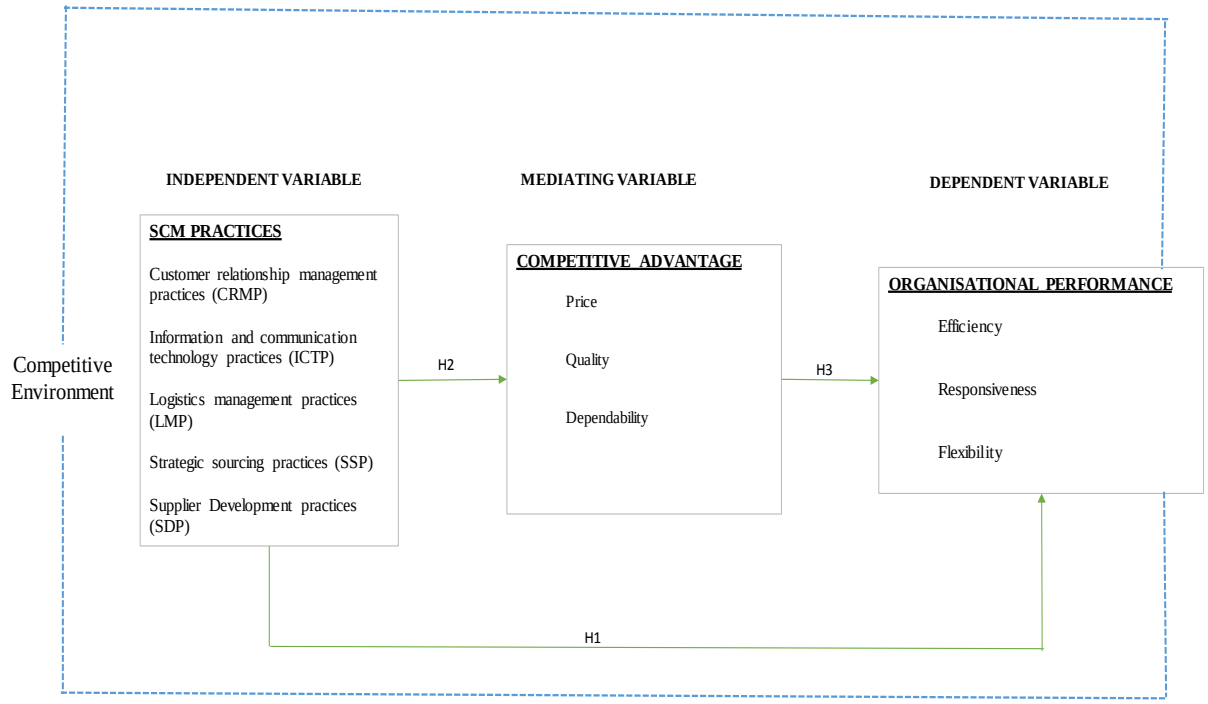

Figure 2: Conceptual Framework

Source: Author

1.8.1 SCM Practices and Organisational Performance

Koh *et al.*, 2007; Li *et al.*, 2006; Sundram *et al.*, 2011) point out that the common goal of SCM practices is the ultimate improvement of organizational performance. According to

Okello & Were (2014), “SCM practices contribute 50% to the profitability and the general OP of a firm”. In other words, SCM practices can potentially influence the efficiency of and organisation by reducing cycle time, lead time and defect rate. Additionally, organisations stand to benefit from SCM practices by increasing their “flexibility and ability to respond to customer needs through effective SCM practices” (Sabry, 2015). Moreover, effective SCM practices enhance organisations “volume flexibility, delivery flexibility, reduction in the number of backorders and lost sales” (Aramyan *et al.*, 2005). Further, SCM practices enhance organisations responsiveness to customer needs by reducing “lead-time, fill rate, product lateness, customer response time, shipping errors, and customer complaints” (Aramyan *et al.*, 2007). Thus, SCM practices contribute to organisational performance in numerous ways resulting in the following hypothesis.

> *H_a1: Supply chain management practices positively affect organisational performance in dairy processing firms in Kenya*.

1.8.2 SCM Practices and Competitive Advantage

Supply chain management practices can potentially increase the overall organisation's competitive position in the market (Li *et al*., 2006). According to Anatan (2014), SCM practices enhance the product's quality and delivery dependability, leading to increased customer satisfaction. Additionally, organisations can enhance their CA through “cost leadership, customer service, and product differentiation” Sundram *et al*., (2011) through SCM practices. Through SCM practices, organisations can achieve high customer satisfaction, sustained “customer loyalty and extend value to their customers” (Nik *et al*.,

2014). Past studies have shown that SCM practices can directly influence CA through price, quality, and dependability leading to the following hypothesis.

H_a2: Supply chain management practices positively affect competitive advantage in dairy processing firms in Kenya.

1.8.3 Competitive Advantages and Organisational Performance

Companies with competitive advantage can compete successfully based on "lower prices, higher quality, and faster delivery times." These inherent capabilities of CA may lead to superior OP (Anatan, 2014). Thus, companies with high competitive advantage can generally provide “lower prices, higher quality, higher reliability, and shorter delivery” than competitors. These abilities can improve overall organisational performance through higher responsiveness, flexibility, efficiency, customer satisfaction and loyalty to increase sales and profits (Rakhman *et al.*, 2016). Besides, CA provides greater opportunities for realising superior performance (Battor & Battor, 2010). Thus, CA can contribute to organisational performance through various means leading to the following hypothesis.

H_a3: Competitive advantage positively affects organisational performance in dairy processing firms in Kenya.

1.8.4 Mediation Effect

Supply chain management practices can impact organisational performance directly or indirectly through a mediating variable. The nature of the linkage between SCM practices and organisational performance could be, on the one hand, direct or indirect (Okongwu *et al*., 2015). Therefore, implementing SCM practices in an organisation opens strategic opportunities for creating competitiveness that promotes organisational performance

(Hatani, Djumilah, & Wirjodirjo, 2013). Therefore, CA mediates the relationship between SCM practices and OP (Hatani, Zain, & Wirjodirjo, 2013). Therefore, the following hypothesis was postulated

H_a4: CA mediates the relationship between SCM practices and organisational performance.

1.9 Operational Definition of Terms

SCM practice — Supply chain management practices are "a set of approaches undertaken by an organisation to effectively manage its supply chains" (Simchi-Levi et al.,2008). This study considers five SCM practices as the independent variables; Supplier development (SD) practices, Customer relationship management (CRM) practices, strategic sourcing practices, ICT practices, and Logistics management practices (LMPs).

SD Practice — Supplier development practices are continuous efforts towards improving supplier performance and capabilities to strengthen buyers competitive advantage and performance (Yegon et al., 2015).

SS practice — Strategic sourcing practices refer to all sourcing strategy activities, including demand identification, supplier selection, contracts negotiations, payment terms, quality analysis and monitoring (Biazzin, 2019).

LM practice — Logistics management covers "inventory management, warehousing, transportation, material handling and storage, and packaging

	practices" that ensure the efficient, effective flow and storage of milk and milk products from production to the end consumer through value creation (Odhiambo *et al.*,2017).
ICT practice	ICT refers" to "all devices, networking components, applications, and systems that allow people and organisations to interact in the digital space".
CRM practice	CRM refers to "all practices used to control and manage customer complaints, create long-term relationships with consumers, and improve consumer satisfaction" (Ghatebi, Ramezani, & Shiraz, 2013).
Competitive advantage	CA is an organisation's ability to create a defensible position against the competition through price, quality, and delivery dependability (Kull *et al.*, 2016).
Organisational Performance	Organisational performance is the business's "ability to achieve short term and long-term goals related to supply chain flexibility, efficiency and responsiveness" (Arham, 2014).
Dairy processing firms	Enterprises involved in sourcing milk, bulking, cooling and processing the milk into various end products.

1.10 Scope of the Study

This study aimed to investigate the structural relationship between SCM practices, CA, and dairy processing firms' OP in Kenya. Consequently, the study adopted RVB theoretical framework to conceptualise SCM practices (SD practice, LM practice, ICT practice, SS practice and SRM practice)as key organisational resources with the inherent

capability to generate competitive advantage and organisational performance. These five SCM practices link the dairy processing firms' internal activities with those of the supply chain's upstream and downstream side. The study conducted a census survey of 150 dairy processing firms licensed to operate in Kenya by the Kenya Bureau of Standards (KEBS). Further, the study introduced CA test its mediational role in the model.

1.11 Limitations of the Study

Although every effort to minimize the limitations of this study was made, a few remained outstanding. First, the entire SCM domain could not be covered in one study due to the complexity of s the SCM concept and interdependency among a network of companies producing and delivering a given product. Therefore, the unit of analysis for this study was dairy processing firms in Kenya and the SCM practices linking them with the upstream and downstream players in the chain. However, these SCM practices (SD practice, LM practice, ICT practice, SS practice and SRM practice) may not be comprehensive.

Secondly, there was a lack of adequate current studies on SCM practices in the dairy supply chain, particularly in Kenya; thus, the researcher mitigated this challenge by comparing similar research in different sectors, both locally and globally, to infer the research findings. Thirdly, the study population constituted large, medium and mini dairy processing firms, which may have different levels of implementation of SCM practices and may affect the entire population's generalization. Lastly, this study collected data through a cross-sectional survey design and missed the opportunity to get the long term effects of SCM practices on CA and organisational performance. Despite these

drawbacks, the study provides valuable insights into how SCM practices affect CA and OP.

1.12 Organization of the Thesis

The thesis is organised into six chapters. Chapter one covers the background to the study, statement of the problem, objectives and hypothesis, justification of the study, theoretical and conceptual framework, operational definition of terms, the scope and limitations of the study. Chapter two outlines a literature review of past studies related to SCM practices, CA and OP and a summary of research gaps. Chapter three presents materials and methods applied to address the research problem beginning with research design, population, sample size and sampling techniques, data collection methods, measurement of variables, and data analysis techniques.

Chapter four presents the results starting with descriptive analyses of the study variables followed by study objectives. Chapter five presents the discussion of the study findings enriched with references to similar work and background need to interpret the results. Chapter six presents conclusions drawn from the outcome of data analysis per the study objective. The conclusions and recommendations are also presented in chapter six, based on the study findings. Finally, a list of references and appendices is provided at the end.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of past studies related to SCM practices variables, namely, SD practice, LM practice, ICT practice, SS practice, and SRM practice used in this study and their relationship with CA and OP. Additionally, the chapter presents an empirical review of previous studies and a summary of research gaps to be addressed by this study.

2.2 Supply Chain Management Practices

According to Govindaraju *et al.*(2016), efficient SC needs practices that can integrate an organisation's internal operations with its upstream and downstream activities. Therefore, these practices should cover intra organisation integration and link them with the dairy supply chain's upstream and downstream activities. Anatan (2014) used "strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement" as measures of SCM practices. Spina, Di Serio, Brito, & Duarte (2015), used "collaboration, demand and supply planning, inventory production and distribution management, and logistics" as measures of SCM practices.

Barasa (2016) conceptualised four SCM practice dimensions: "Green Supply Chain, Customer Relationship Management, Supplier Relationship Management, Outsourcing Practices, and Lean Supply Chain". Additionally, Memia (2018) conceptualised Supply chain collaboration Practice, "Green Supply chain management Practice, Information Sharing Practice, Customer relationship management Practice". Apopa (2018) used "Supplier selection practices, Supply chain policies, Supplier Collaboration Practices, and Risk management practices". Furthermore, Chege (2017) used "supplier relationship

management practices, process management practices, customer relationships management practices, and IT support practices". However, these SCM practices are generic and too general for a dairy supply chain. Therefore, there is a need for specific SCM practice applicable in the dairy processing industry context. Most of the SCM practices are generic, and there is a need for specific practices applicable to the dairy processing supply chain. Additionally, non of the studies addressed SCM practices from the agricultural supply chains in Kenya, particularly dairy processing firms. Consequently, this study focused on "logistics management, supplier development, customer relationship management, information and communication technology, and strategic sourcing" practices and tested their relationship with CA and OP in Kenya's dairy processing firms.

2.2.1 Logistics Management Practice

According to Gitonga (2017), logistics management practices (LMP) are routine procedures carried out by an organisation to advance its logistics' effective management. Logistics management is a supply chain practice aiming at meeting customer requirements through effective planning, implementation, and controlling flow and the storage of goods. Several studies have reported that various aspects of LM practice significantly affect competitive advantage and overall organisational performance. Past studies have used different LM practices and examined their effects on competitive advantage and organisational performance. For instance, Mukolwe & Wanyoike (2015) used information management, warehousing management, transport management, and physical distribution practices to examine their impact on Mumias Sugar Company Limited's operational efficiency.

Similarly, Mwangangi (2016) conceptualised LM practices as "transport management, inventory management, order process management and information flow management". Gitonga (2017) also conceptualized LM practice as "order process, inventory management, transportation, information flow, warehousing, and packaging". Furthermore, transport management, warehouse management, and information management are indicators of LM practices (Ingabo (2019). Effective logistics management practices, such as transport management and material handling, can significantly improve a firm's OP (Odhiambo *et al.,* 2017). Therefore, this study considers transport management, material handling, warehousing management, packaging, inventory management, order processing, physical distribution and information flow management.

2.2.2 Customer Relationship Management Practice

Customer relationship management, conceptualised from a process, strategy, philosophy, capability, and technology perspective, is a critical element of SCM (Paul, 2019). The practice of CRM is. However, the general agreement among different author is to conceptualize CRM from a macro process perspective acknowledging the process features of "relationship development and maintenance" (Ata & Toker, 2012). Thus, CRM encompasses the full range of practices used to cultivate and nature "long-term relationships with customers, handle customer complaints, and improve customer satisfaction"(Hove 2015).

Sukati, Abdul Hamid, Baharun, & Tat (2014) affirms that CRM practices entail "inbound customer relationships and outbound customer relationships". Accordingly, customer

relations are “related to the company's ability to communicate the delivery of appropriate products and services to customers locally and globally at the right time, right place, and appropriate quantity and quality”. Therefore, close CRM can lead to product differentiation, customer loyalty, and high customer value” (Hashim, Baig, Amjad, Nazam, & Akram, 2020). Thus, “building a long-term relationship with customers is crucial for achieving sustainable competitive advantage and improving performance” (Shavazi, Moshabiki, Hoseine, & Naiej, 2013). In this study, CRM practices are customer evaluation, customisation, segmentation, differentiation and interactive communication.

2.2.3 Information and Communication Technology Practice

Usually, ICT is a technological system used to coordinate and integrate the flow of information electronically in both directions among the trading partners in a supply chain, including customers. According to Asabere, Oppong, & Kusi-Sarpong, (2012), ICT is an internet of tools (IoT) that includes communication devices such as “radio, television, cellular phones, computer and network hardware, software satellite systems, and various applications”. Although competitors can easily duplicate ICT investment, it is difficult to imitate the ability to make managerial decisions for creating unique “configurations of technology, infrastructure, and business processes” Lai *et al.*, (2006) and the related synergies among them. Therefore, utilisation and development of ICT capabilities help firms capture unique value-creating opportunities leading to a competitive advantage over their competitors and superior organisational performance (Rehman, Nor, Taha, & Mahmood, 2018).

Undoubtedly, ICT has an enormous contribution to the modern business world. Thus, adopting ICT practices allows information sharing among supply chain members leading to "improved forecasting, synchronising production and delivery, coordinating inventory-related decisions, and developing a shared understanding of performance bottlenecks"(Zhang, 2012). According to Lai *et al*. (2006), a high ICT level results in cost and cycle time reduction and an overall improvement in a competitive position.

Thus, businesses enjoy benefits such as reduced paperwork, quick access to information, effective and efficient business transactions, better customer service, better communication, increased productivity, and time-saving (Gorane & Kant, 2017). Additionally, ICT use leads to a more adaptive and responsive supply chain through quick information exchange among different working groups in the SC (Gorane, Prajapati, & Kant, 2018). Thus, ICT practices are associated with improvements in flexibility, quality, cost, delivery, and service performance of an organisation. In this study, ICT practices are information sharing, information integration, tracking systems, monitoring system, and procurement systems.

2.2.4 Supplier Development Practice

Firms have recognised the crucial role of SD in sustaining their competitive advantage and organisational performance. Previous studies have reported several definitions of Supplier Development practices. According to Yildiz Çankaya (2020), SD refers to the "long-term cooperation efforts between the purchaser and its suppliers to develop supplier capabilities in terms of costs, quality, delivery, and technical issues". Ketema (2017) defined SD practices as "any effort of a buying firm working with its supplier(s)

to increase the performance and capabilities of the supplier(s) in order to meet the short and long-term supply needs of the buying firm as well as promote on-going improvements that are intended to benefit both buyer and supplier(s)".

Li *et al.* (2012) argue that a cooperative buyer-supplier relationship is associated with significant "cost reduction, shorter lead-time, increased productivity, and enhanced quality". Moreover, buyer performance is essential in establishing and sustaining a firm's competitive advantage via "product innovation, product quality, timely delivery of the product, and competitive pricing" (Yegon *et al.*, 2015). To enhance SD, buyers have to choose between two models, direct or indirect, with resource invested and organisation commitment towards the program differentiating the two (Rajput & Bakar, 2012).

According to Gichohi *et al.* (2018), the indirect SD approach is passive, focusing only on "supplier identification, evaluation, and selection" to comply with a buyer's needs and requirements. Conversely, direct SD programs comprise the buyer's activities to improve supplier performance competencies for long-term shared benefit. Therefore, in this study, SD practices are credit support, Artificial insemination (AI), veterinary services, animal feeds, and extension education.

2.2.5 Strategic Sourcing Practice

Poor sourcing of materials can seriously affect the production processes at the processor level and, eventually, the final product's distribution to the market. Thus, strategic sourcing (SS) is the act of searching for "potential sources of input, securing the continuity of these sources, exploring alternative sources, and keeping the relevant knowledge up to date" (Ketema, 2017). Therefore, SS consists of planning, evaluating,

implementing, and controlling all sourcing activities undertaken to achieve long-term organisational goals. Thus, SS is a very crucial part of SCM since it enables organisations to "achieve strategic advantage and at the same time act as a means in which a business condition or problem can be alleviated" Kihanya, Wafula, Onditi, & Munene, (2015) more efficiently and effectively

Accordingly, the SS process contributes to competitive advantage and organisational performance through "improved sales margins, improved quality, and logistics arrangements with the suppliers" (Koobair *et at.*, 2017). Additionally, organisations can reduce material cost, secure quality materials, improve on-time delivery, enhance inventory performance and promote customer satisfaction. This study considered the following SS practices; supplier identification, supplier selection, supplier evaluation, communication with suppliers, relationship with suppliers, and quality evaluation.

2.3 Empirical Literature

Researchers have investigated the effects of various SCM practices on the OP but with varied outcomes. Apopa (2018) examined the influence of SCM practices on the performance of government ministries in Kenya. The study adopted the RBV, coordination and system theories, and a cross-sectional survey design targeting 1372 staff working in the SCM department from 20 government ministries. Additionally, the study used "Pearson's Product Moment Correlation analysis(r) and multivariate regression analysis to test the relationship between variables". The findings revealed that SCM practices explained 96.4% of the performance variance, while the organization culture moderated the outcome of the effects. However, the results should be interpreted cautiously since regression analysis could neither assess no correct

measurement error, raising the “possibility of incorrect conclusions due to misleading regression estimates” (Teo, Tsai, & Yang, 2013).

Mollel (2015) sought to investigate the “role of SCM practices towards organizational performance in food processing firms in Dar es Salaam, Tanzania”. The study obtained data from data via “questionnaires from a sample of 53 food processing firms and correlation and Kruskal Wallis test to examine the relationship between SCM practices and organizational performance”. Results revealed that “strategic supplier partnership, customer relationship, level, quality of information sharing, and lean practices were positively related to organisational performance”. However, the study concluded that “there was no relationship between outsourcing and organizational performance”. Outsourcing practices may indirectly affect organisational performance through a mediating variable which not considered in his study. According to Nitzl, Salgueiro, & JL y Cepeda-Carrión (2016), the inclusion of a third variable in a model helps explain the intermediary process in the relationship between two variables.

Memia (2018) sought to establish the influence of contemporary SC practices on large manufacturing firms' performance in Kenya. The study conceptualised SCM practices as a multidimensional construct consisting of supplier relationship practices, customer relationship management practices, outsourcing practices, and lean supply chain practices. Additionally, this study adopted five theories; theory of supply chain constraints, resource-based view theory, value chain theory, the theory of lean six sigma and transaction cost theory. Moreover, the study employed a descriptive research design to collect data from 312 respondents representing 563 large manufacturing organizations listed by KAM. Furthermore, the study utilized correlation and regression analysis to

uncover the relationships among the predictor and criterion variables. The results revealed that all contemporary SC practices significantly influenced performance. However, this study concentrated on the direct relationship between SC practices and performance and omitted the indirect relationship between the variables.

Sukati *et al.* (2012) investigated the linkage between SCM practices and supply chain performance by collecting data from 200 managers selected through convenience sampling from the Malaysian manufacturing industry. The study utilized correlation analysis to uncover the association among the predictor and criterion variables in the model. The results established a significant positive relationship between SCM practices, SC flexibility and customer responsiveness.

Anatan (2014) tested the "influence of SCM practices on the competitive advantage and supply chain performance" of the Indonesian large-scale manufacturing companies using simple regression models. The results revealed that "SCM practices have significant effects on both supply chain competitive advantage and performance". Further results showed that "competitive advantage does not have a significant effect on supply chain performance". Therefore there is a need to explore the mediation role of CA in performance management research using PLS-SEM, which is superior to regression methods in analysing the process of mediation in a model (Joseph F. Hair, Sarstedt, & Ringle, 2019).

Mutuerandu & Iravo (2014) examined the effects of SCM Practices and OP in Haco Industries Ltd. The findings revealed that all the dimensions of SCM practices positively affected "organisational performance in terms of operational costs, reduced lead time,

high customer service levels, product quality, fast response to changes in the market, and expanding its market share sales".

Bezabh (2017), using descriptive and explanatory research design, investigated the "effects of supply chain management practices on the operational performance of ethio telecom". The study findings revealed that "strategic supplier partnership, customer relationship, information sharing, information quality, and lean practices" influenced OP significantly.

Akinyi (2017) aimed to investigate the effects of SCM practices and the performance of the Kenyan private hospitals. The findings indicated that "CRM, lean management, information sharing, information communication technology, strategic partnerships, and outsourcing positively impact private hospitals' performance in Kenya".

Barasa (2016) examined the contributions of SCM practices on the performance of Steel Manufacturing Companies in Kenya. The results revealed that "supply chain collaboration practice, Green supply chain management practice, information sharing practice, and Customer relationship management practices significantly predicted Steel manufacturing companies' performance in Kenya". Unlike steel, milk is a highly perishable commodity and require unique SCM practices.

Cheng (2011) examined the effect of "outsourcing, strategic supplier partnership, customer relationship, information sharing, postponement, quality of information sharing and lean practices" toward organisational performance. The result revealed that "information sharing, quality of information sharing and lean practices were positively related to financial and non-financial performance". However, the study was

conducted in manufacturing companies in Malaysia which is contextually different from Kenya.

Kumar (2015) investigated the effects of supplier relationship management practices and OP of the dairy industry in India. The study established a significant positive association between the adopted supplier relationship management practises on organisational performance by utilising multiple regression methods. Contextually, India's dairy industry operates in a different environment; hence, conducting this study in Kenya will bring new insights and perspective regarding SCM practices.

Sundram *et al.* (2011) explored the "effects of different dimensions of supply chain management practices (SCMP) on supply chain performance (SCP) in the electronics industry in Malaysia". Partial least squares results indicated that "strategic supplier partnership, information sharing, information quality, postponement, agreed vision and goals, as well well as risk and reward, had significant positive effects on SCP". However, the proposed performance measures were only applicable to measuring the entire SC's performance and not the organization level performance. There is a need to validate a common set of performance indicators to evaluate organisational performance and the entire chain's performance (Aramyan *et al*., 2007).

Gorane & Kant (2017) applied the SEM to test the relationships among "SCM practices operational performance, customer satisfaction, and financial performance". The study showed that SC practices improve "operational performance and enhance customer satisfaction and financial performance".

Shradha Ashok Gawankar & Rakesh Raut (2017) examined the association among "customer relationship management, strategic supplier partnership, Information sharing, Information quality, and Lean practises and supply chain performance measures flexibility, integration, responsiveness, efficiency, quality, product innovation, market performance, and partnership quality SEM". The results uncovered a statistically significant relationship between SCM practices and SC performance measures.

2.4 Research Gaps

Past studies produced varied and controverting results raising concern on whether SCM practice can positively influence organisational performance. Moreover, past studies are inconclusive since most of them concentrated on the direct relationship between SCM practices and organisational performance. According to Okongwu *et al.* (2015)**,** the nature of the linkage between SCM practices and organisational performance could either be "direct or indirect, and on the other hand, sequential, non-sequential, intra-dependent, or reverse"**.** Generally, most studies focused on the relationship between SCM practice of either downstream or upstream SC sides and the performance. Therefore, there is a lack of an integrated framework linking upstream and downstream SCM practice to organisational performance (Li *et al.*, 2006).

Additionally, there is a lack of a comprehensive framework linking SCM practices, CA and organisational performance. Furthermore, existing studies focusing on SCM practice in Kenya are based on non-agro based organisations. For instance, Barasa 2016; Apopa 2018) investigated SCM practices' influence on steel manufacturing companies' performance and Government Ministries in Kenya, respectively.

Given the knowledge gap, this study will analyse the effects of SCM practices' effects on competitive advantage and organisational performance using milk processing firms in Kenya. Second, this study applies an integrated framework anchored on RBV to link SCM practices, CA and OP, and uncover the variables' underlying relationship. This study's findings contribute to the debate about how SCM practice affects organisational performance in Kenya's milk processing sector. Competitive advantage in this study served as an independent variable and a mediating variable in the model.

CHAPTER THREE: MATERIALS AND METHODS

3.1 Introduction

This chapter covers the materials and methods used to address the study objectives and hypothesis. Specifically, the chapter presents the research design, target population, sample size and sampling technique. Moreover, the chapter covers data collection method, pilot testing, validity and reliability of the instrument, diagnostic tests, data analysis procedures and ethical issues.

3.2 Research Design

This study adopted both descriptive and explanatory research design with quantitative and qualitative approaches to address the study objectives. A descriptive research design is applied to collect data to describe persons, organisations, settings, or phenomena and provide enough provision to protect bias and maximised reliability (Barasa, 2016). The descriptive design was suitable for this study to allow "data collection, classification, analysis, comparison, and interpretation to provide a summarized report" (Karihe, Namusonge, & Iravo, 2015). Similarly, an explanatory research design was adopted to evaluate the "magnitude, direction, and significance" of the relationship among SCM practices, CA and OP in Kenya's dairy processing firms. Explanatory design is utilized to evaluate relationships among two or multiple variables of interest and predict an outcome. Mwangangi (2016) applied both descriptive and explanatory designs to investigate the effects of logistics management practices on Kenya's manufacturing firms' performance.

3.2.1 Target Population

According to Kothari (2017), a population entails the entire set of units from which the investigation information is utilised to make derivations. The study's target population was all the milk processing firms licensed to process milk and dairy products by the Kenya Bureau of Standards (KEBS). According to KNBS (2019), 92 large-scale dairy processing firms and 58 mini dairies were licensed to process milk and dairy products in Kenya in 2019. Consequently, this study population comprised of 150 large scale and mini dairy processing firms in Kenya.

3.2.2 Sample Size and Sampling Design

Sampling design is the "process of selecting a subset of individuals from within a statistical population to estimate characteristics of the whole population" (Memia, 2018). Due to the small population, the study conducted a census for all 150 dairy processing firms in Kenya. According to Kothari (2004), "a census method is suitable when the population is relatively small or reasonable to include the entire population for some reasons, whereby one does not need to use a sample survey".

3.3 Data Collection Methods

This study utilized primary data that was collected using a questionnaire. A questionnaire was appropriate for data collection because it provides standardized answers making it easy to compile data (Tom, 2017). Well-trained research assistants administered a closed-ended questionnaire to senior managers in the dairy processing firms. Census survey was conducted between October and December 2019.

3.3.1 Measurement of Variables

SCM-practice is a multidimensional construct comprising "supplier development, customer relationship management, logistics management, strategic sourcing, and information and communication technology practices". The application of these SCM practices in Kenya's dairy processing firms was assessed on a" 7-point scale" (1 = Extremely small extent, 7= Extremely large extent). The survey tool for SCM practices is presented in Appendix A. Additionally, CA was assessed by asking the survey respondents to state their level of agreement regarding their firms' ability to create a defensible position in the market place on a 7-point scale (1=Strongly disagree 7=Strongly agree). The survey tool for competitive advantage is presented in Appendix B. Also, on a "7-point scale" (1=Strongly disagree, 7=Strongly agree), the organisational performance was measured by asking the respondent to state their agreement regarding how well the firm had achieved its performance goals. The survey tool for organisational performance is presented in Appendix C. A seven-point scale was preferred to increase the reliability of the measuring tool (Smith, 2013).

3.4 Pilot Study

A pilot survey is meant to eliminate some of the complications likely to come across during the final survey (Apopa, 2018). Thus, a pilot survey was conducted to test the reliability and validity of the data collection instruments in this study. According to Memia (2018), "a pilot sample should be between 1% and 10% of the sample size". Thus, five dairy processing firms representing 3% of the sample size were used for the pilot study and were removed from the final sample in the actual data collection.

3.4.1 Reliability

The reliability of s survey instrument implies its ability to reproduce consistent and stable measurements. This study evaluated indicator reliability and internal consistency reliability. This study assessed the indicator reliability by scrutinising the loadings of the indicators and their significance. According to (Hussain, Shahid, Fangwei, Zhu, Faisal Siddiqi, Ahmed, Ali, Zaigham, Shabbir, Muhammad Salman 2018), "observed variables with an outer loading of 0.7 or greater are believed to be greatly acceptable while the outer loading with a value less than 0.7 should be abandoned". Additionally, an indicator loading's standardised value should be above 0.708 to be significant (Joe F. Hair *et al.* 2020).

The traditional Cronbach's alpha assessed the study's constructs' internal consistency. However, as a traditional method of assessing construct reliability, "Cronbach's alpha is not appropriate for PLS-SEM owing to its sensitivity to the number of items in the scale and the generation of severe underestimation when applied to the PLS path models" (K. K.-K. Wong, 2016). Therefore, Dillon-Goldstein's rho was also reported to augment Cronbach's alpha. According to Rasoolimanesh & Ali (2018), construct reliability is established with Cronbach's alpha and RhoA values higher than 0.7. However, a reliability score above 0.95 means that the individual items measure the same concept resulting in redundancy (Hair jr, Sarstedt, Hopkins, & Kuppelwieser, 2014).

3.4.2 Validity Test

Two types of validity were assessed in this study, the construct's convergent validity and discriminant validity. According to Wong (2016), convergent validity is a model's ability

to explain its indicators' variance. The Average Variance Extracted (AVE) for each construct was calculated to verify that each latent variable has a strong relationship with its reflective indicators (S. Hussain et al., 2018). The convergent validity is established at a minimum AVE value of 0.5 (Fornell & Larcker, 2016). According to Henseler et al., 2009; Sanchez, 2013; Chinn (2010), "each latent variable should have an AVE ≥ .50, suggesting that it explains 50% or more of its indicators' variance". AVE is only assessed for reflective variables. The Average Variance Extracted (AVE) was computed as follows:

$$\text{AVE} = \frac{(\Sigma \lambda i^2)\ Var\ F}{(\Sigma \lambda l^2)\ Var\ F + \Sigma \theta ii}$$

Where: λi is the outer loading, F is factor variance, and θii is error variance. According to Latan & Ramli (2014), AVE should be more than 0.50 to explain 50 % or more of the indicators' variance.

The discriminant validity implies the degree to which constructs empirically differ from one another (Hair jr *et al*., 2014). Traditionally, the Fornell-Larcker criterion and indicator crossloadings have been applied to assess constructs' discriminant validity (K. K.-K. Wong, 2019). This study will apply the cross-loadings of the indicators to verify discriminant validity. This method requires that each "indicator's loadings be higher on its construct than the cross-loadings from other constructs" (Hair jr *et al.*, 2014).

3.5 Diagnostic Tests

Diagnostic tests evaluate adherence to statistical assumption tests meant to increase estimates' accuracy by reducing the probability of Type I and Type II errors (Memia,

2018a). Therefore, this study conducted the following diagnostic tests normality, Homoscedasticity, Multicollinearity, Outliers, Multivariate normality, Multivariate Outliers, Multicollinearity and factor analysis.

3.5.1 Normality

Variation in data distribution for an individual metric leads to poor statistical tests such as the F and t statistics (Hair Jr, Black, Babin, & Anderson, 2010). Therefore, the Shapiro-Wilk tests and Kolmogorov-Smirnov tests were used to determine whether the distributions of the study variables were significantly different from a normal distribution. Additionally, the normality assumption was assessed using a Q-Q scatterplot to plot quantiles of the model residuals against the quantiles of a Chi-square distribution. According to DeCarlo (1997), there should be no strong variation between residuals' quantiles and the theoretical quantiles.

3.5.2 Homoscedasticity

Homoscedasticity examines the assumption that the outcome variable's variance is equal across different values of the predictor variable. The absence of homoscedasticity creates a bias and inconsistency, leading to the generation of extremely inaccurate confidence intervals, significance tests and p-values) for the parameter estimates (Field, 2018). Residuals were plotted against the predicted values in a scatterplot to evaluate homoscedasticity. According to Bates et al., 2014; Field, 2013; Osborne & Walters (2002), “homoscedasticity is manifested in randomly distributed points with a mean of zero without apparent curvature”.

3.5.3 Multicollinearity

Multicollinearity creates a problem in multiple regressions models by rising the standard error of coefficients making them less reliable (Chege, 2017). The presence of multicollinearity between predictors was evaluated by computing Variance Inflation Factors (VIFs). According to (Joseph F. Hair, Hult, Ringle, Sarstedt, & Thiele, 2017), a VIF value greater than 5 indicates a potential collinearity problem in the model. However, the standard practice has established a maximum VIF value of 10 (Menard, 2009). All VIFs are less than 10, suggesting the absence of collinearity between predictor variables in the model.

3.5.4 Outliers

Influential points were identified by plotting the absolute values of Studentised residuals against the observation cases. The model residuals were divided by the standard deviation of the estimated residual to get Studentised residuals. According to Field, 2013; Stevens (2009), "an observation with a Studentised residual value greater than 3.19, at 0.999 quartile of a *t* distribution with 88 degrees of freedom, was considered an outlier".

3.5.5 Exploratory Factor Analysis

Exploratory factor analysis was run to reduce the research data into manageable variables using the Kaiser criterion and Promax rotation to decide the number of factors to retain. Accordingly, all factors with an eigenvalue greater than one were retained for interpretation. Additionally, each variable's communality was estimated by replacing the squared multiple correlations with eigenvalues extracted from the correlation matrix

Ledesma & Valero-Mora, (2007); Fabrigar & Wegener, (2016). The factor loadings were interpreted by taking each loading's absolute value (Comrey & Lee, 2019).

3.6 Data Analysis

Data were analysed in Statistical Package for Social Scientists (SPSS) 20 and the analysis of moment structures (AMOS) 25 software to generate both descriptive and inferential statistics. Frequency distribution means and standard deviation from descriptive statistics were presented in frequency tables. Further, as the main analytical technique, SEM was applied to uncover the structural relationships between the study variables and confirm the hypothesis. Moreover, regression analysis was utilized to uncover each of the independent variables' contribution to the dependent variables.

3.6.1 Partial Least Squares SEM

According to Sarstedt et al. (2019), "PLS-SEM has become a standard tool for examining complex inter-relationships among observed and latent variables in business management and social science". PLS-SEM was preferred owing to its ability to simultaneously model multiple independent-dependent and mediation relationships (Richter *et al.*, 2016). Additionally, PLS-PM is a non-parametric test and does not assume anything about the model's distribution of data.

Anderson & Gerbing (1988) suggested a two-step modelling approach starting with first estimating the measurement model separately before estimating the structural model. The two-step modeling approach was the most appropriate in the context of the present analysis due to its advantages compared to the single-step analysis, which, on the

contrary, involves the simultaneous estimation of both measurement and structural models (Vieira, 2012). Therefore, PLS-PM was evaluated by inspecting both the measurement (outer) and structural (inner) models.

A measurement model offers a means for specifying the relationship between the measurement items (variables) and latent factors (variables). According to Hove (2015), a measurement model is a "theoretical model that reveals the structural relationships among latent variables and their observed variables" as well as the error terms for each of the observed variables. According to Hair, Black, Babin, & Anderson (2006), the measurement model allows the investigator to use numerous variables for a particular independent or dependent construct. The following equation represents the measurement model:

A measurement model for X variables $\boldsymbol{x} = \Lambda_{\boldsymbol{x}}\boldsymbol{\xi} + \boldsymbol{\delta}$ (3)

A measurement model for Y variables $\boldsymbol{y} = \Lambda_{\boldsymbol{y}}\boldsymbol{\eta} + \boldsymbol{\varepsilon}$ (4)

where

- Xi or Ksi (ξ_s) and eta (η_s)represent a vector matrix of exogenous and endogenous variables, respectively.
- X (1, 2, 3…) and Y (1, 2, 3,…..Xn) are the exogenous and endogenous constructs' measures, respectively.
- Lambda (Λ_x and Λy) represents a regression matrix relating exogenous and endogenous latent variables to their respective observed variable.

- Delta (δ) and Epsilon (ϵ) represent a vector matrix of measurement errors related to the exogenous and endogenous variable, respectively.

The assumptions of these models are that E (ξ, δ'), E (η, ε') = 0

The measurement model, or outer model, was assessed by examining the indicator variables' unidimensionality, indicator loadings, communalities, and crossloadings. Bootstrapping was used to check the significance of each loading. Cronbach's alpha (α) and Dillon-Goldstein's rho (ρ) were calculated to evaluate indicators' unidimensionality. Unidimensionality of indicators can be assumed if Cronbach's alpha and Dillon-Goldstein's rho have large values ($\alpha \geq .7$ and $\rho \geq .7$) (Sanchez, (2013). Further, factor loadings and communalities were examined for the reflective indicators to identify any indicators with weak loadings for the latent variables. Each indicator's variability should explain at least 50% of its latent variable construct ($|\text{loading}| \geq .707$; communality $\geq .50$) (Henseler & Sarstedt, 2013; Sanchez 2013;). Otherwise, it is identified as a weak loading.

The validity of the model was evaluated by examining the indicator crossloadings. According to Sanchez 2013; Henseler, Ringle, & Sarstedt (2015), crossloading occurs when an indicator has a higher absolute loading on a different latent variable than the one to which it is assigned. Moreover, Bootstrapping was performed with 500 resamples to determine the significance of the indicator loadings. The significance of parameter estimates was determined using 95% confidence intervals at 0.05 alpha value (Henseler et al., 2014). Mathematically, the empirical model was presented using general Linear Structural Relations (LISREL).

$$\eta_2 = \beta\eta_1 + \Gamma\xi + \zeta$$

(5)

where

- Xi or Ksi (ξ) and Eta (η1,η2), represents exogenous latent variable (SCMP) and endogenous latent variables (CA and OP), respectively
- Gamma (Γ) coefficients represent the paths connecting ξ to η1 and η2, respectively
- Beta (β) represents paths connecting η1 to η2
- Zeta (ζ) represents the error terms

This model assumes that ζ is uncorrelated with ξ and that 1 − B is non-singular.

The structural or inner model was assessed by examining the R^2-values for each endogenous variable and the goodness of fit (GoF) index for the model. Bootstrapping was also used to determine the inner model's reliability and test the path coefficients' hypothesis. Accordingly, R^2-values were calculated for each endogenous variable to determine whether relationships among the latent variables are appropriate. Each endogenous variable should have an R^2-value ≥ .20 (Sanchez, 2013). The GoF index was calculated by computing the geometric mean of the average R^2-values and average communality for each latent variable to evaluate the model's predictive power. According to Chinn 2010; Sanchez (2013), values greater than .90 are considered a good model fit, while a GoF index less than .90 and greater than .70 is an acceptable model fit, while a GoF index less than or equal to .70 indicates poor predictive power.

3.6.2 Multiple Linear Regression

Multiple linear regression (MLR) was run to estimate the individual predictor variables' contribution to the model. The study utilized *F*-test to judge whether the set of predictor variables collectively predicts the criterion variable. Further, R^2 was utilized to evaluate the variance in the criterion variable accounted for by a set of predictor variables. Additionally, a *t*-test was used to determine each predictor's significance, while beta coefficients were used to determine each independent variable's prediction magnitude. The results were interpreted based on the significance of predictors, where every one unit increase in the predictor variable increase or decrease the dependent variable by the magnitude of the unstandardized beta coefficient. The regression model is as follows:

$$y_i = \beta_0 + \beta_1 x_{i2} + \beta_2 x_{i2} + \cdots \ldots \beta_{in} x_{in} + \in$$

(**6**)

Where

y_i= dependent variable

β_0= y-intercept

x_i= Explanatory variable

β_i= Regression coefficients for each explanatory variable

ε= error term.

i=*n* observations

3.6.3 Hypothesis Testing

The hypothesis was examined by performing Bootstrapping with 500 resamples. The regression coefficients were evaluated using 95% confidence intervals to determine the regression paths' significance using an alpha value of 0.05 (Henseler et al., 2009; Sanchez, 2013; Chinn, 2010). Path coefficients from the bootstrap results were used to evaluate the direction and the effect size of the relationship. Path coefficients are estimates representing the hypothesized relationships linking the research constructs. "Path coefficients are standardized values ranging from -1 to +1, with coefficients closer to +1 representing strong positive relationships and coefficients closer to -1 indicating strong negative relationships" (Hair jr et al., 2014).

The mediational hypothesis was analysed according to procedures recommended by (Nitzl et al., 2016). Accordingly, this method entails the following steps

1) Establishing the indirect effect (a × b)
2) Testing the significance of the indirect effect (a × b) by bootstrapping
3) Assessing the strength of the indirect effect

Bootstrapping was performed with 500 resamples at 95% confidence intervals. The "absence of zero in the confidence interval signifies the significance of the indirect effect" a × b (Cepeda, Nitzl, & Roldán, 2017). Figure 3 illustrates the full structural model for testing mediation analysis.

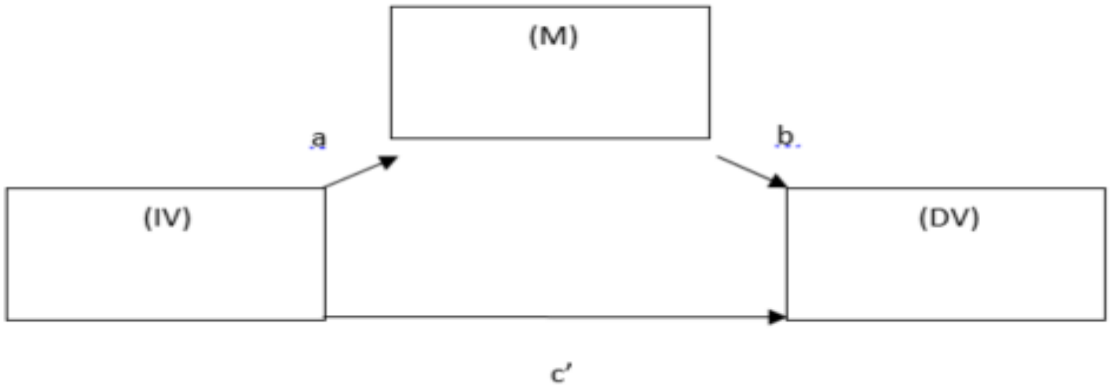

Figure 3: Mediation analysis with M mediating IV and DV

Source: *Baron and Kenny (1986).*

3.7 Ethical Issue

According to Leedy and Ormrod (2010), "most ethical issues fall into one of the following four categories; informed consent, confidentiality, security and honesty". The researcher first obtained authorizations to undertake this research from the Kenyatta University and the National Commission for Science, Technology and Innovation (NACOSTI) before embarking on the field survey. Secondly, the researcher briefed all

participants about conducting this study before giving their consent to participate in the survey. Moreover, the researcher assured participants confidentiality of the information and stressed it in the introduction letter.

CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter presents the finding from the data analysis. In particular, the chapter presents results for response rate, pilot test, reliability and validity tests, demographic information, diagnostic tests, EFA, CFA, descriptive statistics and inferential statistics. The inferential statistics are presented as per the objectives of the study, namely; effects of SCM practices on the organisational performance, effects of SCM practices on Competitive advantage, Effects of competitive advantage on organisational performance, and the mediation role of competitive advantage in the relationship between SCM practices and organisational performance.

4.2 Response Rate

Twenty-five of the registered dairy processing firms were not in operation by the survey time, while five firms were used in a pilot survey and removed from the list. Thus, 120 questionnaires were disseminated for the field survey. Ninety-nine questionnaires were returned from the field survey since 21 one firms were not available for the survey. However, only 89 were complete and usable for data analysis representing a 74% response rate which was good for further data analysis. According to Mugenda (2008), "a response rate of 50% is considered adequate, 60% and above good, while 70% and above is very good".

4.3 Pilot Testing Results

Five dairy processing firms located in Kiambu county were selected to conduct a pilot test in this study. According to Memia (2018), a pilot sample should be between 1% and

10% of the sample size. The pilot test revealed inconsistencies in some questions, and necessary adjustments were made.

4.3.1 Reliability Tests

A confirmatory factor analysis was run to test different measure of reliability. The results revealed that all the indicators had loadings above .707, indicating that the constructs explained over 50 per cent of their indicator's variance, signifying satisfactory item reliability. According to Henseler et *al.* (2009; Sanchez (2013); Chinn (2010), "for the latent variable to explain at least 50% of each indicator's variance, each indicator should have a loading higher than (|loading| ≥ .707". Additionally, loadings for all the indicator variables were significant, at a 95% confidence interval and an alpha value of 0.05, signifying satisfactory indicator reliability. **Table 1** shows a summary of the PLS-SEM outer model.

Table 1: Summary of PLS-PM outer model

Indicator	Construct	Weight	Loading	*SE*	95% CI
CRM practices	SCM_Practices	0.24	0.85	0.08	[0.60, 0.95]
ICT practices	SCM_Practices	0.22	0.89	0.06	[0.73, 0.97]
SS practices	SCM_Practices	0.31	0.84	0.03	[0.78, 0.89]
LM practices	SCM_Practices	0.25	0.86	0.06	[0.63, 0.93]
SD practices	SCM_Practices	0.28	0.87	0.06	[0.62, 0.94]
Cost	Comp_Advantage	0.37	0.86	0.08	[0.57, 0.90]
Quality	Comp_Advantage	0.38	0.88	0.06	[0.62, 0.96]
Delivery dependability	Comp_Advantage	0.54	0.85	0.03	[0.79, 0.92]
Efficiency	Org_Performance	0.42	0.89	0.03	[0.84, 0.95]
Flexibility	Org_Performance	0.35	0.85	0.04	[0.75, 0.91]
Responsiveness	Org_Performance	0.39	0.86	0.03	[0.78, 0.90]

Further results revealed α and ρ values greater than 0.7, indicating the unidimensionality of the three constructs. According to Sanchez (2013), composite reliability is achieved when α and ρ values are greater than ($\alpha \geq .7$ and $\rho \geq .7$). **Table 3** shows a summary of the construct reliability test.

Table 2: Construct reliability

Construct	Indicator Type	Number of items	α	ρ
SCM_Practices	reflective	5	0.89	0.87
Comp_Advantage	reflective	3	0.79	0.88
Org_Performance	reflective	3	0.82	0.89

Note. α = Cronbach's alpha, ρ = Dillon-Goldstein's rho.

4.3.2 Validity Tests

The crossloadings were examined for the reflective indicators to evaluate the discriminant validity of the model. A crossloading occurs when an indicator has a higher absolute loading on a different latent variable than the one assigned to it (Henseler et al., 2015; Henseler et al., 2009; Sanchez, 2013). There were no crossloadings for the model's indicators, suggesting the specified latent variable structure is appropriate for the data. Table 4 shows the summary results of discriminant validity.

Table 3: Discriminant validity test

Indicator	SCM_Practices	Comp_Advantage	Org_Performance
CRM practices	**0.85**	0.49	0.40
ICT practices	**0.89**	0.39	0.45
SS practices	**0.84**	0.52	0.65
LM practices	**0.86**	0.48	0.48
SD practices	**0.87**	0.53	0.53
Cost/Price	0.45	**0.86**	0.35
Quality_	0.43	**0.88**	0.39
Responsiveness	0.58	**0.85**	0.59
Efficiency	0.65	0.52	**0.89**
Flexibility	0.52	0.46	**0.85**
Responsiveness	0.54	0.54	**0.86**

Note. The bolded items are the specified loadings for each indicator.

Additionally, AVE values were computed to evaluate the convergent validity of the constructs. The results revealed AVE values ranging from .74 to .76 for all the constructs, signifying that each latent variable accounted for a significant portion of the indicator's variance. According to Henseler et *al.* 2009; Sanchez 2013; Chin (2010), each latent variable should have an AVE $\geq$ .50 to explain 50% or more of its indicators variance. **Table 4** shows a summary of the convergent validity test.

Table 4: Convergent validity test

Construct	Type	AVE
SCM_Practices	Exogenous	0.74
Comp_Advantage	Endogenous	0.76
Org_Performance	Endogenous	0.75

Note. AVE = Average variance extracted

4.4 Demographic information

4.4.1 Gender

The male respondents' participation was 68%, whereas that of the female respondents was 30%, as in table 4.3 below. These results indicate that male candidates dominate the top management in dairy processing firms in Kenya. The results revealed that women had dismal participation in the decision-making processes (Wambugu, 2016)**. Table 5** presents a summary of these results.

Table 5: Participants by gender

	Frequency	**Percent**
Male	62	69.7
Female	27	30.3
Total	**89**	**100**

4.4.2 Supply Chain Management Training

The research assessed whether the survey respondents from the dairy processing firms had formal SCM training. According to the results, most of the respondents (57%) have gone through formal SCM training, whereas 43% have not gone through the training. According to Essel, Adams, & Amankwah (2019), "managers with higher education tend to adopt more innovative practices than their counterparts with little or no formal education". Hung and Chin (2011) and Zahra (2005) found out that there was a correlation between industry-specific experience and performance. **Table 6** displays the result for formal training in SCM.

Table 6: Formal training in Supply chain management

Formal training in SCM	Frequency	Percent
Yes	51	57.3
No	38	42.7

4.4.3 Department of Service

The majority of respondents (75.3%) were from the finance department, while 20.2% were drawn from the procurement department, and the remaining 4.5% were from the field and extension services department. These findings indicate that the finance department employees have a general and better understanding of business operations. These results are displayed in Table 7.

Table 7: Respondents by departments

Department	Frequency	Percentage	Cummulative%
Finance	67	75.3	75.3
Procurement	18	20.2	95.5
Field extension	4	4.5	100.

N=89

4.4.4 Years of Service for the Respondents

The majority (68.5%) of the respondents had served in the dairy processing industry for over 25 years, while 22.5% had served between 19 and 24 years, and only 9% were in service for 18yrs and below. These results imply that most survey respondents had an adequate understanding of SCM practices and their firms' organisational performance. Similarly, Hung and Chin (2011) and Zahra (2005) found out that there was a correlation between industry-specific experience and performance. Hisrich (1990) established that

the number of years worked has a positive relationship with firm performance. These results are displayed in **Table 8**.

Table 8: Years served in the industry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	below 6	2	2.2	2.2	2.2
	7 to 12	3	3.4	3.4	5.6
	13 to 18	3	3.4	3.4	9.0
	19 to 24	20	22.5	22.5	31.5
	25 and above	61	68.5	68.5	100.0
	Total	89	100.0	100.0	

4.4.5 Business Information

The research collected information about the number of years the company had been in operation, the number of suppliers, the daily milk holding capacity and average daily milk intake. Results in **Table 9** shows mean values of years in operation, the number of members, active members, Daily milk holding capacity and average daily milk intake was19.88315, 3811.281, 1697.831, 25114.38 and 20897.43, respectively. The standard deviation values of years in operation, number of members, active members, Daily milk holding capacity and average daily milk intake were 2.117941, 597.1109, 280.6326, 6228.266, and 7361.504.

The mean values for years in operation had a low deviation, implying that most processing firms have been operating for an average of 20 years. The average number of active suppliers is 3811, and the average daily milk holding capacity is 25114 litres, with a daily milk intake of 20897 litres. Firms in operation over a long period are more

experienced and have acquired unique resources/abilities and skills, translating to superior performance (Pervan, Pervan, & Ćurak, 2017).

Additionally, the results show that the processing industry's average daily milk intake is almost half of the installed capacity, which translates to 46.32% capacity utilization. The result confirms that dairy processing firms in Kenya have been experiencing capacity utilisation challenges, partly due to milk production seasonality.

Table 9: Firm information

Business information	Mean	Std Dev
Years in operation	19.88315	2.117941
Total suppliers	3811.281	597.1109
Active suppliers	1697.831	280.6326
Daily milk holding capacity (Ltrs)	45114.38	6228.266
Average daily milk intake (Ltrs)	20897.43	7361.504

4.4.6 Seasonality of Milk Supply

The majority (98%) of the processing firms experience milk supply seasonality, where 2% of the respondents do not experience seasonality in the milk supply. Lack of adequate milk supply leads to under capacity utilisation estimated at 46% of Kenya's daily installed processing capacity.

The 2% of the processing firms who do not experience fluctuations in milk supply attributed this to several reasons: a high adoption rate of the modern dairy farming technologies such as intensive zero-grazing and silage making practices among the dairy farmers in their catchment area. Additionally, the processors use accredited suppliers to supply quality hay to their farmers on credit. Thus, supplier development practices such

as credit support, training on good feeding management and feed preservation techniques can even milk supply throughout the year. **Table 10** displays these results.

Table 10: Seasonality of milk supply

Seasonality supply of milk	Frequency	Percent
Yes	87	97.8
No	2	2.2

4.4.7 Quality of Milk Supplied

This study sought to establish whether milk supplied to dairy processing firms in Kenya meet quality standards. The results revealed that 91% of the processing firms in Kenya have challenges with milk quality. Quality is crucial in milk processing since it affects the shelf life and overall profitability of the processing firms (Njiru, 2018). **Table 11** shows the results.

Table 11: Quality of milk supplied

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	81	91.0	91.0	91.0
	No	8	9.0	9.0	100.0
	Total	89	100.0	100.0	

4.4.8 Farm-gate price

The average farm-gate price was Ksh. 28.2, with a range between KSh.18 and 39 per kilogram. Additionally, most processing firms were buying milk at a price of Kes 35. Farmgate prices vary significantly across the country despite being largely "indistinguishable between the formal and informal chains" (EADD, 2008). Additionally, raw milk price fluctuates with the season, while processed milk price is relatively static throughout the year. In most cases, the price paid to farmers is determined by the buyer

without negotiations with farmers. However, dairy farmers can get high prices by "building countervailing power," although not tenable over long-term contracts (Schlecht & Spiller, 2009). **Table 12** shows the results.

Table 12: Farm gate price

Mean	28.1854
Median	27.0000
Mode	35.00
Minimum	18.70
Maximum	39.00

4.4.9 Terms of Payment to Suppliers

The research collected information regarding the terms of milk payments. According to results, most (82%) of the processing firms pay their milk suppliers monthly, 6% pay weekly, whereas 2% pay daily. Dairying is a capital intensive undertaking that requires a short cash cycle. Thus delayed payments make the formal market unfavourable to farmers who are generally facing immediate cash flow needs. Additionally, several processing firms have wound up due to insolvency leaving behind unpaid milk deliveries and exposing farmers to great loss leading to mistrust of the formal market. Consequently, dairy farmers prefer the "cash-based" informal marketing channel over the formal channel due to payment delays (EADD, 2008). Table 13 displays these results.

Table 13: Terms of milk payment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	2	2.2	2.2	2.2
	Weekly	5	5.6	5.6	7.9
	Monthly	82	92.1	92.1	100.0
	Total	89	100.0	100.0	

4.5. Diagnostic Tests

4.5.1 Normality Test

Shapiro-Wilk test reveals SDP (W = 0.99, p = .885), ICTP (W = 0.98, p = .115), CRMP (W = 0.98, p = .300), SSP (W = 0.99, p = .677), LMP(W = 0.98, p = .323), CA (W = 0.96, p = .140), and organisational performance (W = 0.98, p = .158). According to Anderson (2003), the Shapiro-Wilk test indicated that W values must be above the 0.05 threshold to depict normality distribution. Similarly, Kolmogorov-Smirnov tests revealed SDP (D = 0.06, p = .847), ICTP (D = 0.06, p = .858), CRMP (D = 0.09, p = .446), SSP (D = 0.09, p = .483), LMP(D = 0.07, p = .748), CA (D = 0.09, p = .436), and organisational performance (D = 0.12, p = .168). These results suggests that the residuals of the model were generated by a normal distribution hence ascertaining the assumption of normality. **Table 14** displays the normality test.

Table 14: Shapiro-Wilk and Kolmogorov-Smirnov results

	Shapiro-Wilk		***Kolmogorov-Smirnov***	
Variable	*W*	*p*	*D*	*p*
SDPs	0.99	.885	0.06	.847
ICTPs	0.98	.110	0.06	.858
CRMPs	0.98	.300	0.09	.446
SSPs	0.99	.677	0.09	.483
LMPs	0.98	.323	0.07	.748
Competitive advantage	0.96	.140	0.09	.436
Organisational performance	0.98	.158	0.12	.168

Notes df=89 α=0.05

Additionally, a Q-Q scatterplot was used to plot the model residuals quantiles against the quantiles of a Chi-square distribution. According to DeCarlo, 1997), "strong deviations

could indicate that the parameter estimates are unreliable". The Q-Q scatterplot in **Figure 4** does not reflect deviations of sample quantiles from the theoretical quantiles indicating that the data was normally distributed.

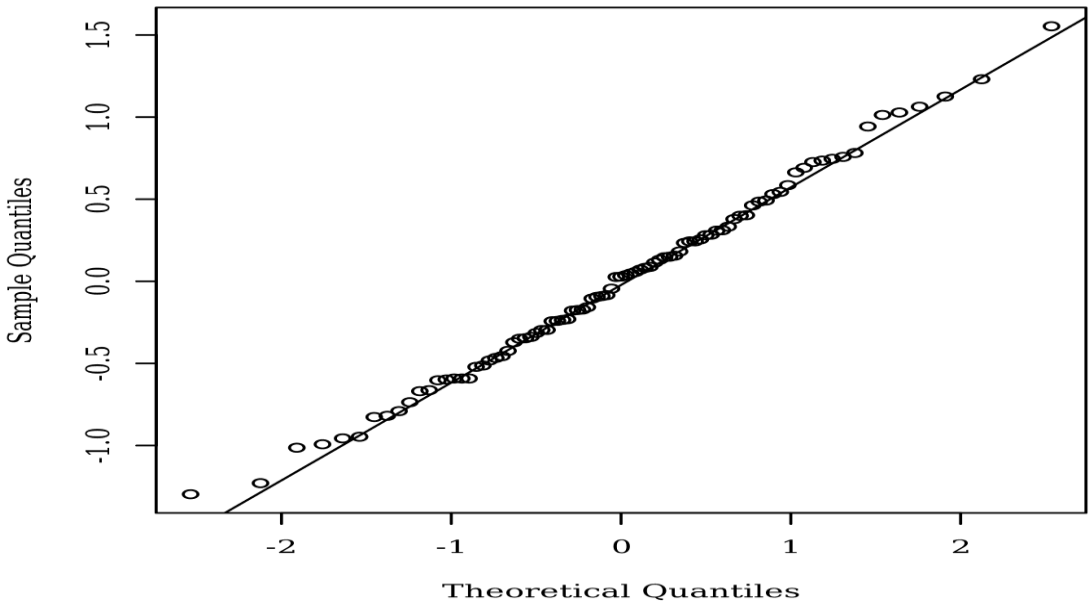

Figure 4: Q-Q scatterplot

4.5.2 Heteroscedasticity

According to Bates et al., 2014; Field, 2013; Osborne & Walters (2002), "homoscedasticity is manifested if the error terms are randomly distributed within a mean of zero". The scatterplot results in **Figure 5** do not depict apparent curvature, indicating that residuals have the same variance at each level of the predictor variable.

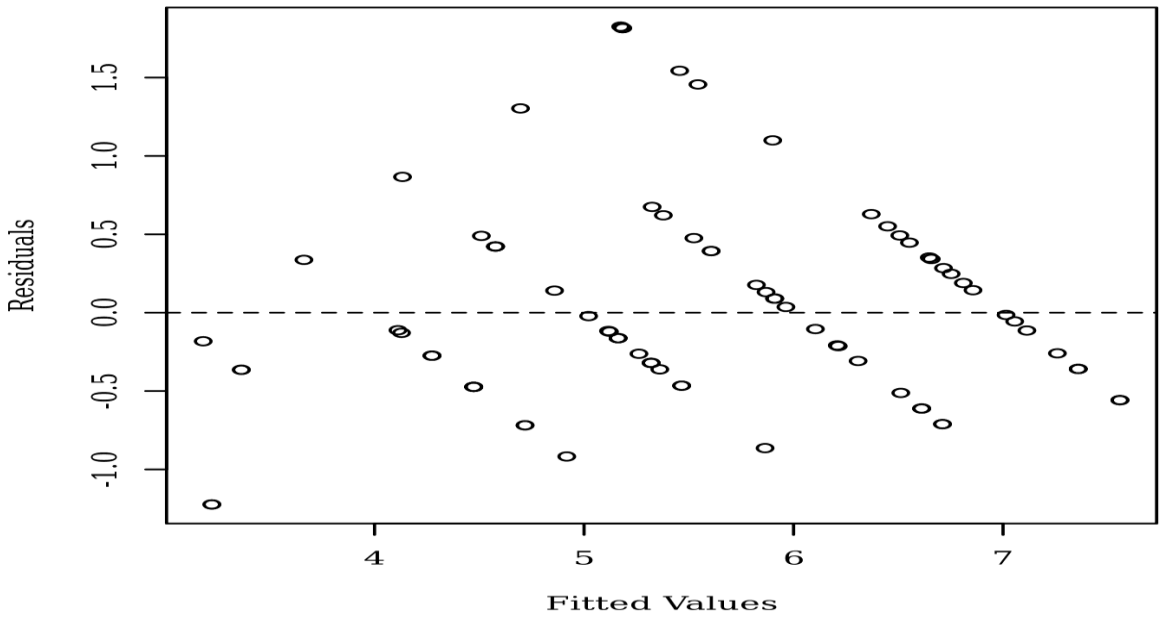

Figure 5: Scatterplot for regression residuals

4.5.3 Multicollinearity

The results revealed that VIF values were below 5, signifying a lack of multicollinearity between predictor variables in the model. While a VIF value greater than 5 is cause for concern, literature considers a VIF value of 10 as the maximum upper limit (Menard 2009; Lind, Marchal & Wathen 2012). **Table 15** shows a summary of these results.

Table 15: Multicollinearity test

Predictor variables	Tolerance	VIF
LM Practices	0.681	1.469
CRM Practices	0.677	1.477
ICT Practices	0.771	1.297
SD practices	0.428	2.338
SS practices	0.623	1.604
CA	0.363	2.751

4.5.4 Outliers

Figure 6 shows that all observations had Studentised residuals below the allowable limit of 3.19 in absolute values. According to Field, 2013; Stevens (2009), an "observation with a Studentised residual value greater than 3.19, at 0.999 quartile of a *t* distribution with 88 degrees of freedom, was considered an outlier".

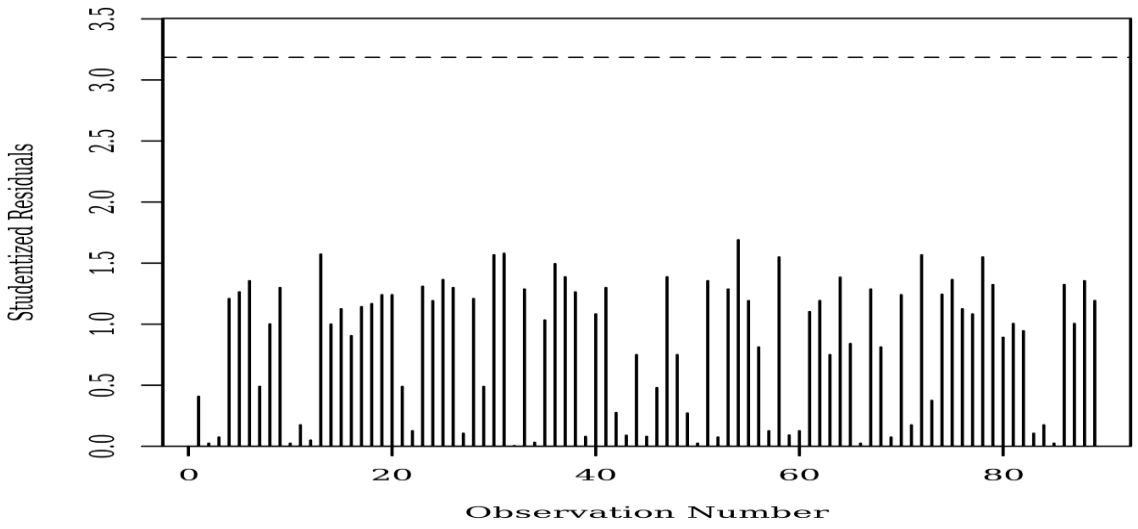

Figure 6: Studentised residuals plot for outlier detection

4.5.8 Exploratory Factor Analysis (EFA)

Supplier Development Practices

The results reveal the KMO value of 0.81, which is above the cut- off point of .50, signifying sampling adequacy and sufficiently distributed matrix values for factor analysis (Yong & Pearce, 2013). Additionally, Bartlett's test was significant at α=0.000 with a Chi-square χ^2 (10) of 105.585, at p < 0.001, implying multivariate normality of data (Wipulanusat, Panuwatwanich, & Stewart, 2017). **Table 16** shows the summary results.

Table 16: KMO and Bartlett's Test for supplier development

Kaiser-Meyer-Olkin measure of sampling adequacy.		0.81
Bartlett's Test of Sphericity	Approx. Chi-Square	105.585
	df	10
	Sig.	0.000

Moreover, a one-factor model accounting for 79.01% of the data's total variance and an eigenvalue of 3.95 was retained. The Chi-square goodness of fit test generated insignificant $\chi^2(5) = 8.60$, $p = .060$ at 0.05 alpha value, signifying that the one factor had a good fit to data. The following variables had excellent loading on SD Factor; SD1, SD2, SD3, SD4, and SD5. Table 17 shows a summary of these results.

Table 17: Factors for supplier development

Factor	Eigenvalue	% of variance	Cumulative %
1	3.95	79.01	79.01

Note: $\chi^2(5) = 8.60$, $p < .060$.

Logistics Management Practices

The KMO result of 0.898 was above the .50 threshold, signifying sampling adequacy and sufficiently distributed matrix values for factor analysis (Yong & Pearce, 2013). Additionally, Bartlett's test was significantly high at α=0.000 with a Chi-square $\chi^2(28)$ of 374.22, at $p < 0.001$, implying multivariate normality assumption was met (Wipulanusat et al., 2017). **Table 18** displays a summary of these results

Table 18: KMO and Bartlett's Test for Logistic management

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.898
Bartlett's Test of Sphericity	Approx. Chi-Square	374.22
	df	28
	Sig.	0.000

Additionally, a one-factor model accounting for 75.09% of the total variance in the data and an eigenvalue of 3.98 was retained. The Chi-square goodness of fit results generated an insignificant $\chi^2(20) = 17.41$, $p < .107$, at .5 alpha value, signifying that the one factor had a good fit to data. The following variables had excellent loadings for logistics management, Log_M1, Log_M3, Log_M5, and Log_M6, while Log_M2, Log_M4, Log_M7and Log_M8 items had had very good loading. **Table 19** a summary results.

Table 19: Factors for logistics management

Factor	Eigenvalue	% of variance	Cumulative %
1	3.98	75.09	75.09

Note: $\chi^2(20) = 27.41$, $p < .107$

Strategic Sourcing Practices

The KMO result of 0.756 was above the .50 threshold, signifying sampling adequacy and sufficiently distributed matrix values for factor analysis (Yong & Pearce, 2013). Additionally, Bartlett's test is significantly high at α=0.000 with a Chi-square of $\chi^2(15)$ 187.804, at $p < 0.001$, implying multivariate normality of data (Wipulanusat et al., 2017). **Table 20** show a summary of these results.

Table 20:KMO and Bartlett's test for strategic sourcing practices

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.756
Bartlett's Test of Sphericity	Approx. Chi-Square	187.804
	df	15
	Sig.	0.000

Furthermore, a one-factor accounting for 77.60% of the variance and an eigenvalue of 2.26 was retained. The Chi-square goodness of fit test results generated an insignificant $\chi^2(9) = 15.30$, $p< 0.08$ at .5 alpha value, signifying that the one factor depicted the data well. Accordingly, SSP1, SSP2, SSP4, SSP5, and SSP6 items had excellent loadings, while SSP3 items had very good loading for the strategic procurement factor. **Table 21** shows the summary results.

Table 21:Factors for strategic sourcing practices

Factor	Eigenvalue	% of variance	Cumulative %
1	2.26	77.60	77.60

Note: $\chi^2(9) = 15.30$, $p< .080$.

Customer relationship management practices

The KMO result of 0.767 was above the .50 threshold, signifying sampling adequacy and sufficiently distributed matrix values for factor analysis (Yong & Pearce, 2013). Additionally, Bartlett's test is significantly high at α=0.000 with a Chi-square $\chi^2(10)$ of 163.202, at $p < 0.001$, implying multivariate normality of data (Wipulanusat et al., 2017). **Table 22** displays a summary of these results.

Table 22: KMO and Bartlett's test for CRM

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.767
Bartlett's Test of Sphericity	Approx. Chi-Square	163.202
	df	10
	Sig.	0.000

One factor accounting for 87.36% of the variance, and an eigenvalue of 2.37 was retained. The Chi-square goodness of fit test results generated $\chi^2(5) = 7.00$, $p = .220$, at 0.05 alpha value, signifying that the one factor had a good fit to the data. Accordingly, CRM1 and CRM2 variables had excellent loadings while CRM3, CRM4 CRM5 had very good loadings for the CRM factor. **Table 23** shows the summary results.

Table 23:Factors for customer relationship management practices

Factor	Eigenvalue	% of variance	Cumulative %
1	2.37	87.36	87.36

Note: $\chi^2(5) = 7$, $p < .220$.

ICT practices

The KMO of 0.797 was above the .5 threshold, signifying sampling adequacy and sufficiently distributed matrix values for factor analysis (Yong & Pearce, 2013). Additionally, Bartlett's test is significantly high at α=0.000 with a Chi-square $\chi^2(10)$ of 175.889, at $p < 0.001$, implying multivariate normality of data (Wipulanusat et al., 2017). **Table 24** presents a summary of these results.

Table 24: KMO and Bartlett's test for ICT

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.797
Bartlett's Test of Sphericity	Approx. Chi-Square	175.889
	df	10
	Sig.	0.000

One factor accounting for 85.49% of the variance and an eigenvalue of 2.77 was retained. Chi-square goodness of fit test results generated an insignificant $\chi^2(5) = 8.79$, $p = .068$ .05 alpha value, suggesting that the one factor had a good fit to the data. ICT1, ICT3, and ICT5 had excellent loadings on the ICT factor, while ICT2 and ICT4 had very good loadings. **Table 25** shows the summary results.

Table 25: Factors for ICT practices

Factor	Eigenvalue	% of variance	Cumulative %
1	2.77	85.49	85.49

Note: $\chi^2(5) = 9.79$, $p = .068$.

Competitive Advantage

The KMO of 0.92 was sufficiently above the .50, signifying sampling adequacy and sufficiently distributed matrix values for factor analysis (Yong & Pearce, 2013). Additionally, Bartlett's test is significantly high at α=0.000 with a Chi-square $\chi^2(28)$ of 956.251, at $p < 0.001$, implying multivariate normality of data (Wipulanusat et al., 2017). **Table 26** show a summary of these results.

Table 26: KMO and Bartlett's test for competitive advantage

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.92
Bartlett's Test of Sphericity	Approx. Chi-Square	956.251
	df	28
	Sig.	0.000

Accordingly, three factors were retained; One factor accounting for 41.43% of the variance with an eigenvalue of 3.31; followed by a second factor accounting for 24.73% of the variance with an eigenvalue of 1.18 and a third factor accounting for 19.97% of the variance with an eigenvalue of 0.80. The three factors combine had 86.13% of the total variance in the data. The Chi-square goodness of fit test results generated insignificant $\chi^2(7) = 9.53$, $p = .217$ at 0.05 alpha value, suggesting that three factors depicted a good fit to the data.

The following variable had excellent loadings for Factor 1 (Quality): CA1, while CA2 and CA8 variables had very good loadings. On the other hand, CA4 and CA7 variables had excellent loadings for Factor 2 (Cost). Moreover, CA3 and CA6 variables had very good loadings for Factor 3 (Responsiveness). **Table 27** shows these summary results.

Table 27: Factors for competitive advantage

Factor	Eigenvalue	% of variance	Cumulative %
1	3.31	41.43	41.43
2	2.18	24.73	66.16
3	1.80	19.97	86.13

Note: $\chi^2(7) = 9.53$, $p = .217$.

Organisational Performance

The KMO of 0.938 was above the .5 threshold, signifying sampling adequacy and sufficiently distributed matrix values for factor analysis (Yong & Pearce, 2013). Additionally, Bartlett's test is significantly high at α=0.000 with a Chi-square $\chi^2(36)$ of 1043.666, at $p < 0.001$, implying multivariate normality of data (Wipulanusat et al., 2017). **Table 28** shows a summary of these results.

Table 28: KMO and Bartlett's test for organizational performance

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.938
Bartlett's Test of Sphericity	Approx. Chi-Square	1043.566
	df	36
	Sig.	0.000

Three factors for organisational performance were extracted and retained. The first factor accounted for 24.29% of the variance with an eigenvalue of 1.94, while the second factor accounted for 21.12% of the variance with an eigenvalue of 1.61. Additionally, a third factor accounted for 18.55% of the variance with an eigenvalue of 1.32. The three factors combined had 63.96% of the total variance in the data. The Chi-square goodness of fit test results generated insignificant $\chi^2(7) = 10.40$, $p = .299$ at .05 alpha value, suggesting that three factors depicted a good fit to data.

Moreover, the following variable had excellent loadings OP1 while OP2 and OP3 variables had very good loadings for Factor 1(Market performance). On the other hand, OP4, OP5 and OP6 variables had excellent loadings for Factor 2 (Operational performance). The OP9 variable had excellent loadings, while OP7 and OP8 variables had very good loadings on Factor 3 (Customer satisfaction). **Table 29** shows Eigenvalues, Percentages of Variance, and Cumulative Percentages.

Table 29:Factors for organisational performance

Factor	Eigenvalue	% of variance	Cumulative %
1	1.94	24.29	24.29
2	1.61	21.12	45.41
3	1.32	18.55	63.96

Note: $\chi^2(7) = 10.40$, $p = .299$.

4.5.9 Confirmatory Factor Analysis

Supply Chain Management Practices

The Chi-square test of goodness fit for the five-factor model was insignificant $\chi^2(5) = 6.48$, $p = .262$. According to Hooper et al. (2008), a good model fit have an insignificant Chi-square statistic (χ^2) at 0.05 critical level. Additionally, other fit indices values are .98, .05, and .06 at 90% CI = [0, 0.17], for CFI, SRMR, and RMSEA, respectively, implying that the model was properly specified and had an adequate fit to the data. **Table 30** shows the summary results.

Table 30: SCM practices measurement model

NFI	TLI	CFI	RMSEA	SRMR
0.93	0.97	0.98	0.06	0.05

Note. $\chi^2(5) = 6.48, p = .262;$ RMSEA 90% CI = [0.00, 0.17]

Moreover, standardized loading for the five SCM practices indicators range from .73 to .87 and are all statistically significant at a 95% confidence level, suggesting that they adequately represent the latent constructs. Additionally, there were no observed variables with R^2 values ≤ of 0.20. According to Hooper *et al.* (2008), "R^2 value ≤ .20 suggests that the observed variable does not adequately describe the factor and should be considered for removal from the model". However, any R^2 greater than .90 is a manifestation of high collinearity (Kline 2015). **Table 31** presents R^2 values, along with the error for each observed variable.

Table 31: Parameters of SCM practices

Parameter Estimate	Unstandardized	Standardized	R^2	*p*
SCM practices	1.00(0.02)	1.00	----	<.001
LM practices	1.52(0.27)	0.77	0.59	< .001
ICT practices	1.42(0.25)	0.75	0.56	< .001
SD practices	1.71(0.28)	0.87	0.76	< .001
CRM practices	1.76(0.24)	0.73	0.53	< .001
SS practices	1.27(0.26)	0.83	0.69	< .001

$\chi^2(5) = 6.48$, $p = .262$: Significant level $p < .05$: R^2 = Squared multiple correlations

Competitive Advantage

Chi-square goodness of fit test generated insignificant, $\chi^2(9) = 16.27$, $p = .32$, indicating a good model fit. Additional, other fit indices revealed RMSEA = 0.01, 90% CI = [0, 0.15],

NFI= 0.92, CFI = 0.97, TLI = 1.00, SRMR = 0.06, model was properly specified and had an adequate fit to the data. **Table 32** presents a summary of these results.

Table 32: Competitive advantage measurement model

NFI	TLI	CFI	RMSEA	SRMR
0.92	1.00	0.97	0.01	0.06

Note. . $\chi^2(9) = 16.27$, $p = .032$; RMSEA 90% CI = [0.03, 0.18

Additionally, the loadings for all competitive advantage indicators were significant, and there were no observed variables with R^2 values ≤ of 0.20. According to Hooper *et al.* (2008), "R^2 value ≤ .20 suggests that the observed variable does not adequately describe the factor and should be considered for removal from the model". Additionally, any R^2 greater than .90 is determined to have high collinearity (Kline, 2015). **Table 33** shows a summary of these results.

Table 33: Parameters of competitive advantage

Parameter Estimate	Unstandardized	Standardized	R^2	*p*
Competitive Advantage	1.02(0.02)	1.00	----	< .001
Quality	1.27(0.18)	0.86	0.74	< .001
Cost	2.12(0.33)	0.75	0.56	< .001
Delivery dependability	1.89(0.14)	0.79	0.62	< .001

$\chi^2(9) = 16.27$, $p = .32$: Significant level p < .05: R^2 = Squared multiple correlations

Organisational Performance

The Chi-square goodness of fit test result is insignificant, $\chi^2(17) = 20.70$, $p = .12$, suggesting that the model fit the data well. Further results for other fit indices are RMSEA = 0.10, 90% CI = [0.05, 0.15], CFI = 0.98, TLI = 0.97, SRMR = 0.03 implying

that the model was properly specified and had an adequate fit to the data. **Table 34** show a summary of these results.

Table 34: Organisational performance measurement model

NFI	TLI	CFI	RMSEA	SRMR
0.96	0.97	0.98	0.10	0.03

Note. $\chi^2(17) = 20.70$, $p = .12$; RMSEA 90% CI = [0.05, 0.15]

Also, there were no observed variables with R^2 values $\leq .20$. Additionally, all the loadings for the items measuring competitive advantage were significant. According to Hooper *et al.* (2008), "R^2 value $\leq .20$ suggests that the observed variable does not adequately describe the factor and should be considered for removal from the model". Additionally, any R^2 greater than .90 is determined to have high collinearity (Kline, 2015). **Table 35** shows a summary of these results.

Table 35: Parameters of organisational performance

Parameter Estimate	Unstandardized	Standardized	R^2	p
Organisational Performance	1.22(0.32)	1.00	---	< .001
Efficiency	0.58(0.10)	0.83	0.69	< .001
Flexibility	2.10(0.36)	0.87	0.75	< .001
Responsiveness	2.73(0.47)	0.80	0.65	< .001

$\chi^2(17) = 20.70$, $p = .12$ Significant level p < .05: R^2 = Squared multiple correlations

4.6 Descriptive statistics for the variables

4.6.1 Logistic management practices

This study assessed the extent of adoption of LMPs in the dairy processing firms in Kenya. The following indicators were used to measure LM practices in this study;

Transport management, Material handling, Warehousing management, Inventory management, Order processing, Information flow management, Packaging and Physical distribution. The extent of adoption of these practices was measured on "a 7 Likert scale where 1= To an Extremely Small Extent and 7= To an Extremely Large Extent". Mean score and standard deviations for the observed variable of LM practices were calculated and presented in **Table 36**. The results revealed that logistics management had an overall mean score of 4.7, with a standard deviation of 1.4, indicating a moderate extent of practice adoption among Kenya's dairy processing firms.

Table 36: Descriptive statistics for LM practices

Statement	Mean	Standard Deviation
Transport management	5.1	1.2
Material handling	4.3	1.5
Warehousing	5.0	1.3
Inventory management	4.5	1.3
Order processing	5.1	1.4
Information flow management	4.8	1.5
Packaging	4.1	1.6
Physical distribution	4.7	1.4
Aggregate score	**4.7**	**1.4**

4.6.2 Customer Relationship Management Practices

This study assessed the extent of the use of CRM practices in the dairy processing industry in Kenya. The mean score for the following indicators; Customer segmentation, Product customisation, product differentiation, and customer valuation, was calculated to get the CRM practices' aggregate score. The extent of adoption of these practices was measured on "a 7 Likert scale where 1= To an Extremely Small Extent and 7= To an

Extremely Large Extent". Mean score and standard deviations for the observed variable of CRM practices were calculated and presented in **Table 37**. Results showed that CRM practices had an aggregate score of 3.37, with a standard deviation of 0.89, indicating a small extent of the practice adoption among the dairy processing firms in Kenya.

Table 37: Descriptive statistics for CRM practices

Statement	Mean	Standard Deviation
Customer segmentation	3.55	0.93
Product customisation	3.89	0.88
Product differentiation	3.46	0.89
Customer valuation	3.46	0.97
Customer information management	2.48	0.77
Aggregate score	**3.37**	**0.89**

4.6.3 Information and Communication Technology Practices

This study assessed the extent of application ICT practices among the Kenyan in the Kenya dairy processing industry. The overall score for ICT practices was calculated by taking a mean score for the following indicator; Information sharing, information integration, transport tracking systems, processing monitoring system, procurement systems. The extent of adoption of these practices was measured on "a 7 Likert scale where 1= To an Extremely Small Extent and 7= To an Extremely Large Extent". Mean score and standard deviations for the observed variable of ICT practices were calculated and presented in **Table 38**. The results revealed that ICT practice had an aggregate score of 3.4, with a standard deviation of 1.44, signifying a moderate extent of its adoption among Kenya's dairy processing firms.

Table 38: Descriptive statistics for ICT practices

Statement	Mean	Standard Deviation
Information sharing,	4.0	1.4
Information integration	2.8	1.5
Transport tracking systems	3.7	1.4
Processing monitoring system	2.8	1.4
Procurement systems.	3.7	1.5
Aggregate score	**3.4**	**1.44**

4.6.4 Supplier Development Practices

The study assessed the extent of adoption of SD practices among the dairy processing firms in Kenya. The SD practices score was calculated by taking the mean value of the following indicators credit support, artificial insemination (AI), veterinary services, animal feeds, and extension education. The extent of adoption of these practices was measured on "a 7 Likert scale where 1= To an Extremely Small Extent and 7= To an Extremely Large Extent". Mean score and standard deviations for the observed variable of SD practices were calculated and presented in **Table 39**. The results revealed that SD practices had an aggregate score of 4.6, with a standard deviation of 1.48, signifying a moderate extent of practice adoption among Kenya's dairy processing firms.

Table 39: Descriptive statistics for SD practices

Statement	Mean	Standard Deviation
Credit support	4.3	1.4
Artificial insemination (AI)	4.8	1.3
Veterinary services	4.7	1.5
Animal feeds	4.7	1.7
Extension education	4.6	1.5
Aggregate score	**4.62**	**1.48**

4.6.5 Strategic Sourcing Practices

This study assessed the extent of the adoption of strategic sourcing practices in the Kenyan dairy processing industry. The overall score for SS practices was obtained by taking a mean value of the following indicators; Supplier identification, supplier selection, supplier evaluation, communication with suppliers, relationship with suppliers, and quality evaluation. The extent of adoption of these practices was measured on "a 7 Likert scale where 1= To an Extremely Small Extent and 7= To an Extremely Large Extent". Mean score and standard deviations for the observed variable of SS practices were calculated and presented in **Table 40**. The results revealed that SS practices had an aggregate score of 4.52 with a standard deviation of 1.47, signifying a moderate extent of its adoption among Kenya's dairy processing firms.

Table 40: Descriptive statistics for SS practices

Statement	Mean	Standard Deviation
Supplier identification	5.16	1.37
Supplier selection	2.67	1.9
Supplier evaluation	4.56	1.28
Communication with suppliers	4.36	1.37
Relationship with suppliers	5.28	1.46
Quality evaluation	5.07	1.43
Aggregate score	**4.52**	**1.47**

4.6.6 Competitive Advantage

This study assessed the ability of the dairy processing firms in Kenya to form a defensive position with the industry. The overall score for CA was obtained by taking a mean value of cost/price, quality, and delivery dependability. Theses measures were evaluated on "a

7 points Likert scale (1=strongly disagree and 7= strongly agree)". Results in **Table 41** revealed that CA had an aggregate score of 4.71 with a standard deviation of 1.3, implying that most firms neither agreed nor disagreed that dairy firms in Kenya had developed the ability to maintain a defensive position in the industry.

Table 41: Descriptive statistics for competitive advantage

Indicator	Statement	MS	SD
Price/Cost	We offer competitive milk price to our customers	4.99	1.36
	We can offer prices lower than our competitors.	4.84	1.33
Quality	We offer high-quality products to our customer.	4.63	1.41
	We offer highly reliable products	4.99	1.2
	We can compete on a quality basis	4.94	1.28
Delivery dependability	We provide dependable delivery	4.48	1.28
	We deliver customer order on time	4.2	1.35
	We deliver the kind of products needed	4.6	1.18
	Aggregate score	**4.71**	**1.30**

MS=Mean Score, SD= Standard deviation

4.6.7 Organizational Performance

This study assessed the level of organizational performance in dairy processing firms. The overall score for OP was obtained by taking a mean value of flexibility, efficiency and responsiveness. These measures were evaluated on a 7 point Likert scale (1=strongly disagree and 7= strongly agree). Results in **Table 42** revealed that OP had an aggregate score of 5.3 with a standard deviation of 1.63, meaning that dairy firms in Kenya somewhat agreed that they achieved their organisational goals.

Table 42:Descriptive statistics for organisational performance

Indicator	Statement	MS	SD
Efficiency	Our processing cost has declined	5.46	1.62
	Our return on investment has improved	5.45	1.59
	Our inventory cost has declined	5.42	1.41
Flexibility	Our volume flexibility has improved	5.42	1.57
	Our delivery flexibility has improved	5.44	1.58
	Our mix flexibility has improved	5.47	1.45
Responsiveness	Our lead time has improved	5.17	1.76
	Customer complaints have declined	4.75	1.84
	Our customer response time has improved	5.16	1.81
	Aggregate score	**5.30**	**1.63**

MS=Mean score, SD=Standard deviation

4.7 Empirical Results

PLM-SEM was utilized to examine the structural relationships among the study variables. Bootstrapping was performed with 500 resamples to evaluate path coefficients' significance using 95% confidence intervals at an alpha value of 0.05 (Henseler et al., 2009; Sanchez, 2013; Chinn, 2010). Additionally, MLR was used to generate t values and beta coefficients to determine the significance of each predictor and the extent of prediction for each independent variable

4.7.1 Relationship between SCM practices and organisational performance

The structural equation modeling revealed an R^2 for the organisational performance of 0.92, indicating a substantial overall effect size. According to S. Hussain, Fangwei, Siddiqi, Ali, & Shabbir (2018), the R^2 value of 0.75= substantial, .50 = moderate, and 0.26= weak predictive power, respectively. Additionally, the GoF index of the structural model had a value of 0.72, implying that the model had an acceptable fit. According to Sanchez, 2013; Chinn (2010), "GoF values greater than .90 are considered a good model

fit, while less than .90 and greater than .70 is an acceptable model fit, and less than or equal to .70 signify poor model fit". **Table 43** displays a summary of the structural model

Table 43: Summary of the structural model

Construct	Type	R^2	GoF
SCM_Practices	Exogenous	--	
Org_performance	Endogenous	0.92	0.73

Note. R^2 = coefficient of determination

Path analysis for the relationship between SCM practices → Org_performance revealed a regression coefficient of (B)=0.96 indicating a large positive significant effect. Based on Cohen's f^2 value, the effect size can be interpreted as follows "0.02, 0.15, and 0.35 represent small, medium, and large effects", respectively (Hair jr *et al.*, 2014). According to Hair et *al.* (2017), a significant effect is confirmed by a lack of zero in the confidence intervals for an estimated path coefficient leading to the rejection of the null hypothesis.

$H_0$1: SCM practices does not have significant effects on organisational performance

The confidence interval 95% CI [0.95, 0.98] from Bootstrap results did not include zero, leading to the rejection of the null hypothesis that SCM practices do not significantly affect organisational performance. **Table 44** shows a summary of path analysis.

Table 44: Path analysis results

Path	Original B	*M*	*SE*	95% CI	Accept/Reject
SCM practices → Org_performance	0.96	0.96	0.01	[0.95, 0.98]	Rejected

Note. Estimates based on 500 samples. CI= Confidence level. Alpha value =0.05

The linear regression model results are significant with $F(5,83) = 75.65$, $p < .001$, $R^2 = 0.82$. Further results shows that, SD has a positive significant relationship with organisational performance, $B = 0.54$, $t(83) = 4.61$, $p < .001$. Further results showed that ICT had a positive significant relationship with organisational performance, $B = 0.48$, $t(83) = 4.31$, $p < .001$. Additionally, Logistics management had a positive significant relationship with organisational performance, $B = 0.39$, $t(83) = 3.54$, $p < .001$. Similarly, the relationship between strategic sourcing and organisational performance was positive and significant, $B = 0.36$, $t(83) = 4.31$, $p < .001$. Moreover, the relationship between CRM and organisational performance, $B = 0.36$, $t(83) = 3.26$, $p = .002$ was positive and significant. **Table 45** summarizes the bootstrapping results for the regression model.

Table 45: Summary of regression output

Variable	*B*	*SE*	95% CI	β	*t*	*p*
(Intercept)	0.71	0.30	[0.58, 0.81]	0.00	2.39	.019
SD practices	0.54	0.12	[0.31, 0.78]	0.28	4.61	< .001
ICT practices	0.48	0.11	[0.26, 0.70]	0.25	4.31	< .001
LM practices	0.39	0.11	[0.17, 0.61]	0.22	3.54	< .001
SS practices	0.36	0.08	[0.19, 0.53]	0.24	4.31	< .001
CRM practices	0.36	0.11	[0.14, 0.58]	0.19	3.26	.002

Results: $F(5,83) = 75.65$, $p < .001$, $R^2 = 0.82$;

Organisational performance = 0.71 + 0.54*SD + 0.48*ICT + 0.39*LogMan + 0.36*SP + 0.36*CRM.

4.7.2 Relationship Between SCM Practices And Competitive Advantage

The structural equation modeling result shows that the R^2 for the competitive advantage of 0.9, indicating a substantial overall effect size. According to Hussain *et al.* (2018), the R^2 value of 0.75= substantial, .50 = moderate, and 0.26= weak predictive power, respectively. Additionally, the GoF index of the structural model had a value of 0.72, implying that the model had an acceptable predictive power. Additionally, the GoF index of the structural model had a value of 0.72, indicating an acceptable model fit. According to Sanchez, 2013; Chinn (2010), "GoF values greater than .90 are considered a good model fit, while less than .90 and greater than .70 is an acceptable model fit, and less than or equal to .70 signify poor model fit". **Table 46** displays a summary of the structural model.

Table 46: Summary of the inner model

Construct	Type	R^2	GoF
SCMPractices	Exogenous	--	
Competitive advantage	Endogenous	0.90	0.72

Note. R^2 *=Coefficient of determination.*

Path analysis for the relationship between SCM practices → Competitive advantage revealed a regression coefficient (B)=0.95, indicating a large positive effect. Based on Cohen's f^2 value, the effect size can be interpreted as follows "0.02, 0.15, and 0.35 represent small, medium, and large effects", respectively (Hair jr *et al.*, 2014). According to Hair et *al.* (2017), a significant effect is confirmed by a lack of zero in the

confidence intervals for an estimated path coefficient leading to the rejection of the null hypothesis.

(H02): SCM practices does not have significant effects on competitive advantage

The confidence intervals 95% CI [0.93, 0.97] from Bootstrap results did not include zero leading to the rejection of the null hypothesis that SCM practices do not significantly affect competitive advantage. **Table 47** shows a summary of the path analysis.

Table 47: Path analysis results

Path	Original B	*M*	*SE*	95% CI	Accept/ Reject
SCM practices → Competitive advantage	0.95	0.95	0.01	[0.93, 0.97]	Rejected

Note. Estimates based on 500 samples. 95% CI= Confidence interval. Alpha value = 0.05

The MLR results are significant with $F(5,83) = 164.26$, $p < .001$, $R^2 = 0.91$. Further, analysis revealed a positive significant relationship between strategic procurement competitive advantage, $B = 0.62$, $t(83) = 8.31$, $p < .001$. Also, Customer relationship management has a positive significant relationship with Competitive advantage, $B = 0.37$, $t(83) = 5.22$, $p < .001$. Similarly, Logistics Management has a positive significant relationship with competitive advantage $B = 0.41$, $t(83) = 4.96$, $p < .001$. Moreover, SD practices had a positive significant relationship with competitive advantage $B = 0.55$, $t(83) = 4.89$, $p < .00$. Moreover, the results reveals a positive significant relationship between ICT and competitive $B = 0.40$, $t(83) = 3.92$, $p < .001$. **Table 48** displays a summary of summarizes MLR analysis.

Table 48: Multiple Linear Regression results

Variable	*B*	*SE*	95% CI	β	*t*	*p*
(Intercept)	-1.11	0.24	[-1.59, -0.63]	0.00	-4.62	< .001
SP	0.62	0.07	[0.47, 0.76]	0.39	8.31	< .001
CRM	0.37	0.07	[0.23, 0.52]	0.23	5.22	< .001
LM	0.41	0.08	[0.25, 0.57]	0.21	4.96	< .001
SD	0.55	0.11	[0.33, 0.78]	0.23	4.89	< .001
ICT	0.40	0.10	[0.20, 0.61]	0.18	3.92	< .001

Note. Results: $F(5,83)$ = 164.26, p < .001, R^2 = 0.91

CA = -1.11 + 0.62*SP + 0.37*CRM + 0.41*LM + 0.55*SD + 0.40*ICT

4.7.3 Relationship Between Competitive Advantage and Organisational Performance

The structural equation modeling result shows that the R^2 for the organisational performance of 0.96, indicating a substantial overall effect size. According to Hussain *et al.* (2018), the R^2 value of 0.75= substantial, .50 = moderate, and 0.26= weak predictive power, respectively. Additionally, the GoF index of the structural model had a value of 0.82, implying that the model had an acceptable model fit. According to Sanchez, 2013; Chinn (2010), "GoF greater than .90 are considered a good model fit, while less than .90 and greater than .70 is an acceptable model fit, and less than or equal to .70 signify poor model fit". **Table 49** shows a summary of the structural model.

Table 49: Structural model summary

Construct	Type	R^2	GoF
Competitive Advantage	Exogenous	--	
Org_performance	Endogenous	0.96	0.82

Note. R^2 = coefficient of determination

Path analysis for the relationship between Competitive advantage→ Org_performance revealed a regression coefficient of (B)=0.98, indicating a large positive significant effect. Based on Cohen's f^2 value, the effect size can be interpreted as follows "0.02, 0.15, and 0.35 represent small, medium, and large effects", respectively (Hair jr *et al.*, 2014). According to Hair et *al.* (2017), a significant effect is confirmed by a lack of zero in the confidence intervals for an estimated path coefficient leading to the rejection of the null hypothesis.

(H03): Competitive advantage does not have significant effects on organisational performance

Confidence intervals 95% CI [0.97, 0.99] from Bootstrap results did not include zero leading to the rejection of the null hypothesis that competitive advantage does not significantly affect organisational performance. **Table 50** shows a summary of path analysis

Table 50: Path analysis results

Path	Original B	*M*	*SE*	95% CI	Accept/ Reject
Competitive Advantage → Org_performance	0.98	0.98	0.00	[0.97, 0.99]	Rejected

Note. Estimates based on 500 samples

Moreover, results for the MRL are significant with $F(3.85) = 596.50$, $p < .001$, $R^2 = 0.95$. Further results shows that responsiveness has positive significant relationship with organisational performance, $B = 0.30$, $t(85) = 13.26$, $p < .001$. Similarly, Quality has a significant relationship with organisational performance, $B = 0.38$, $t(85) = 13.25$, $p <$

.001. Additionally, Cost has a positive significant relationship with organisational performance, $B = 0.29$, $t(85) = 11.79$, $p < .001$. **Table 51** summarizes regression results

Table 51: Summary of regression output

Variable	*B*	*SE*	95% CI	β	*t*	*p*
(Intercept)	-0.19	0.12	[-0.06, 0.43]	0.00	1.51	.134
Responsiveness	0.30	0.02	[0.25, 0.34]	0.37	13.26	< .001
Quality	0.38	0.03	[0.32, 0.43]	0.42	13.25	< .001
Cost	0.29	0.02	[0.24, 0.34]	0.38	11.79	< .001
Note. Results: F(3.85) = 596.50, p < .001, R2 = 0.95						

4.7.4 Mediation Analysis

The structural equation modeling result shows that the R^2 of 0.41 and 0.5 for the competitive advantage and organisational performance, indicating a moderate overall effect size. According to Hussain *et al.* (2018), the R^2 value of 0.75= substantial, .50 = moderate, and 0.26= weak predictive power, respectively. Additionally, the GoF index of the structural model had a value of 0.71, implying that the model had an acceptable model fit. According to Sanchez, 2013; Chinn (2010), " GoF greater than .90 are considered a good model fit, while less than .90 and greater than .70 is an acceptable model fit, and less than or equal to .70 signify poor model fit". **Table 52** shows a summary of the structural model.

Table 52: PLS-SEM structural model output

Construct	Type	R^2	GoF
SCM_Practices	Exogenous	--	
Comp_Advantage	Endogenous	0.41	
Org_Performance	Endogenous	0.50	0.71

Note.R^2 = Coefficient of determination

Path analysis for the relationship between SCM practices → Org_Performance revealed a regression coefficient of (B)=0.487, indicating a positive and large effect relationship. Also, path SCM practices→ CA has a regression coefficient of (B)=0.639, indicating a large positive effect. Further, the path Competitive advantage→ Org_performance revealed a regression coefficient (B)=0.29, indicating a positive and medium effect relationship. According to Hair jr *et al.*(2014), the effect size can be interpreted as follows "0.02, 0.15, and 0.35 representing small, medium, and large effects", respectively.

Furthermore, non of the confidence interval for the three path models; SCM practices → Org_Performance [0.30, 0.67], SCM practices → CA [0.52, 0.77], and CA → Org_Performance [0.09, 0.49], had zero in their confidence intervals, indicating that three regression coefficients were significant, hence rejecting the three null hypotheses. According to Hair et *al.* (2017), a significant effect is confirmed by a lack of zero in the confidence intervals for an estimated path coefficient leading to the rejection of the null hypothesis. **Table 53** shows the bootstrap for the three regression paths.

Table 53: PLS-SEM path analysis

Path	Original B	*M*	*SE*	95% CI	Sig (p<0.05)
SCM practices → Org_Performance	0.487	0.48	0.09	[0.30, 0.67]	yes
CA → Org_Performance	0.285	0.29	0.10	[0.09, 0.49]	yes
SCM practices→ CA	0.639	0.65	0.06	[0.52, 0.77]	yes

Note. Estimates based on 500 samples; Confidence Intervals (CI) are based on an alpha value of 0.05.

(H_04): Competitive advantage does not mediate the relationship between SCM practices and organisational performance

The second mediation analysis step was the assessment of the significance of the indirect effect. The product of path coefficients of SCM practices→ Competitive Advantage denoted as (a), and Competitive Advantage → Org_Performance denoted as (b) represented the indirect effect in this study. According to Cepeda *et al.* (2017), the indirect effect (ab) must be significant to establish a mediation effect. According to Cepeda *et al.* (2017a), "a significant effect is confirmed by a lack of zero (0) in the confidence interval (CI) for the indirect effect, implying that the path coefficient is statistically different from 0". Confidence interval 95% CI [0.176, 0.242] in **Table 54** revealed the absence of zero hence rejecting the null hypothesis that competitive advantage does not mediate the relationship between the SCM practices and the organisational performance. Therefore, the significant indirect effect implied the presence of a mediation mechanism in the model.

Table 54: Indirect path analysis

Path	Direct effect	Indirect effect (axb)	SE	95% CI	Sig($p<0.05$)
SCM practices→CA→ Org_Performance	0.000	0.182	0.02	[0.06, 0.24]	Yes
SCM practices → Org_Performance	0.487	0.000	0.09	[0.30, 0.67]	Yes
CA → Org_Performance (b)	0.285	0.000	0.10	[0.09, 0.49]	Yes
SCM practices → CA (a)	0.639	0.000	0.06	[0.50, 0.77]	Yes

Note: a=SCM practices → CA, b= CA → Org_Performance. SE=Standard error

These results are present in a full structural model in **Figure 7.**

Figure 7: Full structural model

4.7.5 Type Size of Mediation Effect

Further, the study sought to examine the mediation effect's strength by calculating the total effect and variance account for (VAF).

$$\text{VAF} = \frac{a*b}{a*b+c\prime} \qquad (6)$$

$$\text{VAF} = \frac{0.639 * 0.285}{0.639 * 0.285 + 0.487} = 0.27$$

According to Nitzl et *al.* (2016), VAF below 20% indicate that nearly zero mediation occurs while a VAF between 20% and 80% signifies partial mediation and VAF above 80% indicates a full mediation. According to Hair *et al*. (2013), "partial mediation is established when VAF exceeds the 0.2 threshold level, and that full mediation is demonstrated when it exceeds 0.8". Accordingly, the study established partial mediation since the calculated VAF= 0.27.

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This chapter discusses the results based on the empirical findings from the analysis. Specifically, the chapter will discuss CFA analysis results, followed by the results of study objectives: the relationship between SCM practices and organisational performance: the relationship between SCM practices on competitive advantage: the relationship between competitive advantage and organisational performance and the mediation analysis.

5.2 Confirmatory Factor Analysis

Chi-square goodness of fit results for the three measurement models was not significant, indicating that the models fitted the data well. Furthermore, other fit indices**,** RMSEA, CFI, TLI, and SRMR, were all within the recommended threshold, implying that the three models fitted the data well (Hooper et al., 2008). The results revealed that all the observed variables an R^2 greater than 0.20, suggesting that they adequately described their factors well (Sanchez, 2013).

These results confirmed a reflective second-order construct for SCM practice comprised of five variables: supplier development, logistics management, strategic sourcing, ICT, and CRM. The measurement model can be either reflective or formative. In a reflective measurement model, the underlying construct gives rise to its error-prone manifestations or indicators (Avkiran & Ringle, 2018).

5.3 Effects of SCM Practices on Organisational Performance

The objective sought to explore the effects of SCM practices on Kenya's dairy processing firms' organisational performance. The following hypothesis guided the analysis of this objective:

> *Null Hypothesis (H_0): SCM practices do not significantly affect Kenya's dairy processing firms' organisational performance.*

Bootstrapping with 500 resamples was performed to evaluate the path coefficient's significance using 95% confidence intervals and an alpha value of 0.05 (Henseler et al., 2009; Sanchez, 2013; Chinn, 2010). PLS-PM results revealed that the path coefficient was significantly different from 0 hence rejecting the null hypothesis meaning that SCM practices significantly predicted Org_performance, $B = 0.96$, 95% CI [0.95, 0.98], in the Kenyan dairy processing industry. Thus, a one-unit surge in SCM_Practices will raise the expected value of Org_performance by 0.96 units. Further results from regression analysis were significant with $F(5,83) = 75.65$, $p < .001$, $R^2 = 0.82$, implying that about 82% of the variance in organisational performance is explainable by SD, SS, ICT, LogMan, and CRM, and the remaining variance of 18% is explained by factors beyond the scope of this study.

These results are congruent with previous findings. For instance, Al-Shboul, Barber, Garza-Reyes, Kumar, & Abdi (2018) established that SCM practices positively impact supply chain performance. According to Hussain, Hussain, Akbar, Sulehri, & Maqbool (2014), superior SCM practices enhance an organization's "market performance and financial performance and overall competitive position". Another study by A. Kumar &

Kushwaha (2018) shows that SCM practices "have a significant and positive relationship with the operational performance". A study by Apopa (2018) established a "positive association between supply chain management practices and government ministries' performance in Kenya". Additionally, Barasa (2016) revealed a "statistically significant relationship between supply chain management practices and Steel manufacturing companies' performance in Kenya". Thus, successful implementation of SCM practices improves efficiency, flexibility, and responsiveness (Gorane *et al.*, 2018).

Multiple regression results disclosed that Supplier development practices have the highest significant effect on organisational performance at $B = 0.54$, $t(83) = 4.61$, $p < .001$, indicating a one-unit increase in SD practices will raise the expected value of organisational performance by 0.54 units. Thus, SD practices are important components of SCM since they play a vital role in improving buyer-supplier performance (Rajput & Bakar, 2012). Consequently, SD practices such as credit facilities, extension education, provision of AI services, veterinary services, and animal feeds are key drivers of performance improvement in Kenya's dairy processing firms. These SD practices enhance organisational performance by reducing production cost, improving the product's quality, speed to the market, and operational flexibility (Adedokun, Onikola, & AKoe, 2017).

Past studies have revealed similar results. A study by Yegon *et al*. (2015) revealed that technical support and financial support to supplier had a positive effect on buyer performance. Another study by Lubale & Kioko (2016) found that supplier development has statistically significant effects on organizational performance. Additonally, Li,

Humphreys, Yeung, & Cheng (2012) revealed that a co-operative buyer-supplier relationship is associated with significant "cost reduction, shorter lead-time, increased productivity, and enhanced quality". Thus, a collaborative effort between a buyer and suppliers leads to improved quality at a reduced cost (Gichohi et al., 2018).

ICT practices significantly predicted organisational performance $B = 0.48, t(83) = 4.31, p < .001$ in Kenya's dairy processing industry. Thus, a one-unit surge in ICT practices will raise the expected value of organisational performance by 0.48 units. By providing timely, accurate, and reliable information, ICT investment can greatly improve organisational performance and the overall supply chain performance (SCP). Thus, ICT practices provide a platform for information sharing and other collaboration forms between customers and suppliers. SimchiLevi *et al.* (2003) noted that the integration of ICT provides organizations with a competitive strategy. The implementation of ICT enables businesses to improve communication and coordination of different value-adding activities with their collaborators and between departments within their activities. Thus, applying ICT practices provides substantial cost savings opportunities, increased versatility, accelerated response times and enhanced customer support (Momanyi & Sanewu, 2014).

Previous studies have found that overall ICT capability is positively linked to organizational performance (Bharadwaj, 2000; Kearns and Lederer, 2003; Wamba *et al*., 2008), while others have found that investment in IT can give a firm a significant competitive advantage. Additionally, Nyaberi & MWangangi, (2014) found that adoption of information systems improves performance through "enabling inquiries of inputs to be

made quickly, Orders are emailed quickly, evaluations of suppliers are carried out quickly, and electronic payment is made fast".

Logistics management practices significantly predicted organisational performance (B = 0.39, $t(83) = 3.54$, $p < .001$) in the dairy processing firms in Kenya. Thus, a one-unit surge in LM practices will raise the expected value of organisational performance by 0.39 units. Thus logistics management practices such as milk bulking and chilling, transport management, material planning, packaging, storage, and distribution can increase the dairy processing firms' organisational performance in Kenya. Therefore, effective logistics management practices can drive organisational performance through increased profits, sales volume, services delivery, operational efficiency, and product quality (Green, Whitten, & Inman, 2008). Additionally, companies could attain consumer satisfaction by establishing flexibility in logistics to allow rapid delivery of finished goods products by establishing collection and distribution centres (Zhang et al., 2005). Timely delivery of the products ensures that the products collected are fresh and therefore, the customer is satisfied, which in turn increases the supplies need.

Past studies concurred with these results. Mwangangi (2016) disclosed that logistics management practices such as "transport management, inventory management, order process management and information flow management were individually predictors of firm performance". Additionally, Nuahn (2017) "revealed a positive and significant relationship between logistics operations and the performance" of Kenya creameries co-operative society. Besides, Kirui & Nondi (2017) found that warehousing, inventory management, reverse logistics and transport management were statically significant

predictors of firm performance. Furthermore, a study by Wangari & Kagiri (2015) revealed that "inventory management practices positively and significantly affect profit maximization, customer satisfaction, market share growth and product quality".

CRM practices significantly predicted organisational performance ($B = 0.36$, $t(83) = 3.26$, $p = .002$) in the dairy processing firms in Kenya. Thus, a one-unit surge in CRM practices will raise the expected value of organisational performance by 0.36 units. Thus, CRM practices such as product specifications, customer management system, customer satisfaction, information sharing with customers, and joint problem solving with customers can greatly benefit both the client and organisation.

CRM practices are necessary to ensure better customer value, customer retention, and a good relationship with customers. In marketing performance, firms' use of CRM practices will increase customer loyalty and customer retention through improved customer satisfaction. According to Tworek & Sałamacha (2019), effective CRM practices implementation lead to enhanced customer acquisition, customer retention, financial benefits, customer loyalty, cross-selling, customer profitability, value creation for the customer, customisation of products and services.

Previous studies found similar results indicating that CRM is a significant predictor of organisational performance. A study by Elaheh Taghavi Shavazi (2013) disclosed that CRM components are significant predictors of performance measures. Additionally, Mohamad et al. (2014) showed that "CRM practices have a significant positive effect on organizational performance".

Strategic sourcing significantly predicted organisational performance $B = 0.36$, $t(83) = 4.31$, $p < .001$, in Kenya's dairy processing firms. Thus, milk processors can secure uninterrupted supplies of quality raw milk by adopting effective strategic sourcing practices such as supplier selection, supplier relationship, quality checks, frequency of milk payment, milk grading, and supplier evaluation are significant predictors of organisational performance in the dairy processing firms in Kenya. These SCM practices have the potency to enhance market and operational performance and customer satisfaction of an organisation. These findings support other results from the previous studies that found a significant positive effect of strategic procurement practices on organisational performance. Kumar (2015) confirmed that SS practices have a significant impact on organisational performance.

5.4 Effects of SCM Practices on Competitive Advantage

The objective explored the effects of SCM practices on Kenya's dairy processing firms' organisational performance. The following hypothesis guided the analysis of this objective:

> *Null Hypothesis (H_0): SCM practices do not significantly affect Kenya's dairy processing firms' competitive advantage.*

Bootstrapping with 500 resamples was performed to evaluate the path coefficient's significance using 95% confidence intervals and an alpha value of 0.05 (Henseler *et al.*, 2009; Sanchez, 2013; Chinn, 2010).PLS-PM results revealed that the path coefficient was significantly different from 0 hence rejecting the null hypothesis meaning that SCM practices significantly predicted competitive advantage $B = 0.95$, 95% CI [0.93, 0.97] in

the Kenyan dairy processing industry. Thus, a one-unit surge in SCM_Practices will raise the expected value of competitive advantage by 0.95 units. Further results from regression analysis were significant with $F(5,83) = 164.26$, $p < .001$, $R^2 = 0.91$, indicating that 91% of the variance in competitive advantage is explained by strategic sourcing practices, CRM practices, LM practices, and ICT practices and the remaining variance of 9% is explained by factors beyond the scope of this study.

Past studies have demonstrated that various SCM practices' dimensions influence CA's aspects, such as cost/price levels, quality, and responsiveness. A study by Tracey et al. (1999) linked SCM practice competitive capabilities and established a positive and statistically significant relationship. Additionally, Thatte (2007) investigated the relationship between SCM Practices and competitive advantage and established that higher SCM practice levels lead to higher competitive advantage levels.

Further, Nik *et al*. (2014) examined the impact of SCM practice and the competitive position of small and medium food-processing enterprises (SMEs) in the Malaysian Peninsular. They concluded that selected SCM practices have a direct effect on competitive advantage. Besides, Kariithi (2016) established that firms with higher implementation of SCC, SCA and SCI strategies achieved sustained competitive advantage.

Another study by Quynh & Huy (2018) established that SCM practices have a significant positive influence on the competitive advantage at 0.01% significance level. Wijetunge W.A.D.S. (2016) found a significant correlation between SCM Practices and competitive

advantage. Moreover, Anatan (2014) revealed that SCM practices have a significant influence on competitive advantage.

Individually, strategic sourcing practices significantly predicted competitive advantage $B = 0.62$, $t(83) = 8.31$, $p < .001$ in Kenya's dairy processing firms. Thus, a one-unit change in SS practices will raise the expected value of competitive advantage by 0.62 units. Thus strategic sourcing practices can drive the competitive advantage through reduced costs, improved quality, and delivery dependability in the Kenyan dairy processing firms. The study revealed that strategic sourcing practices such as building long-term relationships with suppliers, performance evaluation, material planning, setting quality standards, supplier selection, and effective sourcing decisions are critical components for enhancing the cost, quality, and delivery dependability of the milk processing firms. These results agree with the existing literature suggesting that supplier development is a major contributor to buyer competitive advantage improvement (Li *et al.*, 2012).

Similarly, supplier development practices significantly predicted competitive advantage in Kenya's dairy processing firms, $B = 0.55$, $t(83) = 4.89$, $p < .00$. Thus a one-unit surge in supplier development practices will raise the expected value of competitive advantage by 0.55 units. Thrulogachantar & Zailani (2011) revealed that sourcing practices significantly impact the firms' competitive priorities regarding quality, cost, cycle time, new product introduction timeline, delivery speed, and dependability and responsiveness. Thus, milk processors can secure a competitive advantage by adopting strategic sourcing

practices such as supplier selection, supplier relationship, quality checks, frequency of milk payment, milk grading, and supplier evaluation.

Logistics management practices significantly predicted competitive advantage, $B = 0.41$, $t(83) = 4.96$, $p < .001$, indicating that a one-unit surge in logistics management practices will raise the average value of competitive advantage by 0.41 units. Thus, logistics management practices provide many ways of increasing "efficiency and productivity and significantly reducing unit costs" (Christopher, 2007). A study by Helmy, ElMokadem, Abd el Bary, & El-Sayeh (2018) revealed that Logistics management could significantly impact the cost advantage.

ICT practices significantly predicted competitive advantage, $B = 0.40$, $t(83) = 3.92$, $p < .001$, indicating that on average, a one-unit surge in ICT practices will raise the value of competitive advantage by 0.40 units. Thus, ICT practices are associated with a high competitive advantage in attaining flexibility, quality, cost, delivery, and service performance. Advancement and alignment of ICT can facilitate the "development of supply chain capabilities" that enhance the supply chain's responsiveness through speedy information sharing (Wu et al., 2006). Adopting ICT practices allows information sharing among supply chain members leading to improved "forecasting, synchronising production and delivery, coordinating inventory-related decisions, and developing a shared understanding of performance bottlenecks" (Zhang, 2012). Therefore, utilising ICT practices helps firms capture unique value-creating opportunities leading to a competitive advantage over their competitors and superior organisational performance (Rehman *et al.*, 2018)**.** The results agree with the existing literature that revealed the critical role ICT practices have on establishing a sustainable competitive advantage

(Marinagi, Trivellas, & Sakas, 2014). According to Lai *et al*. (2006), firms with high ICT levels acquire a competitive advantage in cost reduction reducing cost and cycle time and quality improvement.

CRM Practices significantly predicted competitive advantage, $B = 0.37$, $t(83) = 5.22$, $p < .001$, indicating that on average, a one-unit surge in CRM practices will raise the expected value of competitive advantage by 0.37 units. Thus, a good rapport with the consumer generates customer satisfaction and loyalty, which gives an organization a competitive advantage over competitors (Anatan, 2014). Additionally, building a long-term relationship with customers is "crucial for achieving sustainable competitive advantage and improving performance" (Shavazi et al., 2013).

5.5 Effects of Competitive Advantage and Organisational Performance

The objective sought to explore the effects of competitive advantage on Kenya's dairy processing firms' organisational performance. The following hypothesis guided the analysis of this objective:

> *Null Hypothesis (H_0): Competitive advantage does not significantly affect Kenya's dairy processing firms' competitive advantage.*

Bootstrapping with 500 resamples was performed to evaluate the path coefficient's significance using 95% confidence intervals and an alpha value of 0.05 (Henseler *et al.*, 2009; Sanchez, 2013; Chinn, 2010).PLS-PM results revealed that the path coefficient was significantly different from 0 hence rejecting the null hypothesis. These results indicate that competitive advantage significantly predicted organisational performance $B = 0.98$, 95% CI [0.97, 0.99] in the Kenyan dairy processing industry. Thus, a one-unit surge

in competitive advantage will raise the expected value of organisational performance by 0.98 units. Further results from regression analysis were significant with $F(3.85) = 596.50$, $p < .001$, $R^2 = 0.95$, indicating that 95% of the variance in competitive advantage is explained by Quality, Cost and delivery dependability the remaining variance of 4% is explained by factors beyond the scope of this study.

More results revealed that cost significantly predicted organisational performance, $B = 0.38$, $t(85) = 13.25$, $p < .001$, indicating that a one-unit surge in cost will raise the expected value of organisational performance by 0.38 units. Further results revealed that quality significantly predicted organisational, $B = 0.30$, $t(85) = 13.26$, $p < .001$, indicating that a one-unit surge in quality will raise the expected value of organisational performance by 0.3 units. Moreover, results revealed that delivery dependability significantly predicted organisational performance, $B = 0.29$, $t(85) = 11.79$, $p < .001$, indicating that a one-unit surge in delivery dependability will raise the expected value of organisational performance by 0.29 inits. These results confirmed a significant positive relationship between CA and OP. Thus, competitive advantage is a precursor to a firm's significant organisational performance (Ismail *et al.,* 2010). These results are congruent with previous studies that established a positive and significant relationship between CA and OP. Zulkarnain, Salim, & Sumiati (2018)found that competitive advantage positively influenced company performance. A study by Duran & Akçi (2015) found that the competitive advantage positively and significantly influences a firm's performance. Similarly, Quynh & Huy (2018) established that competitive advantages could significantly influence firm performance. Therefore, the association between a

company's competitive advantage and its performance lead to high profits in almost all organisations (Sajady *et al.*, 2011).

5.6 Mediation Analysis

The objective sought to examine whether competitive advantage mediates the relationship between SCM practices and organisational performance. The following hypothesis guided the analysis:

> *Null Hypothesis (H_0): Competitive advantage does not mediate the relationship between SCM practice and organisational performance.*

Bootstrapping with 500 resamples was executed to evaluate the path coefficient's significance using 95% confidence intervals and an alpha value of 0.05 (Henseler *et al*., 2009; Sanchez, 2013; Chinn, 2010). According to Cepeda *et al.* (2017), "testing the indirect effect's significance (a×b) provides all the information needed to establish a mediation effect". PLS-PM results revealed that the indirect effect SCM practices→CA→ Org_Performance, B = 0.182, 95% CI [0.176, 0.242], was significant, meaning that the path coefficient was significantly different from zero and hence rejecting the null hypothesis. These results revealed that competitive advantage significantly mediates the relationship between SCM practice and organisational performance. However, the direct path coefficient SCM practices → Org_Performance, B=0.487, 95% CI[0.30, 0.67] was also significant, indicating that SCM practices directly affect organisational performance. These results reveal that competitive advantage has a partial mediational effect in the model. "Partial mediation occurs when both the direct and indirect effect is significant" Cepeda *et al.* (2017), which is the case in this study.

Previous studies regarding the mediation effect of competitive advantage in the relationship between SCMP and performance have revealed similar results. For instance, Hatani *et al.* (2013) established that competitive advantage partially mediates the relationship between supply chain flexibility and firm performance. Wijetunge (2016) established partial mediation effects of competitive advantage in the relationship between SCMP and organizational performance. Moreover, Rakhman, Surachman, Rahayu, & Sumiati (2016) revealed that CA had a partial mediation role in the relationship between SCM practice and the OP.

These results agree with the conceptual framework proposed at the beginning of this study. The SCM practices were conceptualised to "affect organisational performance directly and indirectly through competitive advantage as the mediating variable". These results are summarized in a structural model shown in Figure 8linking SCM practice, competitive advantage, and organisational performance.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter summarises the study findings followed by conclusions and recommendations. Specifically, the results are summarized based on the study objectives. Further, the chapter presents conclusions, implications of the study and recommendations for future studies.

6.2 Summary of Empirical Results

This study examined the effects of SCM practices on CA and OP in Kenya's dairy industry. Concurrently, the study assessed the mediational role of CA on the relationship between SCM practice and OP.

6.2.1 Confirmatory Factor Analysis

The indicator loadings for the five SCM practices were significant, supporting a reflective measurement model. Additionally, the SCM practices measurement model generated an insignificant Chi-square goodness of fit test $\chi^2(5) = 5.03$, $p = .412$, at 0.5 significant level indicating a good model fit model. The results support the second-order configuration of SCM practices comprising five factors SD practice, LM practice, SS practice, ICT practice, and CRM practices.

6.2.2 Effect of SCM Practices on Organisational Performance

PLS-SEM results established that SCMPractices significantly predicted Organisational performance, $B = 0.96$, 95% CI [0.95, 0.98], indicating a one-unit increase in SCM practices increase the expected value of Organisational performance by 0.96 units. The regression model results were also significant with $F(5,83) = 75.65$, $p < .001$, $R^2 = 0.82$,

indicating that approximately 82% of the variance in organisational performance was explained jointly by; SD, SPM, ICT, LM, and CRM. Additional results show that SD practices significantly predicted organisational performance, $B = 0.54$, $t(83) = 4.61$, $p < .001$, indicating that a one-unit surge of SD practices will raise the value of organisational performance by 0.54 units. Similarly, ICT significantly predicted that organisational performance, $B = 0.48$, $t(83) = 4.31$, $p < .001$, indicating that a one-unit surge in ICT practices will raise the value of organisational performance by 0.48 units. Moreover, Logistics management practices significantly predicted organisational performance, $B = 0.39$, $t(83) = 3.54$, $p < .001$, indicating that a one-unit surge in LM practices will raise the value of organisational performance by 0.39 units. Simultaneously, strategic sourcing significantly predicted organisational performance, $B = 0.36$, $t(83) = 4.31$, $p < .001$, indicating that on average, a one-unit surge in SS practices will raise the value of organisational performance by 0.36 units. Similarly, the result revealed that CRM practices significantly predicted organisational performance, $B = 0.36$, $t(83) = 3.26$, $p = .002$, indicating that a one-unit surge in CRM practices will raise the value of organisational performance by 0.36 units.

6.2.3 Effects of SCM Practice on Competitive Advantage

PLS-SEM results established that SCM practices significantly predicted competitive advantage, $B = 0.95$, 95% CI [0.93, 0.97]. Additionally, the individual contribution of each practice towards CA was assessed through multiple linear regression. Additionally, regression analysis results were significant with $F(5,83) = 164.26$, $p < .001$, $R^2 = 0.91$, indicating that SPM, CRM, LM, SD, and ICT explained approximately 91% of the variance in competitive advantage. Additional, strategic sourcing significantly predicted

competitive advantage, $B = 0.62$, $t(83) = 8.31$, $p < .001$, indicating that a one-unit surge in SS practices will raise the average value of competitive advantage by 0.62 units. Similarly, CRM practices significantly predicted organisational performance, $B = 0.37$, $t(83) = 5.22$, $p < .001$, indicating that a one-unit surge in CRM practices will raise the average value competitive advantage by 0.37 units. Simultaneously, LM practices significantly predicted competitive advantage $B = 0.41$, $t(83) = 4.96$, $p < .001$, indicating that a one-unit surge in LM practices will raise the value of competitive advantage by 0.41 units. Also, SD practices significantly predicted competitive advantage $B = 0.55$, $t(83) = 4.89$, $p < .00$, indicating that a one-unit surge in SD practices will raise the value of competitive advantage by 0.55 units. Moreover, ICT practices significantly predicted competitive $B = 0.40$, $t(83) = 3.92$, $p < .001$.

6.2.4 Effects of Competitive Advantage on Organisational Performance

PLS-PM results established that competitive advantage significantly predicted organizational performance, $B = 0.98$, 95% CI [0.97, 0.99]. Additionally, regression results were significant with $F(3.85) = 596.50$, $p < .001$, $R^2 = 0.95$, implying that about 95% of the variance in organisational performance is explainable by Quality, Cost delivery dependability.

More results revealed that Quality significantly predicted organisational performance, $B = 0.38$, $t(85) = 13.25$, $p < .001$, indicating that a unit surge in quality will raise organisational performance by 0.38 units. Similarly, cost/price aspects significantly predicted organisational performance, $B = 0.30$, $t(85) = 13.26$, $p < .001$, indicating that a one-unit surge in cost/price will raise organisational performance by 0.3 units.

Simultaneously, delivery dependability significantly predicted organisational performance, $B = 0.29$, $t(85) = 11.79$, $p < .001$, indicating that a one-unit surge in DD will raise the value of organisational performance by 0.29 units.

6.2.5 Mediation Role of Competitive Advantage

PLS-PM results revealed a significant direct path coefficient SCM practices → Org_Performance, B=0.487, 95% CI[0.30, 0.67], indicating that SCM practices directly affect organisational performance. Concurrently, the results revealed a significant indirect effect SCM practices→CA→ Org_Performance, $B = 0.182$, 95% CI [0.176, 0.242], indicating the presence of mediation effect in the model. Thus, CA partially mediated the relationship between SCM practice and OP.

6.3 Conclusions

This study's thesis was that SCM practices could secure a competitive advantage and enhance the dairy processing firms' organisational performance in Kenya. After the analysis, the study concludes that SCM practices significantly predicted competitive advantage and organisational performance in the dairy processing firms in Kenya. Additionally, competitive advantage mediates the relationship between SCM practices and organisational performance. As such, SCM practices first generate a competitive advantage, and the competitive advantage leads to further organisational performance. These results agree with the proposed theoretical and conceptual framework proposed at the beginning of this thesis.

Dairy processing firms have been facing diminishing competitive advantage and organisational performance. Based on the study findings, dairy firms in Kenya could

enhance their organisational performance (efficiency, flexibility and responsiveness) through effective implementation of Supplier development, strategic sourcing, customer relationship management, logistics management and ICT practices. Additionally, dairy processing firms could secure competitive advantage (cost, quality and delivery dependability) through effective implementation of Supplier development, strategic sourcing, customer relationship management, logistics management and ICT practices. These practices significantly predicted competitive advantage and organisational performance in the dairy processing firms in Kenya.

6.4 Implications of the Study

6.4.1 Academicians

This study contributes to SCM knowledge by developing a comprehensive conceptual framework linking SCM practices with CA and organisational performance in Kenya's dairy processing firms. Additionally, the study provides a deeper understanding of SCM practices by conceptualizing them as a second-order reflective measurement model. Further, the study enriches the literature of SCM practices (SS, CRM, LM, SD, and ICT)by confirming their contribution to competitive advantage and organisational performance of the dairy processing firms, which has been lacking.

6.4.2 Practitioners

To enhance organisational performance, business managers may consider investing in these SCM practices. Specifically, businesses should allocate more resources in supplier development practices, which has the highest contribution to the organisational performance model.

Additionally, managers may consider investing in these SCM practices to secure a competitive advantage for their firms. Specifically, managers should pay attention to strategic sourcing practices that have the highest contribution to competitive advantage.

Moreover, managers may consider investing in quality, cost, and delivery dependability to improve organisational performance. Since quality had the highest contribution to organisational performance, managers could improve organisational performance by routinely checking the quality of milk supplied in collection points.

6.4.3 Policy Implications

This study identified areas of policy implications to foster effective dairy supply chain management in Kenya. At the national level, policies should encourage dairy processing firms to continue providing supplier development support such as Credit support, Artificial insemination, Veterinary services, Animal feeding management, Extension and advisory services through tax credits. The dairy farmers' performance affects both the competitive advantage and organisational performance of the dairy processing firms.

Through the KDB, the Government should promote quality premium systems to encourage the production of high-quality raw milk that facilitates the efficient processing of high-quality finished dairy products. This move will help address the quality issues and improve the milk processing firms' competitive advantage and organisational performance in Kenya.

County governments should promote rural milk collection centres (RMCC) by “strengthening milk marketing cooperative societies and producer/trader associations”.

Rural milk collection centres could be important business hubs for delivering a host of livestock development services through a check-off system.

The National Government should encourage processing firms to invest in cold milk chain infrastructure by providing tax exemptions for the imported equipment.

6.5 Recommendations for Further Studies

This study focused on the effects of SCM practices on organisational performance at one level of the dairy supply chain. There is a need to investigate the contribution of SCM practices to the entire dairy supply chain performance. Secondly, This study did not consider the uncertainty factors; therefore, future studies could assess the moderation role of uncertainty factors on the effects of SCM practices on organisational performance. The test of such a hypothesis will provide more insights into the role of SCM practices on organisational performance under uncertainty situations. Lastly, this study collected data from dairy processing firms using a cross-sectional survey design to this study used a cross-sectional survey design to collect data from dairy. Therefore, future studies could apply a longitudinal design to examine the effects of SCM practices on CA and organisational performance. Further studies could apply a longitudinal design to establish the long term effects of SCM practices on CA and OP.

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APPENDICES

Appendix A: Survey tool for SCM practice

Please rate the extent of application of SCM practices in your firm on a scale of 1 to 7. Where
1 To an Extremely Small Extent
2 To a Very Small Extent
3 To a Small Extent
4 To a Moderate Extent
5 To a Large Extent
6 To a Very Large Extent
7 To an Extremely Large Extent

Code	Questionnaire item	Response
SD1	We provide credit support to our milk suppliers	
SD2	We support farmers with affordable artificial insemination	
SD3	We support farmers with veterinary services	
SD4	We support farmers with quality animal feeds	
SD5	We provide extension education to our milk suppliers	
ICT1	We use ICT to share information with all our partners	
ICT2	We use ICT to integrate communication within all our departments	
ICT3	We use ICT to track milk transportation	
ICT4	We use ICT in milk procurement activities	
ICT5	We use ICT to monitor milk processing activities	
LogM1	We have established a transport management system	
LogM2	We have established material handling procedures	
LogM3	We maintain our warehouse regularly	
LogM4	We ensure proper packaging of our products	
LogM5	We have established an inventory management system	
LogM6	We have established systems to monitor our order processing	
LogM7	We have established adequate physical distribution channels for our products	
LogM8	We have the right communication infrastructure to manage information flow	

CRM1	We evaluate our customer satisfaction	
CRM2	We have segmented our clients	
CRM3	We customize products based on customer specifications	
CRM4	We have differentiated our products	
CRM5	We maintain constant communication with our customers	
SS1	We strive to build long term relationship with our suppliers	
SS2	We have a mechanism for supplier selection	
SS3	We have a continuous supplier identification	
SS4	We maintain constant communication with our suppliers	
SS5	We evaluate the performance of our milk suppliers	
SS6	We have set quality standards measures for raw materials	

Appendix B: Survey tool for Competitive advantage

Please rate the firm's ability to maintain a defensible position relative to competition on a scale of 1 to 7. Where
1= Strongly Disagree
2=Disagree
3= Somewhat Disagree
4=Neither Agree Nor Disagree
5= Somewhat Agree
6= Agree
7=Strongly Agree

CODE		1	2	3	4	5	6	7
CA1	We offer competitive milk price to our customers	□1	□2	□3	□4	□5	□6	□7
CA2	We can offer prices lower than our competitors.	□1	□2	□3	□4	□5	□6	□7
CA3	We offer high-quality products to our customer.	□1	□2	□3	□4	□5	□6	□7
CA4	We offer highly reliable products	□1	□2	□3	□4	□5	□6	□7
CA5	We can compete on a quality basis	□1	□2	□3	□4	□5	□6	□7
CA6	We provide dependable delivery	□1	□2	□3	□4	□5	□6	□7
CA7	We deliver customer order on time	□1	□2	□3	□4	□5	□6	□7
CA8	We deliver the kind of products needed	□1	□2	□3	□4	□5	□6	□7

Appendix C: Survey questionnaire for organisational performance

On a scale of 1 to 7, rate your disagreement or agreement with the following statements regarding the organisational performance of your firm in the past five years where
1= Strongly Disagree
2=Disagree
3= Somewhat Disagree
4=Neither Agree Nor Disagree
5= Somewhat Agree
6= Agree
7=Strongly Agree

CODE		1	2	3	4	5	6	7
OP1	Our Profits have improved	□1	□2	□3	□4	□5	□6	□7
OP2	Return on investment has improved	□1	□2	□3	□4	□5	□6	□7
OP3	Our Inventory management has improved	□1	□2	□3	□4	□5	□6	□7
OP4	We have attained volume flexibility	□1	□2	□3	□4	□5	□6	□7
OP5	We have attained delivery flexibility	□1	□2	□3	□4	□5	□6	□7
OP6	We have attained mix flexibility	□1	□2	□3	□4	□5	□6	□7
OP7	Our lead time has improved	□1	□2	□3	□4	□5	□6	□7
OP8	We have reduced the number of customer complaints	□1	□2	□3	□4	□5	□6	□7
OP9	We have improved our customer response time	□1	□2	□3	□4	□5	□6	□7

Appendix D: Loadings and cummunalities for SCM Practices scale

Variable	Factor loading 1	Communality
SD1	0.73	0.53
SD2	0.78	0.61
SD3	0.88	0.77
SD4	0.77	0.59
SD5	0.83	0.69
LMP1	0.75	0.56
LMP2	0.87	0.76
LMP3	0.84	0.71
LMP4	0.79	0.62
LMP5	0.78	0.61
LMP6	0.75	0.56
LMP7	0.76	0.68
LMP8	0.85	0.72
SS1	0.79	0.62
SS1	0.85	0.72
SS3	0.86	0.74
SS4	0.80	0.63
SS5	0.75	0.56
SS6	0.76	0.58
CRM1	0.76	0.57
CRM2	0.72	0.52
CRM3	0.77	0.59
CRM4	0.74	0.55
CRM5	0.85	0.72
ICT1	0.84	0.71
ICT2	0.79	0.62
ICT3	0.87	0.77
ICT4	0.86	0.74
ICT5	0.75	0.56

Note: Factor loadings < .32 are suppressed.

Appendix E: Loading and cummunalities for competitive advantage scale

	Factor loading			
Variable	1	2	3	Communality
CA1	0.77			0.69
CA2	0.79			0.62
CA3			0.76	0.77
CA4		0.77		0.69
CA5			0.78	0.80
CA6			0.85	0.72
CA7		.88		0.77
CA8	0.87			0.76

Note: Factor loadings < .32 are suppressed

Appendix F: Loading and cummunalities for organisational performance scale

	Factor loading			
Variable	Efficiency	Flexibility	Responsiveness	Communality
OP1	1.01			0.88
OP2	0.89			0.79
OP3	0.76			0.58
OP4		0.82		0.67
OP5		0.84		0.71
OP6		0.74		0.55
OP7			0.83	0.69
OP8			0.88	0.77
OP9			0.78	0.61

Note: Factor loadings < .32 are suppressed.

Appendix G: List of published journal articles

1. Enhancing organisational performance in the dairy industry: Supply chain management practices approach. https://www.iprjb.org/journals/index.php/IJA/article/view/1080
2. Sources of competitive advantage in the dairy industry: Supply chain management perspective. https://www.iprjb.org/journals/index.php/IJSCM/article/view/1083

Appendix H: Authorization by NACOSTI