INFORMATION TECHNOLOGY CAPABILITIES IN THE SUPPLY CHAIN AND ORGANISATIONAL PERFORMANCE IN UGANDAN DAIRY INDUSTRY. A CASE STUDY OF BROOKSIDE LIMITED UGANDA

BY

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A DISSERTATION SUBMITTED TO THE DIRECTORATE OF RESEARCH AND GRADUATE TRAINING IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF MASTER OF SCIENCE IN PROCUREMENT AND SUPPLY CHAIN MANAGEMENT OF KYAMBOGO UNIVERSITY.

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DECLARATION

I, **Kivumbi Douglas** hereby declare that this dissertation is my original work and that it does not incorporate without acknowledgement any material previously submitted for a Master's degree or any other academic award in any University; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text to that effect.

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APPROVAL

This is to certify that this dissertation has been prepared and compiled by Kivumbi Douglas and that it was done under our supervision. It is now ready for submission to the Graduate School Kyambogo University in partial fulfillment for the requirements of the award of a Degree of Masters of Science in Procurement and Supply Chain Management.

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DEDICATION

This dissertation is dedicated to my wife and to my children for they have been my motivation to improve again and again.

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I thank my supervisors Dr. Henry Mutebi, Dr. Francis Ssennoga and Dr. Peter Obanda for the guidance and counseling during the dissertation writing and for the sacrifice of your time. The discussions we held and the advice you gave me not only helped me to complete this dissertation but also to look at work-life issues in more practical and logical ways as a contemporary academician. Your patience, critical comments and constructive suggestions gave meaning to the ideas expressed in this dissertation.

With great respect, I would like to thank all the staff of Brookside limited who responded to questionnaires and made this study a success.

To my dear course mates, thank you very much for the interactive sessions we held and generally, for the cooperation.

To my family; my wife, and all my children who endured my long absence from home during the struggle to complete my studies, I say thank you and I will always treasure you.

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LIST OF ABBREVIATIONS

BMC	:	Bulk Milk Chillers
CVI	:	Content Validity Index
ICT	:	Information Communication Technology
IT	|:	Information Technology
NITA	:	National Information Technology Authority
RBV	:	Resource Based View

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ABSTRACT

The purpose of the study was to examine the association between information technology capabilities in the supply chain and its individual constructs (IT infrastructure, information flow management and IT personnel capability) and organizational performance at Brookside dairy limited in Uganda. “The study focused on organizational performance in terms of operational performance. A cross-sectional survey and descriptive design survey were used to obtain data from 169 out of 300 respondents selected using simple random sampling and purposive sampling”.

The study found out that information technology capabilities is positively and significantly related with organizational performance. Additionally, information flow management and IT infrastructure were found to be positively and significantly related with organizational performance expect for IT personnel capability. “As a result, we draw the conclusion that IT capabilities are related to operational performance, and Brookside Ltd. must create initiatives to advance IT capabilities”. This may be done by leveraging IT infrastructure, information flow management, and IT personnel capabilities. “We recommend management of Brookside limited should procure adequate IT hardware and software infrastructure to enable staff operate electronically”. We also recommend the management of Brookside should put in place communication mechanism linked to market information so that the organization makes use of real data when making production decision.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This section contains the study's background, problem statement, purpose of conducting research, hypotheses, the significance of the study, scope of the research, and conceptual framework. It's critical to remember the theoretical, historical, contextual, and conceptual contexts in order to comprehend the role of operational performance in Ugandan diary Industry

1.1 Background of the Study

Operational Performance is the understood as the strategic dimension in which organizations choose to compete (Chavez et al., 2015). “We are aware that operational performance is critical because it improves effectiveness of production activities, creates high-quality products, services and processes” (Chavez et al., 2015; Kaynak & Hartley, 2008).

What is known is that organizations has made it a top priority to ensure that diary firms take operational performance into account when developing procedures and process to enable their implementation (Bhatti, 2010). “However, as much as firms have procedures and policies that promote operational performance, what we don’t know is why operational performance might be insufficient to achieve business change”. Tedla (2016) argues “that the major barriers to operational performance in business change include a productive organizational culture that frequently leads to subpar performance and decreased productivity which leads to decreased organizational performance”. Previous scholars explained operational performance. For instance, Nassazi (2013) state that “operational performance as the successful completion of particular activities evaluated against established or specified criteria for correctness, completeness, cost, and speed”. Yousuf et al., (2019) “emphasizes that operational performance considers the degree to

which the company manages its operations to measure the success or likelihood of the organization's survival". A Resource- based view can be used to explain operational performance because when an organization allocates resources it can be used to improve operational performance by implementing policies and procedures (Tedla, 2016)

1.1.1 Historical background

The development of telecommunications, including the telegraph, telephone, radio, and television, ushered in the information age in the late 19th and early 20th centuries. People now have access to knowledge about far-off events and novel concepts thanks to these inventions. Many people think that the development of integrated circuits or chips, specifically, has been the primary driving force behind the information revolution.

During and after World War II, electronic devices began to replace mechanical ones, which fueled the development of transistors and microprocessors. People's lives have been significantly impacted by the information technology revolution, which has altered the way they think, communicate, and act. In the 1960s, people could not have imagined the computing and communication capabilities that exist today. Technology advancements in the fields of chip, satellite, radio, and optical fiber have made it possible for millions of people all over the world to communicate electronically without being constrained by regional or global borders.

The most significant and most recent wave of the information revolution is the explosion in connectivity boundaries". This explosion in connectivity is the latest and the most important wave in the information revolution (Evans & Wurster, 1997).

Information technology (IT) is undoubtedly seen as a key growth sector in the twenty-first century, particularly in a dynamic and fiercely competitive business environment that calls for the use of

cutting-edge IT tools to increase productivity, cut costs, and provide high-quality goods and services to customers (Allen and Morton, 2004).

Information technology is also regarded as a tool for marketing, contacting current customers and seeking out potential clients, as well as showcasing IT services as standout potential clientele (Werthner & Klein, 2005). According to Molly & Schwenk (1995), "organizations are increasingly using information technology to develop solutions to business problems, to improve both the efficiency and effectiveness of the decision-making process, to enhance productivity and service quality, to achieve dynamic stability, and to compete for new markets.".

Even though the use of ICT in agriculture is not a completely new phenomenon, information has recently become a crucial component of production in agriculture (Rao, 2006). The application of the ICT has greatly affected businesses globally and several firms or organizations, which in turn has changed the yield. Dairy farming has not been exempted from the profound changes in ICT that have occurred over the past ten years (Winrock, 2003).

1.1.2 Theoretical background

Resource Based View Theory

The current study was built upon Edith Penrose's resource-based view (RBV) theory, which she adopted in 1959. The Resource Based View theory was developed to give a framework for evaluating the relative strength of the connection between internal organizational resources, competitive advantage, and performance. According to the RBVT, a company's strategic resources that it owns and controls are primarily responsible for its competitive advantage and superior performance (Rose et al. , 2010). Firm resources, according to Kamasak (2013), "include all assets such as capabilities, organizational processes, firm attributes, information, and knowledge

controlled by a firm that enable the firm to conceptualize and implement strategies that improve its efficiency and effectiveness. ".

The primary contribution of the theory is that it explains how businesses that can identify the characteristics of resources or capabilities that cannot be imitated by competitors will be able to maintain their competitive advantage (Barney, 1991). In accordance with Chen et al. "Scholars have noted the importance of IT capability as a key organizational capability and found that an IT capability that shares the characteristics of rarity and non-substitutability can foster superior firm performance" (Chen et al. , 2014).

The theory is used to explain information technology capability and operational performance because, when examining how IT capability affects operational performance, evidence suggests that outcome variations in firms' performance may be explained by how IT capability maximizes the value of other resources and capabilities within the organization (Radhakrishnan et al., 2010). , 2008). The approach taken in this study is that while IT capabilities are valuable resources, they can also have an indirect impact on other resources or capabilities within the company (Kohli and Grover, 2008).

1.1.3 Conceptual background

This study focused on organizational performance in terms of operational performance and IT capabilities in the supply chain as detailed below

Operational Performance

In this study, operational performance is evaluated in terms of operational costs, product quality, and delivery time.

According to Chavez et al., the strategic dimension in which organizations choose to compete is operational performance. , 2015), as well as the cornerstone of good business practices and overall business success (Sharma and Modgil, 2020). Better operational performance can lead to higher-quality products, services, and processes, according to Chavez et al. (Kaynak & Hartley, 2008; 2015).

Additionally, according to Zhang and Xia (2013), operational performance is a key factor in determining a company's ability to gain a competitive edge, which boosts profits and returns. "In manufacturing firms, operational performance is a way to develop production to the simplest minimal cost in order to maximize profit. According to Russell & Koch (2009), it is also a way to reach the height of production by acting differently, quickly, and cheaply. As an end-to-end system, "operational performance unites the entire activities of a firm, such as after-sales service, manufacturing, and procurement" (Jaeger et al., 2014). In this study, operational performance was defined as a set of standards and benchmarks that organizations adopt and use to achieve performance. Operational performance includes several different metrics, including flexibility, time (speed), quality, cost, innovation, and environment and safety.

The core and most frequently mentioned dimensions of operational performance in dairy processing firms are cost, quality, defects minimization, delivery, innovation, and capacity utilization, according to Marodin (2019) and Sylva (2020). Quality, cost, and delivery time were therefore used in this study's operational performance measurement (Saleh, 2015; Sylva, 2020).

Information Technology Capabilities

IT capability is the ability of an organization to combine and use IT-based resources along with resources from other organizations (Bharadwaj, 2000). IT capability, in the words of some

academics, "is more than just an ability that a firm possesses, but rather a complex package of IT-related resources, skills, and knowledge that enable firms to coordinate activities and other resources to produce desired results" (Stoel and Muhanna, 2009). "Firms with the ability to plan and integrate their IT resources are more positioned to capture information about suppliers and customers, share knowledge, and improve business processes," (Mithas et al., 2011). Through the use of IT capabilities, businesses can improve business operations, processes, and performance (Chae et al., 2014).

Mithas and other people. (2011) reached the following conclusion: "IT capability contributed to firm performance by enabling other firm capabilities such as customer management capability, process management capability, and performance management capability. ".

Bharadwaj asserted in his essay from 2000 that "firm-specific information technology resources, such as IT infrastructure, human IT resources, and IT-enabled intangibles, create firm-wide IT capability.". By successfully enhancing their IT capabilities, businesses can perform better, in the author's observations (Bharadwaj, 2000). According to the resource-based perspective on information technology, organizations should combine their IT infrastructure, information flow management, and IT personnel capabilities to develop a firm-wide IT capability in order to get the best performance out of their IT resources (Bharadwaj, 2000; Wade & Hulland 2004).

An IT infrastructure provides the framework for computer technology, communications, and fundamental data systems within the technical framework that directs organizational work to satisfy management needs (Melville, 2010). Associated with Mitchell. "An IT infrastructure is the foundation upon which a firm can deliver reliable services through an organized and coordinated central information system," claims (2012). ". Improved firm performance is a result of the ability

to offer universal connectivity and access that has adequate reach and range, as well as the ability to adapt the infrastructure to changing business needs and objectives (Mithas et al. , 2011). Zhu (2004) asserts that IT infrastructure provides a platform for the introduction of novel e-commerce capabilities more quickly or effectively.

Information flow within an organization, according to Henczel (2001), "involves information sharing among people within an organization, various departments within an organization, and its environment. Information flow within a company needs to be timely and appropriate from the transmitter at the beginning to the receiver at the end. Durugbo and company. In accordance with (2014), "Information flow is the access to, sharing of, and documentation of information with people; as a result, information sharing is also an essential part of information flow. ". Nowakowsk and Nowakowska (2021) state that "the information provided within a firm must meet some criteria, which control their usefulness in decision-making. The ability to provide users with data and information that meets the necessary standards for accuracy, timeliness, reliability, security, and confidentiality is therefore thought to be a strength of information flow management. According to Kim et al., IT personnel's personal capability was described as their level of professional expertise. , 2012). It is essential that a company's IT team has a combination.

IT personal capability was defined as the level of professional skills or knowledge possessed by for the efficient administration of an organization's IT resources. These abilities include an understanding of and ability to manage IT, as well as an understanding of IT components like programming, databases, networks, and operating systems. Business-savvy IT specialists are better able to develop practical IT solutions and utilize their technical expertise to coordinate the firm's strategies (Bhatt and Grover, 2005; Kim et al. , 2011).

1.1.4 Contextual background

At 1.8 percent increase in global milk production was anticipated. a. (to 1060 Mt by 2031) over the following ten years, faster than the majority of other major agricultural commodities. It was anticipated that the number of milk-producing animals would increase significantly (1.2% p. a.), particularly in areas like Sub-Saharan Africa and in significant milk-producing nations like India and Pakistan (OECD 2022).

"In Africa, milk production was projected to reach nearly 51 million tons in 2022, down 0.5 percent, primarily due to anticipated declines, particularly in Kenya, Ethiopia, and South Africa, due to extreme weather events, impacts of conflicts on production systems, and increasing input costs, countered by moderate gains in several countries.".

Since the 1990s, Uganda's dairy processing industry has been on a recent growth trajectory. It was established by the first Dairy Industry Act in the 1960s, which created the Dairy Corporation, a government organization in charge of the regulation, expansion, and market development of the dairy industry (Toye, 2012).

In Uganda, the formal and informal marketing channels made up a dual system that served as the dairy value chain's organizational framework. In the formal value chain, farmers' milk was quickly delivered to primary milk collection centers (MCCs), where it was kept in coolers for a brief period of time.

The structure of the dairy value chain in Uganda was a dual system that comprised of the formal and informal marketing channels. In the formal value chain, milk from farmers was quickly transported to primary milk collection centers (MCCs).

According to DDA (2020), there are 483 MCCs with storage capacities ranging from 2000 to 8000 liters, and there are 1.9 million liters of collection capacity nationwide. Milk was delivered from MCCs to bulk collection centers (BCC) with larger capacity chilling facilities using small milk (transporter) tankers or bulk milk tankers.

By the end of 2021, it was estimated that milk production would have increased from 2.08 billion liters in 2015 to 2.64 billion liters in 2020, falling 2.81 billion liters short of the target of 3.0 billion liters (DDA Database FY 2020/21).).

Uganda's Milk sheds (Dairy Regions)

Uganda is split up into six milk sheds (dairy regions) based on milk production and market conditions. There are significant differences among the six dairy regions in terms of milk production, market dynamics, and dairy infrastructure

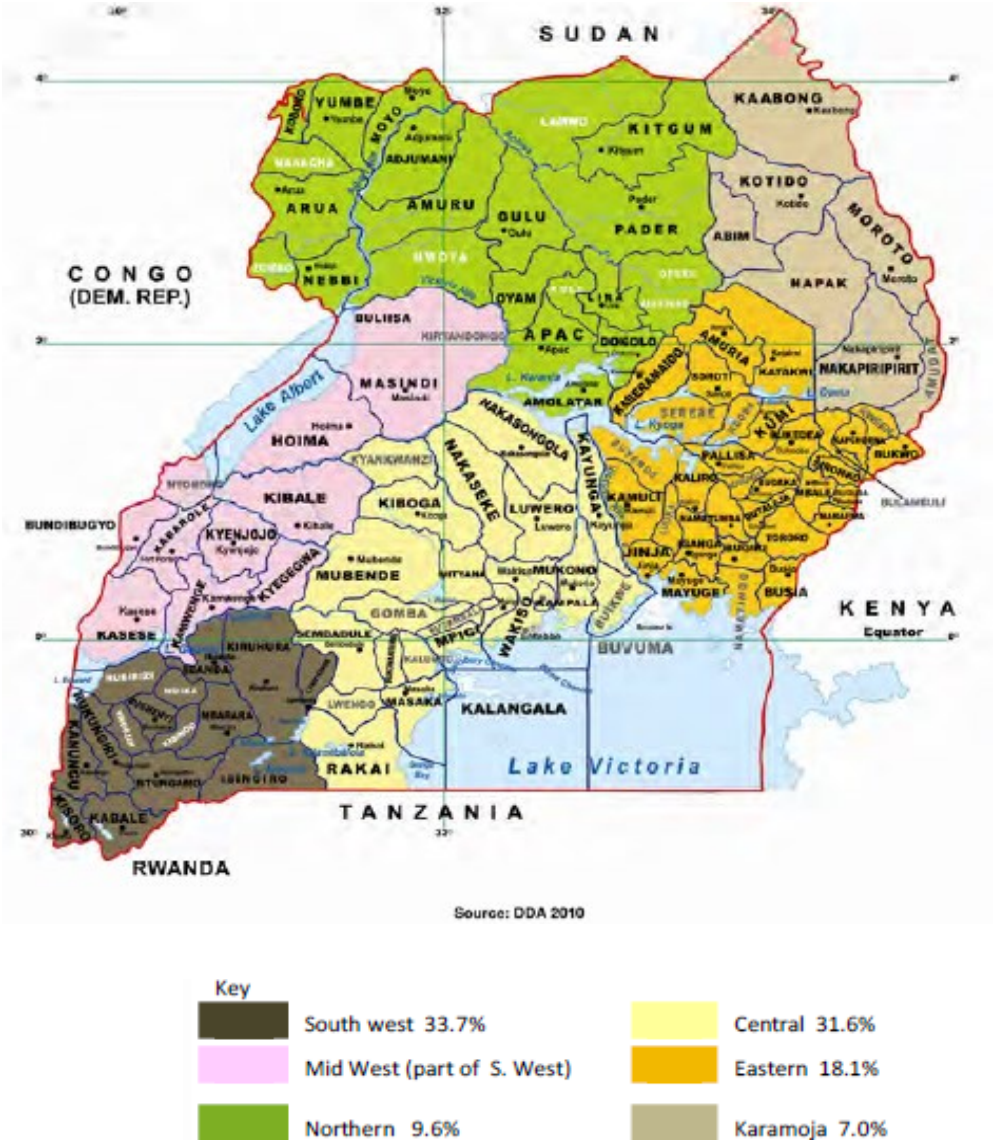

Figure 1. 1: Map of Uganda showing the different milk sheds

According to estimates, the Ugandan dairy industry accounts for more than half of the total output from the livestock subsector. Along the dairy value chain, many people are employed in a variety of economic activities, particularly in the production, collection, bulking, and transportation of milk as well as in its processing, distribution, and marketing, as well as in the provision of inputs and support services.

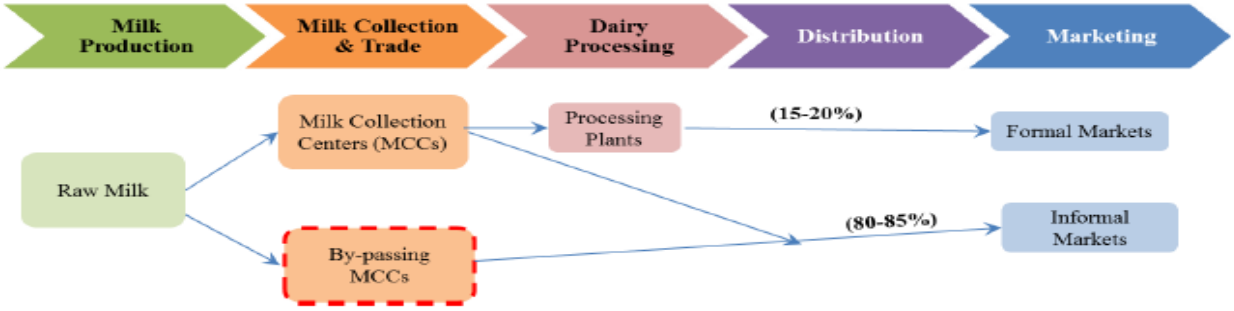

Figure 1.2: Overview of Milk Collection and Trade Channels in Uganda

Source: (Makoni et al., 2014)

The gray market rules the milk market. It is also known as "traditional ways of milk marketing," where milk is bought from farmers and later sold to consumers with little to no processing (value addition). The infrastructure for collecting milk was previously overseen by the state-owned business Dairy Corporation Limited, but after it was privatized in 2006, Brookside Limited took over management of it. , 2012). Nevertheless, "Milk collection infrastructure has been concentrated in the Southwestern (75%) and Central (15%) regions" (Makoni et al. , 2014; Toye, 2012). These regions act as the traditional supply chain and infrastructure foundation for Dairy Corporation Limited. Brookside Limited, one of the 15 dairy processing businesses in Uganda, is based in Kenya and has affiliates in Tanzania and Uganda. "There are seven Milk Collection Centers operated by the company in Uganda, and they are situated in the cities of Rusherwe, Bukwiri, Sembabule, Nakaseke, Mubende, Kazo, and Mbarara. ". Local cooperatives and bulk milk collection facilities are two places where farmers in the aforementioned regions sell their milk. Before the milk is delivered to Brookside Limited, it is tested to see if its water content is 1% or less and if its temperature is within the acceptable range of 1 C to 4 C (Quality Assurance report, 2019).

The driver transfers the manual milk test results from each satellite laboratory at the milk collection centers to the processing plant where the milk is once more put through the same tests in the main laboratory to verify the quality of the milk.

The Brookside value chain is thus characterized by limited infrastructural support systems such as milk handling facilities like the milk graders, modern pasteurizers, and milk separators, lack of a quality-based payment system that disincentives investment in quality collection facilities, fluctuating prices of the raw milk, the quality of milk, and the fact that the majority of the dairy industry is run by the informal sector at about 80%. According to Brookside Limited's Annual Report from 2020, this has recently had an impact on consumption rates as milk quality has been steadily declining. This is demonstrated by the percentage of returns or spoilt milk in the table below, which increases the cost of rework.

Table 1.1: Annual total milk received and rejected

Milk in Litres /annum							
2018		2019		2020		2021	
Milk Accepted	Milk Rejected /Returns	Milk Accepted	Milk Rejected/ Returns	Milk Accepted	Milk Rejected/ returns	Milk Accepted	Milk Rejected/ returns
97,564,090	11,071,090	100,391,940	12,046,940	106,323,057	12,445,050	121,310,532	15,948,000
	11.35%		11.99%		12%		13%

Source: **Brookside data**

Therefore, if this situation is not averted through implementing new information technology, then the organization is yet to be out competed by the other players in the market.

1.2 Problem statement

Despite the fact that academics generally agree that operational performance is crucial for a variety of reasons, including its ability to improve the effectiveness of production activities and produce

high-quality goods and services, processes, and products (Chavez et al. (2014) and Kaynak and Hartley (2008). Diary companies have not yet realized its significance because nations still struggle to achieve operational performance.

In order to buy all the milk from farmers and send it for processing and sale, cooperatives were established in the UK. But before experiencing poor financial results, these cooperatives deal with problems that ultimately cause their demise. This frequently occurs as a result of the cooperative paying its farmer members a low milk price, which causes a loss in milk production, idle capacity, subpar management, and an underfinanced balance sheet (Bhatti, 2010).

Government efforts in Nigeria to promote the expansion of the regional dairy value chain to achieve milk production independence in the nation were unsuccessful due to pastoralist transhumance, which makes breeding and herding extremely basic and dangerous Ekumankama et al. (2020), and in Ethiopia, the development of the dairy market is constrained despite the lack of particularly significant infrastructure barriers because farmers have fewer cows now, mostly for their own use, and they produce a lot of milk in semi-urban areas to satisfy the needs of the metropolis (Ignowski et al. , 2022).

Ekou (2014) found that milk production in Uganda is still largely subsistence, with the attendant inefficiencies and quality issues typically associated with such production systems, despite the fact that the country's dairy industry relies on a traditional, low-input pasture production system. The local dairy processing companies face fierce competition from the informal milk sector channel, which supplies 80% of the milk on the market (Makoni et al. , 2014).

The current situation is threatening the long-term viability and sustainability of dairy processing businesses by undermining their competitiveness. The report states that "the existing literature on

operational performance further illustrates a lack of understanding of the relationship between information technology capability and operational performance as dairy firms must find new ways to achieve competitive advantage and enhance performance in order to survive and sustain in an increasingly competitive global marketplace.". We look into how Brookside Limited Uganda's operational performance and its IT supply chain capabilities are related in order to close this gap.

1.3 General objective of the study

To examine the association between Information Technology Capabilities in the supply chain and operational performance at Brookside Limited Uganda.

1.4 Specific objectives of the study

1) To assess the relationship between IT Infrastructure in the supply chain on operational performance at Brookside Limited Uganda.
2) To examine the association between Information flow management in the supply chain on operational performance at Brookside Limited Uganda.
3) To assess the association between IT personnel capability in the supply on operational performance at Brookside Limited Uganda.

1.5 Hypothesis

H1: What is the relationship between Information Technology Capability and operational performance at Brookside Limited Uganda?

H2: What is the relationship between IT Infrastructure and operational performance at Brookside Limited Uganda?

H3: What is the relationship between information flow management and operational performance at Brookside Limited Uganda?

H4: What is the relationship between IT personnel capability and operational performance at Brookside Limited Uganda?

1.6 Scope of the study

1.6.1 Content scope

This study focused on Brookside Limited's operational performance in the dairy supply chain, paying close attention to IT capabilities that were limited to IT infrastructure, Information flow management, and IT staff capability.

Information technology was chosen because Brookside Uganda Limited worked in the dairy industry, specifically milk, which was regarded as perishable and having a short shelf life. This indicates that the purchasing organization made sure to ensure quick responses and develop information systems to ensure there is speed in product delivery, quality products, and lower operational costs. The independent variable in this study was information technology, which had an impact on organizational performance as measured by higher quality, lower operational costs, and quicker product delivery. Information technology was measured by IT infrastructure, information flow management, and IT personnel capability. These variables were believed to be influenced by the organizational size.

1.6.2 Geographical scope

Brookside dairy Uganda Limited was located at Plot 49-53/55, Fifth Street Industrial Area, Kampala/P.O. Box 7078 Fifth St, Kampala.

1.6.3 Time scope

The study reviewed related literature and reports from 2000 up to date. This period was chosen because the researcher had confidence that information within the time frame is relevant to understand the existing problem in the dairy industry and more specific for Brookside dairy Uganda Limited to understand the current information technology implementation and the challenges the company encounters.

1.7 Significance of the study

i. It is hoped that the management used the findings as the foundation for reviewing the organization's performance and that the identified improvements were implemented to improve performance at work and boost operational effectiveness.

ii. It is hoped that this study will help organizations identify underutilized data management and communication systems and tools, as well as areas where these resources are being wasted. By identifying these areas, controls can be put in place to reduce resource waste and costs.

iii. It is also hoped that the study's findings will help institutions and organizations devise plans for successfully implementing information technology and establish benchmarks that will improve organizational performance.

iv. The study provided Brookside with information on how to provide high-quality milk and related products while lowering operational costs in the Ugandan market.

v. The study also served as a source of reference for future technological research, which helped researchers. In this context, the research aims to close the existing scholarly gap by investigating how the supply chain's information technology capabilities affect operational effectiveness.

1.8 Justification of the study

The justification of this study was due to the growing dependency on information technologies by many business organizations and an aim of increasing awareness on the importance of Agro-ICT (IT in agriculture). “More so, the perishable nature of dairy products, it was a challenge to effectively manage the dairy supply chain”. Further, these products needed quick responding supply chain supported by effective coordination (Mor, Bhardwaj & Singh, 2018). “Because of this study on the relationship between information technology capabilities in the supply chain on operational performance at Brookside Limited was undertaken to clearly indicate how IT infrastructure, Information flow management and IT personnel capability affected the operational performance of an organization in terms of quality products, operational cost and speed in product delivery”. IT capabilities were required for efficient and effective knowledge management and change management in a firm's supply chain (Wu et al., 2006).

1.9 Conceptual framework

As illustrated in the diagram below, this conceptual framework portrays the hypothesized relationship between Information Technology Capabilities and Operational performance

Conceptual Framework

Information Technology Capabilities (IV)

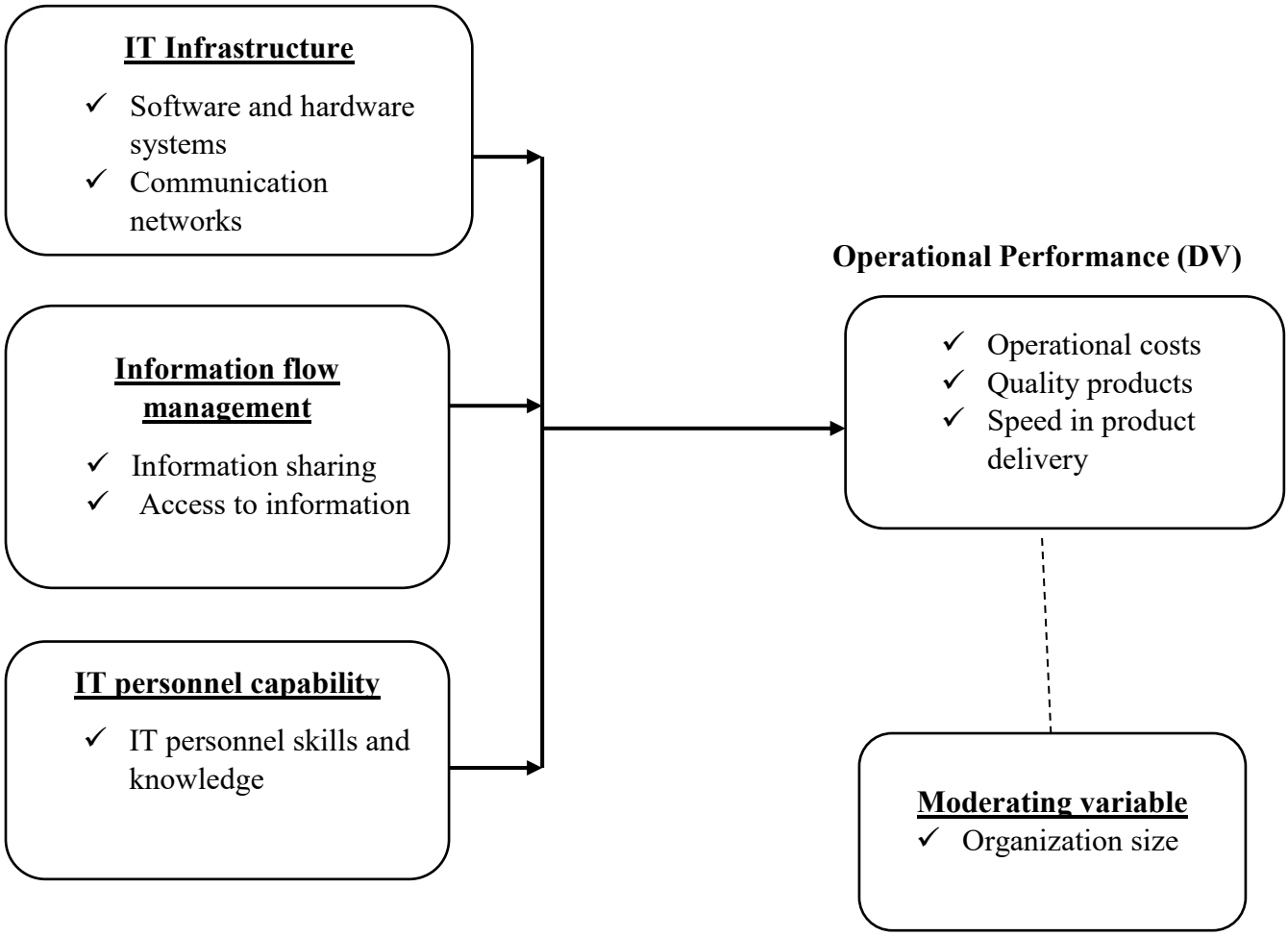

Figure 1.3: A conceptual framework illustrating the relationship between variables under evaluation

Source: Adapted from **Kim et al (2012), Sylva (2020)** as modified by the researcher

Description of the Model

Information technology capabilities were based on the model of Kim et al (2012) which measures the variable using IT infrastructure, Information flow management and IT personnel capability. Operational performance was based on the model of Sylva (2020) which measures the variable

using costs, quality products and speed in product delivery. On the other hand, organizational size was based on Olagunju (2013).

1.10 Definition of key concepts of the study

Operational performance

Operational Performance is the understood as the strategic dimension in which organizations choose to compete (Chavez et al., 2015). We are aware that operational performance is critical because it improves effectiveness of production activities, creates high-quality products, services and processes (Chavez et al., 2015).What we don't know is why operational performance might be insufficient to achieve business change. Tedla (2016) argues "that the major barriers to operational performance in business change include a productive organizational culture that frequently leads to subpar performance and decreased productivity which leads to decreased organizational performance". Previous scholars explained operational performance. For instance, Nassazi (2013) state that "operational performance as the successful completion of particular activities evaluated against established or specified criteria for correctness, completeness, cost, and speed". Yousuf et al., (2019) "emphasizes that operational performance considers the degree to which the company manages its operations to measure the success or likelihood of the organization's survival". A Resource- based view can be used to explain operational performance because when an organization allocates resources it can be used to improve operational performance by implementing policies and procedures (Tedla, 2016)

Information technology Capabilities

Information Technology Capability is understood as the capacity to manage IT-related costs, deliver systems as needed, and influence firm goals through IT implementation, as well as the ability to operate a firm's digital information network to create, control, and carry out inter-firm

transactions (Muazu & Abdulmalik, 2021). Information technology capability is critical because it interrelates and has an impact on how well an organization may use its IT assets for strategic objectives to achieve business value, business strategies and improving work processes (Cai 2016 & Turulja & Bajgorić, 2016). "Information technology capabilities relates to operational performance as information technology capabilities facilitates innovativeness which positively affects firm's performance" (Turulja & Bajgorić, 2016)

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter discussed the review of related literature on IT capabilities in the supply chain and organizational performance based on what scholars have observed, opined and their various viewpoints. “It was done with a view of highlighting the theoretical explanations on the study inquiry as well as offer theoretical answers to the study research questions and literature gaps”. The first part presents the theoretical underpinnings. This was followed by the conceptual review where the concept of IT capabilities in the supply chain and organizational performance were reviewed based on the empirical studies conducted by other scholars.

2.1 Theoretical Review

Several studies have used a variety of theories to gain a better understanding of the role of IT capabilities in the supply chain in facilitating operational performance. The theoretical lenses of Resource-Based View as adopted by this study explain operational performance.

2.1.1 Resource Based View

Barney (1991) and Wernerfelt (1984) “developed the resource-based view to explain how firms gained a competitive advantage and superior firm performance”. The theory was based on superior firm performance being attributable to resources and skills that were firm-specific, rare, and difficult for rival firms to imitate (Bharadwaj, 2000). The theory assumed that organizations' skills, capabilities, and other resources differed, and that these resources were the primary determinants of firm performance. Thus, firms that were able to identify the characteristics of resources or capabilities that could not be imitated by competitors gained a sustainable competitive advantage (Barney, 1991). Scholars noted “the importance of IT capability as a key organizational capability

and discovered, consistent with RBV's view, that an IT capability that shared the characteristics of rarity and non-substitutability could foster superior firm performance (Chen et al., 2014).

Ewuga (2019) underscores that the resource-based view demonstrates how the social structure of a firm can aid in ensuring that resources are fully utilized in driving the organizational objectives and helps recognize the types of resources that contribute to long-term strategic advantages. However, when investigating how IT capability led to superior performance, evidence suggested that differences in firm performance outcomes may be explained by how IT capability leverages the value of other resources and capabilities within the organization (Radhakrishnan et al., 2008). The study's perspective was that IT capabilities were valuable resources, but they contributed indirectly by influencing other resources or capabilities within the firm (Kohli & Grover, 2008). Using Grants' resource classification scheme, key IT-based resources were classified as tangible resources consisting of physical IT infrastructure components, human IT resources consisting of technical and managerial IT skills, and intangible IT-enabled resources consisting of information flow, knowledge assets, and synergy.

In the above view, the study proposes information technology capabilities and operational performance as tangible and intangible resources that it seeks to integrate to create value which leads to operational performance.

2.1.2 Conceptual Review

Operational Performance

Various studies looked at operational performance in different aspects, but in this study we refer to operational performance as the strategic dimension in which organizations choose to compete (Chavez et al., 2015). Existing literature and academics have operationalized operational

performance in terms of costs, quality products and speed in product deliver. (Sylva 2020). The goal of operational performance is to be to provide clients with high-quality goods or services by use of practical procedures (Panigrahi et al., 2023).

According to past literature, Muheesi et al. (2023) that better contract management translates into better operational performance. Others scholars believe lean manufacturing practices can explain operational performance (Panigrahi et al., 2023). Others acknowledge that businesses might concentrate on how to apply quality management practices to improve their operational performance.

The adoption of operations performance in Ugandan diary firms is documented through value chains that show practice and procedures used so as to achieve operational performance. According to Ekou (2014) Uganda's dairy industry relies on a traditional, low-input pasture production system milk production. In their research, Makoni et al., (2014) expound that the informal milk sector channel that accounts for 80% of the milk on the market is a tough rival for the local dairy processing businesses all of which are impediments to operational procedures. As a result, delivering high-quality goods and services quickly can boost customer satisfaction, which can be improved through improved operational performance.

Previous researchers linked operational performance to various variables. For instance, Liu et al., (2020) linked operational performance to financial benefits; Trattner et al., (2019) linked operational performance to product complexity; Rosemary et al., (2014) linked operational performance to lean manufacturing; Panigrahi et al., (2023) linked operational performance to lean manufacturing practices; Muheesi et al., (2023) linked operational performance to contract

management. The indicators of operational performance include costs, quality products and speed in product delivery.

2.2 Information Technology Capability

Information Technology Capability is understood as the capacity to manage IT-related costs, deliver systems as needed, and influence firm goals through IT implementation, as well as the ability to operate a firm's digital information network to create, control, and carry out inter-firm transactions (Muazu & Abdulmalik, 2021). In this study information technology capability was operationalized through IT infrastructure, Information flow management and IT personnel capability (Kim et al 2012). Previous scholars have demonstrated the significance of information technology capability in explaining operational performance by being reliable, agile, responsive, and cost-effective when competing in a dynamic market. For instance, Khai, Zulkifli & Mohamad, (2014) revealed that information technology capability can help improve operational performance; In his essay Chu et al., (2019) argues that information technology capabilities promotes firm innovation. Turulja & Bajgorić, (2016) in his study also highlighted how information technology capability leads to innovativeness and Muazu & Abdulmalik, (2021) highlighted how information technology capability leads to a competitive advantage. The indicators of information technology capability include; IT infrastructure, Information flow management and IT personnel capability.

2.3 Information Technology in the dairy Industry

Even though the use of ICT in agriculture was not a new phenomenon, information had recently become a critical factor in agricultural production (Rao, 2006). The resounded changes in information technology that occurred over the last decade have affected almost every aspect of human activity, and dairy farming is no exception (Winrock, 2003). Information, like labor, capital, and land, was regarded as a factor of production (Rao, 2006). According to Dralega

(2007), combining information with other production factors would improve agricultural production and marketing. It was a critical resource for development and empowerment, enabling farmers to make informed decisions about agricultural product production, marketing, and management of agricultural products and services (Mureithi, 2013). Dairy farming systems, according to Berman (2010), were most likely the most complex of agricultural production systems. Other agricultural systems with crops, plants, and livestock inputs and outputs occurred only a few times per year. These items were usually related to one or two other items.

Even the most basic dairy farming systems contained a wealth of potential information in the form of records of milk yields, fertility, feed production and usage, animal health, labor input, and prices (Aker, 2010). The conversion of this potential into data, and then into information, was determined by the prevalence of literacy.

2.4 Dairy industry standards

According to the International Standards Organization (ISO) 2018, the ISO standards catalog lists all milk and milk products standards, the bacterial quality of the milk and the acidity of the milk as show in the table below.

Table 2.1: ISO standards Catalog

Quality Tests	Acceptable limits	Standards
Acidity test (titratable)	≤ 0.18%	ISO 6091:2010
Freezing point (added water)	-0.54˚C	ISO 5764:2009
Fat content	0.8%	ISO 1736:2008
Protein	3.4%	ISO 8968:2014

Source: **International Standards Organization (ISO) 2018**

From the above table, the titratable acid test measured the acidity of the milk, added water was measured by changes in the freezing point of milk from its normal values (ISO5764,2009). The average fat content of raw milk was 4.4g of milk fat per 100g but the acceptable limit does not exceed 0.8%. The protein fat content of milk was around 3.4% which had a bearing on the price the farmer achieves for its milk (ISO 8968:2014).

In Uganda, the Dairy Development Authority was in charge of promoting and monitoring quality in the dairy industry by enforcing standards in collaboration with the Uganda National Bureau of Standards. The Authority created new dairy industry standards and updated existing ones in Uganda Standards Catalogue 2019 as shown in the table below.

Table 2. 2: Uganda Standards Catalogue

Quality Tests	**Standard**
Determination of fat content of milk of good quality	US ISO 1211: 2010
Determination of water content in milk	US ISO:2446: 2008
Determination of hygienic requirements for production, processing, handling, transportation and distribution	US163:2019
Determination of requirements and methods for sampling and testing of raw cow milk	US EAS 67:2006

Source**: Uganda Standards Catalogue (March 2019)**

2.5 IT infrastructure

"IT infrastructure capability was defined as the ability to organize technical facilities (hardware systems and networks), applications (platforms, databases, operating systems, and core software), and IT management services" Lu & Ramamurthy (2011). Technology facilities encourage the knowledge sharing and provide the employees with the knowledge required Abdi et al., (2018).

An information technology infrastructure serves as the foundation for computer technology, communication, and basic data systems within the technical framework that guides organizational work to meet management needs (Melville, 2010). According to Mitchell et al. (2012), an IT infrastructure is the foundation upon which a company can deliver dependable services through an organized and coordinated central information system".

Aydiner et al. 2019 conducted a study in which supply chain information systems played a role in these collaborations and communication processes with the goal of information management and sharing, which provided a path for organizations to make decisions.

Budiarto et al. (2017) discovered that supply chain information management systems facilitated supply chain processes, communications within these processes, and interferences across various partners in the supply chain network. According to the study, these integrated information systems improved organizations' ability to reduce logistics lead time.

Deshmukh et al (2015) researched on computer application in the dairy industry in India and pointed out that the introduction of Enterprise Resource Planning solution in Amul dairy cooperative society brought about dynamic changes in the business environment. This application comprised of Automatic Milk Collection System Unit which were installed at village societies to automate milk producer logistics, facilitate the capture of member information, milk fat content, milk volumes collected and amount payable to members. Similarly, India Institute of Management (IIM) developed and provided an application software Dairy Information System Kiosk (DISK) to facilitate data analysis and decision support in improving milk collection". Therefore, by implementing such Information technology infrastructure management observed radical changes

such as improvement in the delivery mechanism and bought transparency in business operations, processing time for payment to milk producers reduced from a week to few minutes.

The information systems made possible through elimination of delays by organizations in terms of cutting down the slack time on the basis of the use of automatic data capturing and storage and also the automatic material handling and exchange of data through electronic means (Lui et al 2018). The study conducted by Saeed et al (2019) stated that the use of integrated supply chain information systems also increased the performance of supply chain functions of organizations through providing the required information for functional support.

Mexico, one of the leading countries in Latin America in terms of innovation, conducted research on dairy production processes. The advancements in conservation, packaging, mass production, continuous production, and separation and isolation of milk components are examples of technological innovation. In Argentina, dairy industry innovations focused on process improvements such as dehydration, ultra-pasteurization, modern cheese manufacturing, process automation, and quality testing equipment. “Costa Rica developed two types of innovation: closed innovation, which is related to process improvement, and open innovation, which is related to the rapid growth and intensive industries on information and communication technologies (FAO, 2012)”. The findings of the above research revealed that technology advance brought about increased efficiency in processes, lowering of costs and helping economies to evolve.

According to the study of Irefin et al, (2012) “mentioned the various types of ICT tools used by modern businesses such as emails, web portals, video conferencing, internet-based software and social media”. With all these modern new technologies, businesses simplified the supply chain process and eventually reduced transportation mistakes. These businesses used software like Flash

view which enabled some intelligent business owners to consolidate all aspects of the supply chain in one place. This software allowed firms digitally organize data, monitor, manage transportation and tracking of information and create electronic invoices with ease. Through the use of supply chain technologies businesses greatly reduced the time spent on transporting, receiving and compiling order data.

Cao (2021), conducted a study on the recent innovation in the dairy industry and pointed out that information technology infrastructure was a key factor in minimizing costs for example the National Dairy Support Project in India financed the End Implementing Agencies (EIAs) to purchase and install bulk milk chillers (BMC) at village milk collection points, which generated savings in transportation, operations, handling and processing costs". "EIAs also purchased standardized Automatic Milk Collection Units, Data Processor-based Milk Collection Units and adulteration testing kits at village collection centers along with associated information technology systems. All these village-level infrastructures for milk collection and bulking helped in faster release of payment to milk producer".

The infrastructure of information technology improved the business efficiency and competitiveness of producer organizations and cooperatives in national, regional, and global markets (Kenya National Federation of Agricultural Producer, 2008). "In this case the federation developed a software known as CoopWorks which was first tried in Tulaga dairy coop in 2006 to perform tasks like preparing member monthly payments, keeping members records of milk delivered". This system had fewer errors, which increased member confidence, and the number of active members increased from 800 to 1800, dairy milk consumption more than tripled from 3000 to 10,000 kilograms per day, and the average price paid to members increased from K shs.10 to Kshs.17 per kilogram. Tulaga coop membership had reached 3000 by 2010, and milk production

had reached 18,000 kilograms per day. "Therefore, since the introduction of CoopWorks, Tulaga dairy increased the number computers from 4 to 15 since they abuse the paper-based system, provide information via website and lower the costs of operation".

Walse (2016) conducted a case study examining "the use of Business Application of information technology in the dairy industry in Gulf states dairy production and dairy products". It revealed that machine vision system was implemented as a key technology which contributed to increased profitability, improved product quality and safety at dairy product production for example sophisticated computer technology enabled Gulf states dairy industries to measure and analyze each log so that it is cut to provide the most profit in the lumber market.

In Uganda, the dairy development authority purchased a state-of-the-art mobile van to ensure the quality and safety of milk and milk products. This mobile laboratory equipment facilitated on-site milk testing and increased regulatory confidence. The equipment was obtained to instill public confidence in the compliance standards of the milk and milk products tested (Dairy Development Authority Annual Performance Report 2018/2019).

2.6 Information flow management

Dimensions such as information access and information sharing determined the flow of information (Demiris et al 2008). "Organizations run on information. Stop the information, and the organization will come to a halt. Better information necessitates better organizations". Worse information flows result in poor performance. Better information flow leads to better performance. According to (Ron 2014), when information does not flow, the organization's safe and proper functioning is jeopardized, and information flow is a powerful indicator of the organization's overall functioning.

Sharing information was critical because it provided a mechanism for coordinating and integrating supply chain activities (Lee, 2000; Ramayah & Omar, 2010). "According to Bowersox et al. (2000), information sharing among supply chain partners allowed firms to achieve common goals while also allowing for the coordination of supply chain activity processes (Lee, 2000; Barratt, 2004; Lambert, 2004)".

Information sharing was also particularly important within the internal supply chain. If companies cannot share information internally, it would be difficult for them to share information with their partners (Rupple, 2004). The distribution of useful information among people, systems, or organizational units in an open environment benefited supply chain entities by addressing issues such as what to share, whom to share, how to share, and when to share such information, and the information flow among supply chain partners bridges trust and contributes to the improvement of organizational performance (Lee et al., 2006).

Data flow, team interactions, and knowledge generation were all aspects of information exchange (Demiris et al., 2008).

Clark and Lee (2010) in their research EDI enabled channel transformation, revealed that the implementation of a successful supply chain required the continuous flow of information. Sharing of information was an essential action that required coordination of the different supply chain units as it enabled organizations to establish better interaction with their trading partners.

The extent to which a company shares relevant, accurate, complete, and confidential information in a timely manner with its supply chain partners was referred to as information sharing (Hudnurkar et al., 2014). "Suppliers' willingness to share information implied trust and commitment to designing, implementing, and managing initiatives that add value. This

information sharing kept business structures together and allowed them to respond to competitive challenges in the supply chain". As a result, Ryu et al. (2009) concluded in their study on the evaluation of demand information sharing methods in the supply chain that information sharing could help reduce the problems of excess inventory caused by market and supplier uncertainty.

According to research conducted in Uganda, more than 90% of farmers interviewed owned a radio but only 25% owned a mobile phone (Ferris et al., 2006). "Radio programming became more interactive, with phone-ins and radio dairies allowing listeners to contribute dairy information cheaply and easily". In Kenya, radio Mbaitu Fm prioritized dairy farming content and reached out to farmers cooperatives in Kikamba. "In Zambia, RIU established a radio listeners' club that trained over 1000 people in recording techniques and club coordination". Cooperative unions could record their meetings, questions, and development concerns and send them to their local station.

According to Jorgenson et al. (2016), information flow using information technology enabled decision making in real time. "He confirmed that information technology benefits the supply chain by reducing cycle time, keeping inventories low, minimizing the whip effect, and improving transportation channels. However, information technology had a high level of integration, which was the degree to which information systems were related and shared (Carlos, 2017)". Furthermore, information technology enabled an increase in the volume and complexity of information that needed to be communicated among partners, such as inventory levels, delivery status, and production scheduling, which translated into better supply chain control, which also led to coordination between the client and the supplies (Prajogo et al., 2012).

"According to Monostori and Allaoui et al (2019), information technology used in the supply chain reduces complexity and streamlines information flows, improves coordination in production

processes, and planning and control". "It was concluded that by integrating information technology into a company's productive process and supply chain, tangible operational benefits that facilitate greater workforce capability are realized (Llach et al., 2015)".

Walse (2016) pointed out that communication and collaboration through the use of internet, intranets and extranets support real time global communication and collaboration among employees, suppliers, customers and other partners. "This enabled members of different organizations and people at different locations to work together as members of virtual teams share the same information very fast thereby reducing costs of movement, delays in information circulation".

Although information sharing provided benefits such as improved resource and equipment utilization, cost reduction, and effective management of supply chain events (Zhang et al., 2019; Kim and Chai, 2017), there was a lack of studies available to examine the relationship between information sharing and organizational performance, particularly in the agri-food context. Because of the visibility enabled by ICT, supply chain members could have up-to-date customers and suppliers through information sharing (Zhong et al., 2017; Barratt and Barratt, 2011). Other studies focused on the types of benefits gained from information sharing (Kembro et al., 2017; Marinagi et al., 2015; Hosoda et al., 2015; Costantino et al., 2014). "The benefits of information sharing in the manufacturing industries may include cost reduction. Inventory reduction, increased visibility, internal service improvement, resource utilization improvement, and achieving desired efficiency (Shamout & Elayan, 2018; Lotfi et al., 2013)".

Inter-organizational information sharing is influenced by government legislation and policies in both direct and indirect ways (Mitchell and Kovach, 2016; Yang and Maxwell, 2011). "Accurate

and frequently shared information among supply chain members saves time when making decisions in unexpected situations". This increased delivery and operational flexibility (Kembro et al., 2017; Ali et al., 2017). "Better information dissemination capabilities aided organizational performance, and higher levels of information sharing put organizations ahead of their competitors (Guesalaga et al., 2018)".

"The information technology-enabled supply chain can easily manage the flow of information with key business processes, materials, and money within and outside networks, and it contributes to firm profits by improving quality, lowering coordination costs, and lowering transaction risks (Mabert et al, Sander & Premus, 2002)". According to Levary (2002), information technology in the supply chain reduces cycle time, inventories, minimizes the Bullwhip effect, and improves the effectiveness of distribution channels.

The true value of information sharing within a supply chain is defined by the fact that the benefits obtained outweigh the costs involved. "These costs included the investment in information systems as well as charges imposed by suppliers for providing the information. Communication and administration expenses were included in the coordination costs". "These costs could be reduced by recent advancements in information technologies such as Enterprise Resource Planning and other Web technologies (Li, Shaw et al 2002)".

"Rahman and Afsar (2008) examined the impact of information technology application on supply chain performance in the steel supply chain, in their study published in the Iranian journal of information technology". "They suggested the following: Sharing and information technology of supply chain affect accountability of steel supply chain, Information technology and information

sharing of supply chain affect steel supply chain efficiency, responding of supply chain affects steel supply chain performance, and supply chain efficiency affects supply chain performance".

2.7 IT personnel capability

The level of individual ability to contain knowledge about technical elements, IT resource management, business functional, and ability to communicate and work with other people is known as information technology personnel capability (Kim et al., 2012).

Information technology has enabled innovative projects in the dairy industry, such as the National Dairy Support Project in India, where the installation of 69 Data Loggers for Bulk Milk Coolers at village level Dairy Cooperative societies aided in the monitoring and control of Bulk Milk Cooler performance in real time. "Additionally, the provision of SMS alerts and web portal-based information via data loggers aided in remote performance monitoring, preventative planning for potential breakdowns, and the timely resolution of equipment failures".

Information technology knowledge is an important enabler of key information technology products and services for smoothing the business operation flow. "For example, the Jharkhand Milk Federation in India successfully piloted milk fortification under the South Asia Food and Nutrition Security Initiative (SAFANSI)". The pilot investigated the potential for large-scale milk fortification in India through micronutrient fortification in the liquid milk supply chain, consumer advocacy, and enabling scale-up and institutionalization. "From 2017 to 2019, the pilot reached 25 Milk Federations, DPCs, and Milk Unions across 20 states, beginning with 13,000 liters of Vitamin A and D fortification per day and increasing to 5.5 million liters of milk per day by 2019, providing access to approximately 6 million consumers (National Dairy Support Project, World Bank, 2020)".

“The Australian dairy industry came up with newer technologies that demonstrated improvements to productivity in dairying for example milk harvesting was improved with the development of automatic milking systems such as the Lely Astronaut, DeLaval VMS, and Insentec Astrea, as well as in-line sensors such as milk meters, daily milk yield recording, and milk component monitoring, have all assisted dairy unions in reducing the amount of human labor required for milk harvesting and providing the opportunity to increase milk frequency without increasing labor”.

User attributes such as prior experience with information technology played a significant role in IT's eventual success (Sabherwal et al. 2006). The study of Dong et al., (2009) sought to better understand the value of information technology (IT) in supply chain contexts. “They developed a conceptual model that links three IT-related resources (backend integration, managerial skills, and partner support) to firm performance improvement, based on resource-based theory and transaction cost economics”.

Information technology personnel played an important role in enabling key IT products and services to help businesses run smoothly. “IT personnel propose an appropriate technical solution to solve business problems related to IT applications”. Essentially, IT personnel used the adaptability of IT infrastructure to propose a solution to management (Byrd & Turner, 2000). As a result, IT personnel have a direct and positive impact on the agility performance of an organization (Fink & Neumann, 2007). “Organizations are increasingly relying on the skills their employees acquire throughout their careers, and it is critical for these organizations to be aware of their employees' knowledge and skills, particularly in information technology (Cragg et al., 2012)”.

Empirical Review

Information Technology Capability and operational performance

Literature indicates that information technology capability positively influences operational performance (Chu et al., 2019; Muazu & Abdulmalik, 2021; Turulja & Bajgorić, 2016). "Research conducted in China by Chu et al., (2019) shows a positive relationship between information technology capability and operational performance". In contrast, research conducted by Muazu & Abdulmalik (2021) shows a positive and significant relationship between Information Technology capabilities and competitive advantage which leads to operational performance. Turulja & Bajgorić, (2016) conducted research and shows information Technology capability facilitates innovation and indirectly affects operational performance

Scholars show that information technology capability fuels operational performance by enabling organizations to respond to continuously changing market needs by employing digital technology (Chu et al., 2019). "Relatedly, Muazu & Abdulmalik, (2021) underscores that information technology capability fuels operational performance through integration, development, and reconfiguration of internal and external competencies to generate new types of competitive advantage". "In that repute, the resource-based view theory is regarded appropriate on how information technology capability explains operational performance as it drives firms to integrate, develop and configure competencies to achieve operational performance". The study's primary goal was to determine the relationship between information technology capability and operational performance.

Basing on the above disclose, it was hypothesized that;

H1: There is a positive relationship between Information Technology Capability and Operational Performance

IT Infrastructure and operational performance

Literature indicates that information technology infrastructure positively influences operational performance (Cholis et al., 2022; Jabbouri, 2018; Mithas et al.., 2005; Muazu & Abdulmalik, 2021). “Research conducted by Muazu & Abdulmalik, (2021) shows IT infrastructure significantly and positively influences competitive advantage”. In contrast (Mithas et al.., 2005) discovered that organizational capabilities will mediates the links between IT infrastructure capability and operational performance. (Cholis et al., 2022) discovered that IT infrastructure capability and organizational Agility do influence operational performance significantly. (Jabbouri, 2018) discovered that IT infrastructure has a direct effect on operational performance.

IT infrastructure and operational performance are interconnected because IT infrastructure has the power to increase a company's responsiveness so that it has a greater competitive edge as well as its adaptability and ability to better foresee and respond to current and future changes so that operational performance is improved. information flow management and operational performance (Cholis et al., 2022). “In that repute, the resource-based view theory is regarded appropriate on how IT infrastructure explains operational performance because a firm with the necessary tangible resources like IT infrastructure because they increase an organizations responsiveness which in turns leads to improved operational performance”. Thus, the study aims to establish the relationship between IT infrastructure and operational performance.

Basing on the above disclose, it was hypothesized that;

H2; IT infrastructure is positively related to operational performance

Information flow management and operational performance

Literature indicates that information flow management positively influences operational performance (Chege et al., 2017; Huo et al., 2016). “Research conducted by Huo et al., (2016) in Australia shows a positive association between information flow management and operational performance. Research conducted by Chege et al., (2017) in Kenya shows a positive association between information flow management and operational performance of financial market intermediaries” .

Scholars demonstrate that information flow management influences operational performance because a full automation of information flow management systems will improve the quality of the information provided, which in turn improves the ability to make informed decisions and so improve operational performance (Chege et al., 2017). Pypłacz, (2020) bolsters the notion that information flow management systems enhance the use of their resources and the knowledge generation process, both of which lead to improved operational performance. “Information and knowledge sharing are enhanced through bettering a company's documentation and information dissemination to make sure that employees have the information and knowledge necessary to complete their tasks, which promotes the effectiveness and efficiency of operations performance. (Huo et al., 2016)”.

Information flow management and Operations management have an impact on one another because information flow management guarantees that personnel have access to the information and knowledge they need to do their responsibilities. (Huo et al., 2016). “In that repute, the resource-based view theory is regarded appropriate on how information flow management explains operational performance because a firm with the necessary information flow management systems will enable employees access information and knowledge that leads to operational performance”.

Therefore, the study aims to establish the relationship between information flow management and operations management

Basing on the above disclose it was hypothesized that;

H3: There is a positive relationship between information flow management and operations performance

IT personnel capability and operational performance

Literature indicates that IT personnel positively influences operational performance (Chen & Tsou, 2012; Kmieciak et al., 2012; Makhloufi, 2018). Research conducted by Kmieciak et al. (2012) in Polish shows a positive relationship between IT personnel and operational performance. "Research conducted by Makhloufi (2018) in the Malaysia shows a positive relationship between IT personnel and operational performance". Research conducted by Chen & Tsou (2012) in Taiwan shows it capability has an impact on operational performance.

Scholars demonstrate that IT personnel influences operational performance because when IT staff capability is combined with IT infrastructure, it offers significant benefits with the required business and technical expertise that results in operational performance (Makhloufi, 2018). Kmieciak et al. (2012) supports the idea that IT personnel is used to utilize and strengthen the influence of other resources or competencies on operational performance. Operational performance is achieved by utilizing IT capability to create customer service and service process innovation (Chen & Tsou, 2012).

"IT personnel and operational performance influence each other because IT personnel and operational performance because the activities of IT personnel enhance organizational learning processes, interorganizational interchange, communication, and knowledge sharing, all of which

support operational performance (Chen & Tsou, 2012)". In that repute, "the resource-based view theory is regarded appropriate on how IT personnel capability explains operational performance because IT personnel that skills and competence will strengthen the influence of other resources on operational performance". Therefore, the study aims to establish the relationship between IT personnel and operational performance.

Consequently, based on the literature review above, this study developed the fourth hypothesis (***H4***), which stated that;

H4: There is a positive relationship between IT personnel capability and operational performance

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter explains the approach that was followed in data collection in order to achieve the set objectives. “The chapter focused on the research design, the study population, sample size and selection, the sampling techniques, the procedure of data collection and data collection methods, validity and reliability concerns, data analysis methods, measurement of the study variables as well as ethical consideration and limitations of the study”.

3.1 Research Design

This study adopted a cross-sectional study design because with this type of research design the researcher is able to collect data from many different individuals at a single point in time (Lauren 2023). “This research design was chosen because it allowed collection of respondents’ ideas and information on the study objectives”. “Descriptive research design was used to identify characteristics and frequencies in order to have meaningful conclusions and recommendations”. This research used a quantitative approach enabled us delivers accurate information that may be expressed in plain language using statistics and numbers on the relationship. Collection of quantitative data was done using a questionnaire which were distributed to the respondents.

The time horizon for this research was cross sectional since it required data collection to be conducted at a particular point in time.

3.2 Study Population and sample size determination

“The study population for the study was 300 respondents who were permanently employed and who directly work with Brookside’s internal supply chain and as the study focused on operational

performance, the unit of analysis for this study was Brookside limited". "Krejcie and Morgan (1970) recommend that a sample size of 169 be chosen from a population of 300". While the unit of inquiry consisted of people from production and quality assurance unit, top management, finance and administration, stores and packing unit, sales and marketing and procurement unit. The individuals from these areas deemed necessary because they were involved in the day-to-day activities, requiring them to have knowledge and the ability to provide valid responses to what is being studied.

Table 3.1: Showing Sample Size per Department

Category	**Study Population**	**Sample Size**
Top Management	6	3
Finance and Administration	27	15
Procurement Unit	5	3
Stores & Packing Unit	40	23
Sales and Marketing	82	46
Total	**300**	**169**

Source: Brookside dairy industry employment records of 2021

3.3 Sampling techniques

In selecting the respondents, both purposive and simple random sampling techniques were used in selecting respondents. Purposive sampling was used for the procurement unit and top management since it they were knowledgeable about the subject under study and their informed views enabled the researcher to clearly answer the objectives of the study. Simple random sampling was used to select staff from the production, management, finance and administration, stores and packing and finally sales and marketing units where all staff had equal chances of being selected to take part in the study. The method was chosen because it provided a larger sample which increased the credibility of the results (Patton, 2001).

3.4 Data Collection Methods and Instrument

The following data collection methods and tools were used

3.4.1 Research Methods

3.4.1.1 Survey

The researcher used the survey approach following the guidelines put across by (Kothari, 2010); Sekaran & Bougie, 2014) which involved a closed questionnaire to obtain quantitative primary data from the selected respondents.

3.4.2 Data collection Tools.

3.4.2.1 Questionnaire

Questionnaire refers to documents that include a series of open and closed questions, to which the respondent is invited to provide answers (Rowley, 2014). “The questionnaires were designed to collect general information from Brookside dairy industry. The level of agreement of the respondents was measured on a five (5) point ordinal scale where; 1 = Disagree 2 = Strongly Disagree 3 = Neutral 4 = Agree and 5= Strongly Agree”. The closed -ended questions enabled the researcher to specifically direct the respondents towards the desired responses and were chosen for this study because it’s proven to be likely to increase response rate (Rowley, 2014).

3.5.3 Source of Data

The source of data was primary data from Brookside Limited Uganda.

3.6 Procedures of data collection

Approval was sought from the graduate school of Kyambogo university to ensure compliance with ethical guidelines through the data collection process. “Data collection started with a pilot study where the questionnaires were administered to a sample of participants who were not to be part of

the study with the view of collecting feedback which was used to improve on the quality and consistency of the questionnaire before the actual rollout was done".

3.7 Measurement of variables

All measures of the study variables in this study were adapted from previous researchers

Organizational performance which reflects operational performance was measured in terms of operational costs, quality product and speed in product delivery adapted from Saleh, 2015; Sylva, 2020). "Scores on each item were assigned using a five-point Likert scale. These were 1 = Disagree 2 = Strongly Disagree 3 = Neutral 4 = Agree and 5= Strongly Agree. Each point carried a numerical score that was used in the study of operational performance".

IT capabilities was measured by IT infrastructure, Information flow management and IT personnel capability from Kim et al. ,2011& 2012. "Scores on each item were assigned using a five-point Likert scale. These were 1 = Disagree 2 = Strongly Disagree 3 = Neutral 4 = Agree and 5= Strongly Agree. Each point carried a numerical score that was used in the study of operational performance".

3.8 Data control

This addressed both the validity and reliability of data collection instruments of this research.

3.8.1 Validity of instruments

"Validity in research relates to approaches that are used during data collection and analysis that confirm that findings and interpretations of a study are dependable, can be confirmed, and that they are justifiable". "Validity tests were conducted for content validity index to test how well the instrument was representative, capturing relationships between the variables as well as measuring

the concepts (Saunders et al, 2015; Sekaran & Bougie, 2014)". Content validity index was used to calculate the validity of instruments, using the formula below:

$$CVI = \frac{Total\ Number\ of\ items\ declared\ valid}{Total\ Number\ of\ items\ in\ the\ Instrument}$$

Table 3. 2: Content Validity Index (CVI) for the study variables

Variable	No. of items declared valid	Total no. of items on the instrument	CVI
IT infrastructure	5	6	0.83
Information flow management	4	5	0.80
IT personnel capability	4	5	0.80
Operational performance	5	6	0.83

From table 3.2 above, it is clearly illustrated that the items that were included in the study were greater than the cutoff point of 0.70, according to Amin (2005) and these items were valid for the instrument to obtain findings for the study.

3.8.2 Reliability

Reliability is defined as the consistency of either measurement or design to give the same conclusions if used at different times or by different scholars. "According to Sarstedt et al. (2019) for a given construct, item loadings must be more than 0.7 to be regarded as reliable and the results confirm that all items met this criterion". Thereafter, internal consistency was measured through internal consistency reliability (Sekaran & Bougie, 2014) as well as split-half reliability using Cronbach's alpha. After the data collection, reliability analysis was done, the findings for each of the variables are presented in table 6 below;

Table 3.3: Cronbach's Alpha statistics for the survey questionnaire

Reliability statistics for the survey questionnaire		
Measures	**Cronbach's Alpha**	**No. of items**
IT infrastructure	.767	5
Information flow management	.838	4
IT personnel capability	.811	4
Organizational performance	.768	5

As indicated in table 3.3 above, the Cronbach's Alpha test reveals that the instrument's internal consistency as 79.6% which is well above the acceptable value (70%). Thus, the research instrument is reliable and the findings with the instrument in the study are acceptable.

3.9 Data analysis

The researcher conducted a quantitative data analysis. This involved uncovering structures, extracting important variables, detecting any irregularity and testing any assumptions (Kombo & Tromp, 2006).

3.9.2 Quantitative data analysis

"The quantitative data analysis consisted of numerical values from which descriptions such as mean and standard deviations were made (Kombo & Tromp, 2006)". "Data collected was checked to ensure regularity and accuracy; this was useful in ensuring that the objectives of the study were being addressed". Analysis was done according to the objectives of the study, data generated by questionnaires was cleaned, edited and coded before analysis was done; then analyzed using the Statistical Package for Social Sciences (SPSS) Version 23.

"Regression analysis was also conducted using multiple linear regression to analyze the association of IT infrastructure, Information flow management and IT personal capability in the supply chain on organizational performance in Ugandan dairy industry". But before conducting a

multiple regression analysis, several assumptions were tested to check whether the variables were fit to run a regression analysis. “The assumptions included; sample size being more than 20 records for each variable, absence of outliers in all variables, absence of multicollinearity and normal distribution of study variables”.

3.10 Ethical considerations

The researcher informed the respondents on the nature and purpose of the research, the procedures that were used and expected benefits to the respondents at large. Key ethical issues relating to research process included privacy of possible and actual participants were followed.

Respondents were accorded voluntary nature of participation and the right to withdraw partially or completely from the research process. “Prior and informed consent was requested from them and the researcher maintained high degree of confidentiality of data provided by individuals or identifiable participants and their anonymity”. The researcher was honest in search of genuine problems.

The researcher also ensured that the data collection method and instruments were fairly free of anxiety. “The researchers further assured the respondents that a discussion of the research findings would be conducted as a way of disseminating the knowledge gathered”. Other issues concerning acknowledging all the works that were cited to avoid plagiarism and related malpractices.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF FINDINGS

4.1 Introduction

"This chapter presents background information of the respondents included in the study, descriptive statistics of the research variables, based on the specific objectives of the study". "The first section presents the background information of the respondents, this is followed by the descriptive analysis for IT infrastructure, information flow management and IT personnel capability. Results of linear regression for each variable are presented and interpreted together with a multiple regression".

4.2 Response Rate

The table below presents the response rate of the respondents where 169 questionnaires that were administered, 144 questionnaires were fully filled and returned representing 85.2%. This was considered a satisfactory representation of the whole population.

Table 4. 1: Response Rate

Category	Target No. of Respondents	Realized No. of Respondents	Percentage of Response (%)
Respondents	169	144	85.2 %

4.3 Background characteristics of Respondents

The characteristics of respondents included Sex of respondents, Age bracket, highest level of education, nature of departments and time worked in the position as shown in table 7 below;

The table indicates that male respondents were slightly higher with a percent of 54.2% as compared to the females comprising of 45.8%. This is associated with the nature of work in the organization

which requires adequate energy, men are more than female however, the organization is gender sensitive where both women and men are employed which makes the findings a representative of the population. “The majority of the respondents were in the range of 25-35 years of age comprising of 72.2% and the other respondents included in the study were aged below 25 years comprising of 11.8%. This implies that the majority of the employees are in the age that can easily adopt and use information technologies as compared to the old who are resistant to change”.

“Additionally, it was observed that the majority of the respondents included in the study hold degrees which comprised of 63.9%, and respondents that hold a postgraduate comprised 4.9%. This implies that the respondents have the education background which can enable them apply information technologies and have the capacity to provide meaningful answers to the questions presented before them in this study”. “Regarding the departments that were visited to collect data include the production, quality assurance unit and sales and marketing unit which comprised of 27.1% each of the two departments and these were very useful in data collection process because they are directly involved in the operations and the procurement department had the least percentage of 2.1%. The findings were therefore a representative of the employees in all the departments of Brookside diary limited”.

Lastly, majority of the respondents at Brookside limited had worked for a period of 5 years and above comprising a percent of 69.4 and the respondents that had worked for less than 1 year were only 9.7 This implies that the respondents had adequate experience in the operations of Brookside limited and were knowledgeable in how IT capabilities affect operations performance.

Table 4.2: Characteristics of respondents

	Categories	Frequency	Percentage
Sex of respondents	Male	78	54.2
	Female	66	45.8
Age bracket of respondents	Below 25 years	17	11.8
	25-35 years	104	72.2
	35 years and above	23	16.0
Education level of respondents	Postgraduate	7	4.9
	Degree	92	63.9
	Diploma	35	24.3
	Certificate	10	6.9
Departments of respondents	Top Management	11	7.6
	Production and quality assurance unit	39	27.1
	Finance and Administration	21	14.6
	Stores and Packing unit	31	21.5
	Sales and Marketing unit	39	27.1
	Procurement unit	3	2.1
Time worked in the position	Below 1 year	14	9.7
	1-5 years	30	20.8
	5 years and above	100	69.4

Source: ***primary data 2022***

4.4 Descriptive Analysis

"The study described the characteristics and the nature of the data regarding operational performance and IT capabilities in terms of IT infrastructure, information flow management and IT personnel capability. The method was based on standard deviation and mean". The extent to which participants' perspectives regarding IT capability and Operational Performance were measured using mean and standard deviation

4.4.1 Operational performance

Under this study variable respondents were asked to either agree or disagree with the following observations on organizational performance of Brookside diary. "The variable was measured using

items scored on a five-point Likert scale ranging from 5= Strongly Agree, 4= Agree, 3= Not Sure, 2= Disagree, and 1= Strongly Disagree". "A mean result below 4.42 suggests low operational performance while a mean result of ≥ 4.42 suggests a high operational performance on a particular item of the variable". The descriptive statistics showing the percentages, mean and standard deviation results are shown in table 8 below;

As indicated in table 8 below, the findings reveal that generally, respondents perceive all the statements measuring operational performance to be above average on the scale of 1 to 5. It can however be seen that there are notable differences on the various items of operational performance evaluated.

"For instance, 100% of the respondents agreed that our organization is effective in fulfilling requirements with a mean of 4.49 and standard deviation of 0.502". "This item constituted the highest score followed by organization's effectiveness in on-time delivery where 98.6 % of the respondents agreed and only 1.4% of the respondents were neutral with a mean of 4.48 and standard deviation of 0.528". "Our organization's efficiency in delivering reliable quality products had 99.3% of the respondents agreed and only 0.7% were neutral with 4.47 as mean and 0.515 as standard deviation. 99.3% of the respondents agreed that Reduction in cost to reach internal customers and 0.7% were neutral with a standard deviation of 0.515". All these four items were above the overall mean of 4.42, this is likely to imply that the respondents might totally agree that IT capabilities have a positive relationship on how the operations perform and they should be given attention by management.

"However, reduction in inventory costs was below the overall mean with 79.2% of the respondents in agreement and 20.8% of the respondents were neutral with a mean of 4.15 and standard

deviation of 0.738". "Basing on the analysis undertaken in table 8 above, it's evident that the majority of the respondents agreed that the operational performance in terms of service delivery, reduced operational costs and also increased efficiency and effectiveness at the milk collection centers and Brookside diary in particular due to effectiveness in fulfilling requirements".

Table 4.3: Descriptive results for operational performance

	No	Mean	Std. Dev
Our organization's effectiveness in fulfilling requirements	144	4.49	0.502
Our organization's effectiveness in on-time delivery	144	4.48	0.528
Reduction in cost to reach internal customers	144	4.51	0.515
Our organization's efficiency in delivering reliable quality products	144	4.47	0.515
Reduction in inventory costs	144	4.15	0.738
Overall mean	**4.42**		

Source: Primary data 2022

4.4.2 IT Capabilities

"To examine the association of IT infrastructure, Information flow management and IT personnel capability on operational performance. The means and standard deviations of the study variables were computed on the basis of a 5-point Likert scale where 1=Strongly disagree and 5=Strongly agree".

In regard to IT infrastructure a mean result of ≥ 4.28 suggests a high association of IT infrastructure on operational performance. it's clear that the majority of the respondents agreed that IT infrastructure at Brookside diary Limited has helped to reduce on operational costs and ensuring quick delivery of milk products.

"In regard to information flow management a mean result of ≥ 4.22 suggests that information flow management has relationship with operational performance. It is clear that the respondents agreed

that information flow management at Brookside diary Limited has helped improve on operational performance".

"In regard to IT personnel capability a mean result of $\geq$ 2.94 suggests low effect of IT personnel capability on operational performance". This implies that IT personnel capability were below the overall mean implying that the respondents clearly identified that the personnel in Brookside still have knowledge and applicability gaps when it comes to IT which need to be addressed in order for performance to improve.

Table 4. 4: Descriptive results for IT capabilities

	No	**Mean**	**Std. Dev**
IT infrastructure	144	4.28	0.68
Information flow management	144	4.22	0.73
IT personnel capability	144	2.94	0.90
Overall mean		**3.81**	

4.5 Correlation Analysis

"A Pearson coefficient, which ranges from -1 to 1, indicates the degree of linear correlation between two variables. In order to ascertain the relationship between IT Capabilities and Operational Performance, zero-order correlation analysis was used". "The correlation coefficients show that information technology infrastructure and operational performance are significantly associated with each other at 0.01 level (2-tailed)". "Additionally, the correlation coefficients of information flow management and operational management are not associated with each other at 0.01 level (2-tailed). Lastly, the correlation coefficient of IT personnel capabilities and operational performance shows a positive association". Results reveal both a negative association between information technology infrastructure and operational performance. This suggests that even if information flow systems are present, without the right people to disseminate and understand this

information, operational performance won't be achieved. “Additionally, information technology infrastructure and operational performance are significantly associated with each other”. “This implies that when information technology infrastructure is readily available an organization can easily increase a company's responsiveness so that it has a greater competitive edge as well as its adaptability and ability to better foresee and respond to current and future changes so that operational performance is achieved”. Lastly there is a positive association between IT personnel capabilities and operational performance. This implies that that when an organization will improve its performance in terms of efficiency, reduced waiting time, quick delivery of products and reduced operational costs, if more efforts are invested in equipping the employees with required IT skills

Table 4.5: Pearson’s Correlation

Correlations

		mean_ITPC	mean_OP
mean_ITPC	Pearson Correlation	1	.110
	Sig. (2-tailed)		.190
	N	144	144
mean_OP	Pearson Correlation	.110	1
	Sig. (2-tailed)	.190	
	N	144	144

Correlations

		mean_ITI	mean_OP
mean_ITI	Pearson Correlation	1	.195*
	Sig. (2-tailed)		.019
	N	144	144
mean_OP	Pearson Correlation	.195*	1
	Sig. (2-tailed)	.019	
	N	144	144

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		mean_IFM	mean_OP
mean_IFM	Pearson Correlation	1	-.264**
	Sig. (2-tailed)		.001
	N	144	144
mean_OP	Pearson Correlation	-.264**	1
	Sig. (2-tailed)	.001	
	N	144	144

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

4.6 Multiple Regression

The study also utilized the multiple linear regressions to determine the influence of the independent variable on the dependent variable included in the study.

"Table 15 below shows adjusted R^2 of 0.133 suggesting that IT infrastructure, Information flow management and IT personnel capability all predict 13.3% of the variance in operational performance and they were significant predictors at Brookside Limited, Uganda". This is like to lead management to focus on the three aspects by providing resources and developing an IT policy and procedures to guide on proper implementation of IT in their operations.

"The unstandardized coefficient results reveal that Information flow management with (Beta= -0.190, t=-4.264 Sig. = 0.000) is the strongest predictor of operational performance". "This means that there exists a positive association between information flow management and operational performance". Therefore, an increase in information flow management at Brookside Limited in terms of information sharing and accessibility of information might improve operational performance in terms of quality of the products, reduced operational costs and increase in speed of delivery. IT infrastructure with (Beta= 0.172, t=2.225, Sig. = 0.028) is the second strongest predictor. "This means that there exists a moderate positive association between IT infrastructure and operational performance implying that IT infrastructure has the power to increase a company's responsiveness so that it has a greater competitive edge as well as its adaptability and ability to better foresee and respond to current and future changes so that operational performance is achieved". Lastly there is IT personnel capability with (Beta= 0.192, t= 2.200, Sig. = 0.029) which was the least predictor. This means there is a moderate relationship between IT personnel and operational performance implying that if Brookside Limited desires to improve its performance in

terms of efficiency, reduced waiting time, quick delivery of products and reduced operational costs, more efforts should be invested in equipping the employees with required IT skills.

Table 4. 6: Multiple Regression Test Results

Model		R	R Square		Adjusted R Square	Std. Error of the Estimate	
1		.389[a]	.151		.133	0.36820	
Model			Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
1	(Constant)		4.265	.351		12.154	.000
	IT infrastructure		.172	.077	.181	2.225	.028
	Information flow management		-.190	.045	-.359	-4.264	.000
	IT personnel capability		.087	.040	.192	2.200	.029
a. Predictors: (Constant), IT infrastructure, Information flow management, IT personnel capability b. Dependent Variable: Operational performance							

$P \leq 0.05$

Source: Primary data 2022

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

“This chapter presents the summary, conclusion and recommendations of the study on IT capabilities in supply chain and organizational performance at Brookside Limited, Kampala, Uganda”. The chapter presents the summary based on the study findings, conclusion, recommendations and areas for further study.

5.2 Summary of the study findings

“The study centered on finding the relationship between Information Technology Capability and operational performance at Brookside Limited Uganda”. The study collected data from 169 participants from Brookside Limited Uganda. “The study was guided by four specific objectives which included; to assess the relationship between IT Infrastructure in the supply chain on operational performance at Brookside Limited Uganda, to examine the association between Information flow management in the supply chain on operational performance at Brookside Limited Uganda, to assess the association between IT personnel capability in the supply on operational performance at Brookside Limited Uganda and to examine the association between Information Technology Capabilities in the supply chain and operational performance at Brookside Limited Uganda”. This analysis' conclusions showed that Brookside Limited Uganda strongly agreed that IT capability leads to operational performance.

The results show that (i) IT infrastructure has a positive and moderate relationship on operational performance. “When IT infrastructure is increased there is a high likelihood of achieving operational performance because IT infrastructure has the power to increase a company's

responsiveness as well as its adaptability and ability to better foresee and respond to current and future changes". (ii) The findings demonstrated a positive and significant relationship between Information flow management and operational performance at Brookside Limited Uganda where information flow management fuels operational performance increasing information sharing and accessibility of information might improve operational performance in terms of quality of the products, reduced operational costs and increase in speed of delivery. (iii) IT personnel capability has a moderate association with operational performance at Brookside Limited implying that if Brookside Limited desires to improve its performance in terms of efficiency, reduced waiting time, quick delivery of products and reduced operational costs, more efforts should be invested in equipping the employees with required IT skills

"In addition to the above, regression results revealed that IT capability plays a positive role in the relationship with operational performance, suggesting that when Brookside decides to implement IT capability, it shifts resources to IT infrastructure, information flow management, and IT personnel capability, all of which will increase or promote operational performance making, IT capabilities essential therefore management should concentrate on developing an IT Capabilities".

5.3 Discussion of findings

Under this section the study findings are being explained in relation to the literature reviewed and find out whether the study findings are in line with what other previous researchers investigated.

5.3.1 IT Capabilities and Operational Performance

H1 aimed at testing the relationship between IT capabilities and Operational Performance. "The results show that IT Capabilities. The results show that IT capabilities are significantly associated with Operational Performance. This suggests that IT Capabilities proactively responds to

operational performance". "This happens when IT capabilities result in a decrease in inventory costs, efficiency in producing dependable quality items, effectiveness in on-time delivery, and effectiveness in satisfying customer demands".

"The findings are in line with those of Hadikusuma (2022) who found out that IT capabilities shapes operational performance by adjusting to external developments, endure in the face of competition, increase customer happiness, save operating expenses, and save time thanks to IT capabilities and in support (Masini, 2015) claims that IT Capabilities enhances the capacity of an organization to process information, changing how production processes are controlled and work is organized, changing the scope of the process, and changing work procedures". These variables are explained by a resource-based view theory because IT capabilities are sufficient enough to bring about change which in turn leads to operational performance

5.3.2 IT infrastructure and operational performance

"H2 aimed at testing the relationship between IT infrastructure and Operational Performance. The results indicate positive and moderate relationship between IT infrastructure and Operational Performance". IT infrastructure is likely to be impacted by operational performance. This happens when there is a need to invest in IT infrastructure to adapt specific practices; if we don't, we risk failing to adapt to current trends and failing to be better able to foresee and respond to current and future changes, such as reducing the time spent at milk collection centers or promptly satisfying business requirements.

"The findings are in line Deshmukh et al (2015) who also researched on computer application in the dairy industry in India and pointed out that the introduction of Enterprise Resource Planning solution in Amul dairy cooperative society brought about dynamic changes in the business

environment. Resource Based View theory explains IT infrastructure and operational performance in such a way that when firms procure the right IT infrastructure it leads to operational performance".

5.3.3 Information flow management and operational performance

"H3 aimed at testing the relationship between information flow management and operational performance. The results show that information flow management and operational performance positive and significant association. Information flow management in Brookside Limited drives operational performance because information sharing has enabled improvement in speed of product delivery". "Information flow management in Brookside Limited drives operational performance because information sharing has enabled improvement in speed of product delivery. Information flow management is connected to operational performance when enables to predict delivery times, reduction of customer response time, reduces excessive inventory and enables the dissemination of accurate information".

"The results are consistent with previous studies, including that done by Sanders and Premus (2002) and Dralega (2007) who discovered that information flow management improves quality of agricultural production, lowers coordination costs and transaction risks, and improves operational performance by controlling the flow of information with key business processes, materials, and money both inside and outside of networks. The results are in line with the resource-based view theory, which explains how information flow management with the use of the right resources will led to operational performance".

5.3.4 IT personnel capabilities and operational performance

H4 aimed at testing the relationship between IT personnel capabilities and organizational performance. “The results show that moderate association between IT Personnel Capabilities and operational performance. IT Personnel Capabilities are likely to impact operational performance”. When IT staff members are adept at managing the IT function, operational performance follows. This happens when information systems provide novel production techniques for product enhancement, when information systems satisfy business demands, and when IT people have the ability to develop bespoke software applications, these factors can all contribute to operational performance.

“The findings are in line with study of Makhloufi, (2018) who discovered that IT personnel capabilities influences operational performance because it offers significant benefits with the required business and technical expertise that results in operational performance”. “Resource based view explains IT personnel capabilities and operational performance in such a way that the organization will invest resources to equip IT personnel capabilities so as to improve operational performance”.

5.4 Conclusion

“The study sought to examine the relationship between IT capabilities in the supply chain on operational performance of Brookside Limited, Kampala- Uganda”. “The study findings indicate that there is positive and moderate relationship between IT infrastructure and Operational Performance. The findings also demonstrated that information flow management and operational performance positive and significant association. In the same regard, the study revealed that there is a moderate association between IT Personnel Capabilities and operational performance”. Lastly, the results show that IT capabilities are significantly associated with Operational Performance.

“These results shed light on how Brookside Limited's IT capabilities is impacted by operational performance. Because of this, it is crucial that Brookside Ltd. develop interventions meant to promote IT capabilities. By utilizing IT infrastructure, information flow management, and IT personnel capabilities, this may be accomplished”.

5.5 Recommendations

The management of Brookside diary limited should procure adequate IT hardware and software infrastructure to enable staff operate electronically. “The software applications should be updated more often to keep up with the changing technological changes with the view of becoming more efficient in operations”. Findings revealed that adoption of IT capabilities was still low, Brookside diary Limited should carry out strategic planning and create clear IT policies for the production and procurement department together with the IT department of the organization.

“The study further recommends that the government and all stakeholders in the diary sector should carry out public awareness campaigns on the importance of adopting IT capabilities in ensuring effective operation and productivity of their firms”.

“The management of Brookside should put in place communication mechanism linked to market information so that the organization makes use of real data when making production decision”. “The procurement and production departments together with the IT department should carefully plan well on how to manage their information systems because this information may be stolen and gets into the competitors’ circle and then it becomes a disaster for Brookside diary”. Brookside should ensure that information along the entire supply chain flows freely and react quickly to any predictable market changes, thereby gaining competitive advantage.

Basing on the findings that revealed that most of the respondents were not aware and neutral about the IT personnel capabilities. This showed that there is need to apply the Technological Acceptance Model or Theory to equip employees with necessary expertise and skills in the use of the new technologies. "The management of Brookside should identify staff training needs and train them on Information technology and its application. Staff should be sensitized on the benefits of implementing information technology in their daily roles so that it reduces on resistance from staff".

5.6 Limitations of the study

The use of questionnaires was a limitation as it created. biases of respondents in understanding the some of the questions and this was mitigated by individually explaining to respondents where they haven't understood so as to eliminate bias.

The study focused on IT capabilities in one country, which is why it may not be able to be generalized for all systems and countries. "The responses collected from the urban population left out the contributions from the rural settings from whom more responses could have been identified (or a totally different set of response)".

The study focused one entity in Kampala district mainly yet there could be other milk collection firms in the other regions of the country. Those milk processing firms in the other regions have not been considered in this study therefore, the results obtained from the study do not represent those manufacturing firms in other regions.

Some of the questionnaires that were provided during the process of data collection were not returned. And also, the questionnaires that were returned some items were not selected and returned them not filled in.

5.7 Areas for further research

“Since only 13.3% of variations in organizational performance is accounted for by IT infrastructure, information flow management and IT personnel capability”. “Therefore, research could be conducted to examine other factors other than these under study”. Further studies may be conducted under investigating the intervening effect of organizational size on the relationship between IT capabilities practices and organizational performance of diary firms, it was included in the conceptual framework though not studied. Another study may be conducted on factors the influence organizational performance of diary firms in Uganda with exception of IT capabilities and it should be a cross-sectional study.

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APPENDICES

APPENDIX I: QUESTIONNAIRE TO STAFF OF BROOKSIDE LIMITED.

Dear Sir /Madam

Introduction.

Thank you for agreeing to participate in this study. I am Kivumbi Douglas a Postgraduate student at Kyambogo University pursing a program leading to the award of Masters of science in procurement and supply chain management. I am carrying out research on the topic: '***The association of IT Capabilities in the supply chain on organizational performance in Ugandan dairy industry***. ***A case study of Brookside Limited Uganda***.' Please be assured that all the information collected will be kept confidential and that your identifiable indicators will never be shown to any other party or for any other purpose other than for its academic purpose. This survey is aimed at seeking the association of IT Capabilities in the supply chain on the organizational performance at Brookside dairy limited Uganda.

Section I: Background Information (Tick as appropriate)

No.	Bio-data	Options	Please Tick
1.	Gender	Male	
		Female	
2.	Age bracket	Below 25 years	
		25-35 years	
		35 years and above	
3.	Highest level of education	Postgraduate	
		Degree	
		Diploma	
		Certificate	
		Others (Specify)	
4.	Departments	Production and quality assurance unit	

		Top Management	
		Finance and administration	
		Stores and packing unit	
		Sales and marketing unit	
		Procurement unit	
		Others specify	
5.	Time worked in the position	Below 1 year	
		1-5 years	
		5 years and above	

SECTION II: IT Capabilities in supply chain

Instructions

Indicate the extent to which you agree with the following statement effect of IT infrastructure, information flow management and IT relationship resource on organizational performance by indicating (SA) if strongly agree (A) if agree, (N) Neutral (D) if disagree (SD) if strongly disagree.

Code	**IT Infrastructure**	**SD**	**D**	**N**	**A**	**SA**
ITI1	Our information system has reduced on the time spent at the milk collection centers.					
ITI2	The information system has led to improvement in milk standards.					
ITI3	Our information system has led to increased connectivity to a range of information.					
ITI4	Our information system can minimize errors made while entering milk data at the milk collection centers.					
ITI5	IT systems are used extensively by our suppliers and business partners					
ITI6	Our IT system can satisfy business requirements timely					
	Information flow management	**SD**	**D**	**N**	**A**	**SA**
IFM1	Information sharing has enabled improvement in speed of product delivery					
IFM2	IT-based information sharing enables Brookside to predict delivery times.					

IFM3	Customer response time is reduced as a result of information sharing					
IFM4	Sharing of information enables dissemination of accurate diary information with in the supply chain					
IFM5	Information sharing reduces excessive inventory in the supply chain					
	IT personnel capability	**SD**	**D**	**N**	**A**	**SA**
ITPC1	Our IT personnel are good at managing the IT function					
ITPC2	Our IT personnel can develop information systems create innovative production methods for product improvement.					
ITPC3	Our organization can develop information systems that meet business needs.					
ITPC4	Our organization has a strong IT function with skills					
ITPC5	Our personnel have the ability to create customized software applications.					

SECTION III: Organizational Performance

Instructions

Indicate the extent to which you agree with the following observations on organizational performance by indicating (SA) for strongly agree (A) for agree, (N) Neutral (D) for disagree (SD) for strongly disagree.

Code	Scale	SD	D	N	A	SA
	Organizational Performance					
OP1	Our organization's effectiveness in fulfilling requirements					
OP2	Our organization's effectiveness in on-time delivery					
OP3	Our organization's efficiency in delivering reliable quality products					
OP4	Reduction in cost to reach internal customers					
OP5	Reduction in inventory costs					
OP6	Our organization use computer-based systems to minimize wastage.					

THANKS FOR YOUR TIME

Appendix III: DETERMINING SAMPLE SIZE FOR RESEARCH ACTIVITIES, EDUCATIONAL AND PSYCHOLOGICAL MEASUREMENT

Table for Determining Sample Size from a given Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: "N" is population size

"S" is sample size

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Appendix IV: ACCEPTANCE LETTER TO CONDUCT RESEARCH.

Brookside
BROOKSIDE LIMITED

10th May 2022

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: KIVUMBI DOUGLAS

The above student (students No. 1708111014777) a master's student at Kyambogo University has been accepted to conduct his research from the Brookside Limited Uganda.

He is being supervised by the office of the Supply Chain Manager.

This is to request you to provide him with the information necessary for his study.

Thank you

Yours faithfully,

MR. NAREEBWA DESMOND
SUPPLY CHAIN MANAGER

Cc Head Operations

Cc Head Quality Assurance

Directors: M. Kenyatta - Executive Chairman (Kenyan)
J.S. Armitage (British) | Pierre-Andre' Terisse (French)