

**EFFECTS OF SUPPLIER DEVELOPMENT ON SUPPLY CHAIN
PERFORMANCE IN THE DAIRY SECTOR IN NYANDARUA COUNTY**

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**A Research Thesis Submitted to the School of Business Management and
Economics in partial fulfillment of the requirements for the award of Master of
Science in Supply Chain Management of Dedan Kimathi university of
Technology**

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DECLARATION

I declare that this is my original work and has not been presented in any other university or any institution of higher learning for examination.

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DEDICATION

This study is dedicated to my twin brother Jeremiah Gichohi and my fiancée Caroline Wanjiru for their tireless support and encouragement while during my studies.

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I thank the almighty God for giving me strength, wisdom, time, ability and finances to embark on this proposal and for the day to day guidance and protection. I would like to extend my gratitude to my family for their financial and moral support, encouragement, and understanding when writing this research thesis.

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LIST OF ABBREVIATIONS

A.I	- Artificial Insemination
EAD	- East Africa Dairy
KCC	- Kenya Co-operative Creameries
KDB	-Kenya Dairy Board
KMDP	- Kenya-Market-led Development Program
KPI	- Key Performance Indicators
Nyala	-Nyandarua and Laikipia dairy limited
SCM	- Supply Chain Management
SD	-Supplier Development

ABSTRACT

The aim of the study was to assess the effects of supplier development on supply chain performance in the dairy sector in Nyandarua County. The study was guided by four objectives which were to assess the effects of; financial support to suppliers, training of supplier, technical assistance and to evaluate the effect of technological support to suppliers on supply chain performance in the dairy sector in Nyandarua County. The study was founded on Network Theory, Social Capital Theory and Resource based Theory to help grasp the concept of supplier development and its effects on supply chain performance. Descriptive study design was adopted for the study. A sample of 158 respondents was selected from the target population of 263. Structured questionnaires were deployed to collect primary data while secondary data was obtained from journals, the selected dairy firms websites and Kenya Dairy board reports. The data collection instruments were pilot tested to improve their reliability. Cronbach Alpha coefficient with a value of 0.70 or above was considered to indicate that the instrument is reliable. Data was analyzed with the support of SPSS version 21. Descriptive and inferential statistics were employed to test the degree of relationship among the variables. Multiple regression analysis was used to find out the relationship among the study variables. Quantitative data from the findings were presented in tables while qualitative data were summarized and categorized into themes guided by the objectives of the study. The study findings indicate that financial support to suppliers, training to supplier, and technical assistance to suppliers had a positive and statistically significant effect on supply chain performance while technological support to suppliers had a positive but statistically insignificant effect on supply chain performance in the dairy sector in Nyandarua County at 95% confidence level. The study recommends that dairy firms should devise strategies of ensuring that financial support is sustainable and accessible by all the farmers and also devise strategies of imparting farmers with knowledge of feed preservation for sustained milk production throughout the year for years. Lobbying in the dairy sector for elaborate infrastructure such as road network, electricity and water is necessary to support installation of cooling plants across the region and reduce milk transportation cost. A milk processing and packaging industry should be established in Nyandarua County to enhance value addition which will further boost income and create jobs in the sector as well as promote food security in the country. However, this will only be sustainable if milk supply in Nyandarua County becomes constant.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Krause and Handfield (2006), defines supplier development (SD) as a collaborative effort between a buyer and suppliers to jointly improve in cost, product quality, environmental responsibility, delivery times and operational efficiency. Research indicates that SD contributes positively to a firm through creation and maintenance of capable suppliers, which leads to improved quality, at reduced cost (Rajput & Bakar, 2012).

A supply chain is a set of three or more entities directly involved in the upstream and downstream flows of products, services, and/or information from a source to a customer (Mentzer, 2001). The entities in the supply chain include producers, intermediaries, processors, retailers and product users among others The Kenyan milk industry has undergone major changes following market reforms in the last two decades (Birachi, 2006). The milk supply chain involves activities and processes from production, processing, trading and consumption.

Supply chain performance is the level to which a supply chain fulfills the objectives of dependability, cost speed, quality, and flexibility (Slack, 2007). Supply chain excellence occurs when an organization acquires or develops an attribute or combination of attributes that allows it to gain a competitive advantage that helps it outperform its competitors (Christensen & Fahey, 2004). A firm is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential player. According to Day and Wesley, (2003) superior performance in supply chain activities outcomes and superiority in production reflect a competitive advantage. Gonzalez and Quesada (2004) pointed out that supplier development is the most influential management process for achieving product quality and customer satisfaction

1.1.1 Supplier Development

The concept of SD was introduced by Leenders few decades ago and it has defined as manufacturers' efforts towards increasing the number of relevant suppliers and their performance improvement. Krause (2009) identified two models of SD (indirect or direct) which are distinguished by resource invested and level of organization

commitment towards the program. Indirect Supplier development program is passive and only focus on supplier identification, evaluation and selection with the goal of compliance to a buyer's needs and requirements. On the contrary, active SD programs represent activities undertaken by the buyer with the proprietary aim of improving supplier capabilities for long-term mutual benefit (Watts & Kim, 2008). The broader aspect of SD is characterized by committing financial and/ or human capital by a buyer towards enhancing supplier capacity.

Across the world, companies such as Rio Tinto Iron Ore from Western Australia and Global Frontier Services operating in extractives industries are becoming increasingly aware of the need to earn a social license to operate beyond the legal rights typically awarded by governments. Host communities need to be involved and happy, since they have a lot of power to hinder operations. The development of suppliers from host communities is one way to create a greater sense of participation and benefit for these communities for harmonious relations (Adam, Temple, & Muzart 2009).

In Africa SD was spearheaded by the South African International Business Linkages Program – Phase II (SAIBL-II) began in 2008 and sought to promote the creation and development of a corporate-led movement that fosters supplier development as a national competitive advantage and priority. It also sought to encourage systemic change in the way corporations, black businesses and business service providers (BSPs) do business with one another, while following sound business practices and market forces (Jenkins, Ishikawa, Barthes, & Giacomelli, 2008). The SAIBL-II program was designed to help address South Africa's unemployment challenge by focusing on job creation, competitiveness, sales transactions and integrating black suppliers into the supply chains of large corporations.

Eskom (2010), reported that the SAIBL-II program provided demand-driven and integrated support to its clients through the creation of business opportunities, linkages, and new markets to small scale businesses. Buyer-supplier relationships have significantly been linked to cost of production, delivery time, productivity, quality and reliability (Dyer, 1997; Li *et al.*, 2006; Ou *et al.*, 2010). Supplier development (SD) has become an important avenue for supply chain integration for continuous improvement (Hahn, 2008). According to Rezaei, Jafar, Jing, Wang, and

Lori Tavasszy (2015), firms are increasingly realizing that supplier performance is crucial to their growth and competitiveness.

In Kenya, SD is not new either especially in the dairy sector which has seen substantive changes with major intensification, scaling-up and efficiency of production has been achieved through the developments in animal breeding, feeding efficiency, animal health, supporting policies, strategies by the government and massive investment by private investors (Muriuki, 2011). However these changes are not reflected across the country and expansion in small-scale milk production has largely stagnated. Neely, (2010) on a study on impacts of SD from a buyers perspective reported that the key impacts of SD includes product quality, efficient transport, supplier flexibility, and innovativeness.

A report by Kenya Dairy Board (KDB), (2014), on Dairy Development indicates that the dairy sector has a huge potential of turning around the economy especially in the rural areas but is littered with hurdles along the supply chain. If executed properly, supplier development can lead to significant cost reductions in the long term. Cost reductions can be realized through establishment of more cooling plants, reduction in transport costs, improved animal breeds and feeds. Commercialization of the dairy industry will be possible if the quality of milk and milk products is improved and supply becomes constant. In order to compete effectively and grow in the dairy sector, dairy firms in Nyandarua have invested heavily in enhancing farmers/suppliers capacity in milk production and hence it should find a way of extract maximum value from the network of suppliers it has built and developed.

1.1.2 Supply Chain Performance

Supply chain performance measurement is one way to understand whether supply chain processes are improving or worsening and whether action is required (Krause, 2007). All too often global companies learn about performance problems when revenues fall short of targets, customers take their business elsewhere, or margins fall below expectations. Companies with good supply chain management skills have higher levels of process maturity that lead to better supply chain performance. These firms avoid the difficulties associated with “steering by the rear-view mirror” and can

take steps to correct problems early before they become overwhelming. Rewards for the supplier's improvement are a stimulating tool that indicates the buyer's recognition and provides suppliers with an incentive to further their outstanding achievements (Monczka Handfield, Giunipero, Patterson, & Waters,2011)

The extant literature indicates that supply chains typically improve performance and capabilities by increasing supplier performance goals (Monczka *et al*, 2011), providing the supplier with training (Galt, Newman, Dale & Hohn, 2010); providing the supplier with equipment, technological support, and financial investments (Monczka *et al*, 2011; supplier performance evaluation (Benton, 2004), and rewarding supplier for improved performance (Galt *et al*, 2010). Studies indicate that, after General Motors implemented SD program, suppliers' productivity improved by 50%, lead time was reduced by 75%, and inventory levels reduced by 70% (Pazirandeh & Mattsson, 2009).

Pisello and Gordon (2008), on a study on Supplier evaluation and performance excellence posits that, supply chains can be full of inefficiencies due to poor policies and strategies at the supplier's side that results to hidden costs and slow movement of goods can be improved by supplier evaluation, better communication and supplier development. As more and more organizations realize the importance of the performance of their suppliers to the establishment and sustaining superior supply chain performance, scholars have begun to focus on supplier development programs and study how these initiatives impact on buyer and supplier performance (Hahn & Monczka, 2009).

Pisello and Gordon (2008) argue that, many organizations both in public and private sector are focusing more on their core competences and becoming more dependent on their suppliers to meet ever-increasing demand for quality products by viewing them as partners. As a result for a supply chain to compete in respective markets, it must ensure that suppliers performance, capabilities and responsiveness equals, or surpasses those of competing supply chains.

Krause, (2005) on a study on the relationships between supplier development, commitment, social capital accumulation and performance improvement opines that

one of the supply chain basic objectives is to maintain a network of capable suppliers since suppliers have a direct bearing on quality and cost improvement, delivery performance, as well as new product development. However, it is difficult to identify the specific efforts of supplier development that will uniquely contribute to a supply chain performance. Li, Modi, Mabert and Roger (2005), indicated that supplier development activities among others, include: increasing supplier performance goals, providing suppliers with training, providing suppliers with equipment, technological support as well as evaluating supplier and rewarding them for improvements made.

Humphrey (2011), on a study on the impact of SD on buyer supplier performance concluded that; proper selection of supplier for SD is prerequisite in a manufacturing environment in order to survive and succeed in today's dynamic market environment. Suppliers have played strategic roles in organizations, and have significantly engaged in creating a competitive advantage and their actions have a positive impact on the organization's performance (Jabbour & Jabbour, 2009). The rewards for undertaking a supplier development initiative are well worth the effort. For instance, according to a research conducted by Aberdeen Group (2006), an information technology market analysis and positioning services firm, indicate that the benefits of a good supplier development program include reduced sourcing cycle time, lower inventory costs improved quality, reliability, increased responsiveness to customer needs, market dynamics, improved collaboration and knowledge sharing across the extended enterprise.

Armed with this knowledge, supply chain managers should be able to calculate the impact of a successful supplier development program while weighing the benefits against potential risks. This study examined effect of supplier development on supply chain performance and seeks to understand how specific supplier development efforts may impact supply chain performance and ultimately the benefits of such programs to the buyer.

1.1.3 Supply Chain Performance in the Kenya Dairy Sector

The primary objective of supply chain management is to create value to customers, increase profits, improve efficiency of production operations, reduce cycle times, and increase market share (Williams, 2013). Milk industry supply chains in Kenya

experiences inconsistent supply of milk which can be attributed to lack capacity by suppliers and high cost of milk production which are attributed by low quality of feed and fodder, and the lack of year-round availability of quality forages, animal diseases, and low quality breeds. (Omondi, 2014)

According to KDB, (2012), many local milk processors suffer milk fluctuations between dry and rainy seasons, resulting in low capacity utilization of between 40-60%. To overcome this challenge, major dairy firms in Nyandarua County has embarked on an projects aimed at enhancing small scale farmers capacity by improving farm-management skills in production, mechanization and preservation, introducing feeds varieties, provision of veterinary services, financial support, improving quality of breeds to enhance small scale farmers capacity to produce more and quality milk.

1.1.4 Nature of Dairy sector supply chain in Kenya

Before market liberalization in the early 1990s, there was an organized milk collection and bulking system in the formal market, with two types of milk delivery to KCC facilities: by individual dairy farmers; or by dairy cooperative societies. With liberalization and the collapse of KCC, the collection and bulking system also collapsed (KDB 2007).

The transportation of milk depends on the amount and the buyer. Major processors have their own collection, bulking and transportation systems. Stainless steel (seamless) cans, and occasionally plastic cans, are used for bulking milk from individual suppliers and delivering it to processors' collection, bulking and cooling centers', from where it is transported in cans or by refrigerated tanks to the main processing plants. In some areas, powerful milk intermediaries (traders) have positioned themselves between the market and the milk producers. Their presence complicates the traceability of milk and brings a risk of cross-contamination and microbial overload (KMDP 2012).

The formal milk trade is the market segment licensed by KDB. License are issued for, among others, milk bars (for upto 1000 litres/day each), cottage industries (up to 3000 litre/day), mini dairies (up to 5,000 litres/day), processors (upto 5000 litres/day),

producers (who process, manufacture, prepare or treat the milk for sale), and distributors. Milk reaches consumers through many channels, large processors have more elaborate distribution and retail systems. In rural and suburban areas of Kenya, consumers buy mostly unprocessed milk directly from producers, kiosks, neighborhood shops and hotels. In urban centers, unprocessed and processed milk compete, using more or less the same retail outlets, shops and kiosks near residential areas retail both processed (packaged) and unprocessed milk (KDB 2013)

The main dairy feed used in Kenya highlands especially Nyandarua is natural forage, Napier grass and crop by-products. A report by East Africa Dairy (EAD), (2013) indicates that the dairy industry in Kenya is increasingly moving towards consolidation. This push towards consolidation has led to the increasing need for processors to link up the all stages of milk supply chain from the farm to the factory by taking up the challenge of buying, processing, distributing and selling through major retail outlets across the country.

1.1.5 The Kenyan Dairy Sector

In Kenya, the dairy industry is the largest agricultural sub-sector (Omunyin, Ruto, Yegon, &Bii, 2014)and contributes about 4% to the country's GDP and is a major source of livelihood to millionsof people in the country (Wanjala, & Njehia, 2014).The sector is dynamic with high growth figures of marketed milk and investments by dairy societies and processors mainly in the cold chain, production of long life milk and milk powder. Studies indicate that 80% of Kenya's total milk production is produced by small scale farmers (ROK, 2010). This becomes a major challenge to the dairy industry especially on cost of production, milk collection as well as quality control (Wanjala &Njehia 2016).

The dairy industry provides food, income andemployment to approximately2 million Kenyansinvolved in milkvalue chain includingthe dairy farmers,milk transporters, dairy products vendors, employees of dairy firms, farm input sellers and manufacturers, veterinary officers, milk retailers and distributors (FAO, 2012). However, the growth of the industry has beenconstrained by frequent fluctuations in milk production, poor service provision, low quality feeds(Muriuki, 2011).

Acknowledging this opportunity, dairy companies in Nyandarua has embarked on various programs enhance milk production and build strong ties with the farmers for to wade competition and improve efficiency in the milk sector by advocating for stronger and more inclusive relationships between among key industry players. In the broader context of food security Kenya Market-led Dairy Programme (KMDP, 2012) acknowledges the need for more efficient and competitive dairy value chains, to assure enhanced access for consumers with lower income to safe and affordable milk products.

1.1.6 Dairy sector transitioning

For a long-term sustainable growth, the sector needs to transition from small scale semi-subsistence farming, to an industry that relies on fully commercial dairy farming systems. In regards to milk procurement and processing, the sector needs processors that invest in supply chain development for enhanced productivity and milk quality, offering credible long-term milk procurement contracts. In addition to that, Kenyan government is urged to adopt and enforce dairy industry standards, to develop a strategy to phase-out the raw milk market and encourage value addition (Entrepreneurship Summit, 2015)

Kenya's development blue print, vision 2030 recognizes that the agriculture sector (including dairy) has been operating under outdated colonial legislation dating back to the 1930s, which is impeding growth in the sector; the government has promised to reform this legislation and other areas that need updating (Vision 2030)

1.1.7 Profile of major Dairy firms in Nyandarua County

Over the years, Nyandarua County has consistently produced the highest amount of milk compared to the other regions in Central Kenya due to its higher population of dairy cows and favourable climate (Ndungu, Muliro, Omwamba, Oosterwijk & Jansen 2016) . Income from dairy sector in Nyandarua County rose to Sh2.5 billion in the year 2016 on the back of better animal husbandry practices and investment in feed production, this reflected an 11 per cent rise of earnings from 2015 (Gethi, 2016).

Records from the County livestock office indicate there are 317,000 heads of dairy cattle in Nyandarua with an annual milk production of 234 million liters valued at Sh7 billion per year. However, findings indicate that the full potential for dairy production

of Nyandarua County is yet to be realized owing to perennial challenges facing the dairy sector (Schreiber 2009). Recognizing this opportunity to enhance milk production, major dairy firms have embarked on SD to increase and sustain milk production in the region. For this reason the study will be undertaken in Nyandarua County to assess the effects of SD on SC performance. All the major community owned dairy firms with a daily capacity of over 100,000 liters per day with substantive SD projects were involved in this study. They include;

1.1.7.1 Muki Farmers Cooperative Society Ltd

This is the largest farmers bulking and marketing in dairy firm in Nyandarua County. The firm operates an ultra-modern processing plant located at Ndunyu Njeru, South Nyandarua. The firm was incorporated in the year 1999 with an aim of buying, processing, packaging and distributing dairy products using milk produced from the milk-rich catchment areas in Nyandarua. The firm has a processing capacity of 120,000 litres per day. MUKI collects milk in four catchment areas which includes Kipipiri, Kinangop, South kinagop and Shamata

In 2010 the firm started packaging its milk under the brand Jamaa Fresh Milk and subsequently launched the Kinangop Fresh Milk among other brands. Farmers receive services such as farm inputs supplies, A.I. and animal health services, credits services, Training on better livestock husbandry practices among others (<https://mukifarmerscoop.wordpress.com>).

1.1.7.2 Nyala Dairy Limited

Nyala Dairy is a farmer's dairy company that deals with collection and chilling of milk and later market and sells the milk on behalf of the dairy farmers. The Name Nyala is an acronym of Nyandarua and Laikipia, the two counties where its members are drawn. The cooperative is situated at Ndaragwa Township in Nyandarua County. The average milk intake is currently over 100,000 litres per day. The cooperative has entered into a supply contract with Brookside Dairy, who handles most of the milk, with the balance sold locally to individuals and institutions. It was incorporated in 2001 and in the relatively short period of time since its inception, it has established itself as a major supplier of milk in Nyandarua County with a substantial amount of business generated from both selling of milk and from the support services to the farmers.

Nyala Dairy was organized to be responsive to the needs of the farmers in the remote locations of Nyandarua and Laikipia Counties to enhance milk production through efficient milk collection and provision of support services to ensure milk production is sustained. To achieve this, the company has employed highly technical, field tested and experienced manpower to handle all farmers' needs with a professional's touch therefore positioning the company as the obvious choice for the farmers (<http://www.nyalasacco.co.ke>)

1.1.7.3 OI Kalou Dairy Limited

OI Kalou Dairy Ltd is a well-established dairy company located along Gilgil/Nyahururu Road in Nyandarua County. The company was founded in 2002 and has a capacity to process at least 150,000 liters of milk per day. The company is well equipped with milk cooling plants and own a number of agro vet shops that provides inputs and services on credit to active suppliers from OI kalou, Ndundori, Nyahururu and OI-jorolok. The dairy firm also provides extension services to the members at subsidized rates. The dairy firm is currently receiving supported from East Africa Dairy Development Project to enhance its operation and support dairy farmers in the region

The firm combines the collected milk, chills it and negotiates with local processors for a fair price. In addition to ensuring that farmers receive a fair price for their milk, the organization also contributes to job creation by encouraging dairy farming as well as employing youth from the local community to work in the plant (<https://www.oikocredit.coop/uniting-dairy-farmers-in-kenya.html#.Wi0JY7NLeFE>).

1.2 Statement of the Problem

Dairy farming is a major economic activity in Nyandarua County and remains a source of income to household the industry faces a number of challenges in milk production, transportation, processing and marketing. Specifically, some of the main challenges affecting the dairy sector in the County have been identified as fluctuations in quantity of milk produced, poor infrastructure which affect milk collection and transport, inadequate quantity and quality of animal feeds, lack of good quality animal husbandry, poor farming practices, and wastage which limit the realization of the full potential of this industry.

The major dairy firms within the County experiences inconsistent milk supply which has been attributed to lack of capacity by suppliers given that, on average, the annual milk production per lactating cow in the county is about 2,100 liters against the estimated average of about 4,000 liters over the lactation period. This has a negative impact to dairy processing firms leading to low capacity utilization of about 60%. This translates to idle capacity and within the dairy firms which limit their growth and profitability. Acknowledging this opportunity, the major dairy firms in Nyandarua have embarked on various SD programs to enhance milk production in the region to allow the firms operate at optimal levels.

A study on post-harvest milk losses indicate that about 6% percent of total milk produced in Nyandarua County occurs at the farm level as a result of spillage, lack of market and rejection resulting from poor milk handling (Ndungu, Muliro, Omwamba, Oosterwijk & Jansen, 2016). Through proper training on milk handling these losses can be reduced. The industry's growth is further constrained by fluctuation in milk production, and quality of animal feeds and fodder. Overcoming these through SD will boost the growth of this industry which will have a multiple effect by improve household income, reduce overdependence by increase employment opportunities, and enhance food security in the County and the country by extension.

Current literature have extensively analyzed and discussed the concept SD especially the establishment of SD and the challenges of managing such programs which have provided valuable information in understanding the process of SD. However, there is a gap in the current research on understanding the effects of SD as an means of achieving effectiveness across the entire supply chain. For this reason, this study focused in assessing the effects of SD efforts on supply chain performance and sought to understand how SD affects supply chain in the dairy sector in Nyandarua County.

1.3 Objectives of the Study

1.3.1 General Objective

The main objective of the study was to assess the effects of supplier development on supply chain performance in the dairy sector in Nyandarua County.

1.3.2 Specific Objectives

- i. To assess the effect of financial support to suppliers on supply chain performance in the dairy sector in Nyandarua County.
- ii. To assess the effects of supplier training on supply chain performance in the dairy sector in Nyandarua County.
- iii. To evaluate the effect of technical assistance to supplier on supply chain performance in the dairy sector in Nyandarua County.
- iv. To evaluate the effect of technological support on supply chain performance in the dairy sector in Nyandarua County.

1.4 Research Questions

- i. What are the effects of financial support to suppliers on supply chain performance in the dairy sector in Nyandarua County?
- ii. What are the effects of supplier training on supply chain performance in the dairy sector in Nyandarua County?
- iii. What are the effects of technical assistance extended to suppliers on supply chain performance in the dairy sector in Nyandarua County?
- iv. What is the effect of technological support to suppliers on supply chain performance in the dairy sector in Nyandarua County?

1.5 Significance of the Study

The study aims to create awareness to farmers within the area covered the county on various initiatives being undertaken by dairy firm to support and enhance their capacity in milk production and how to tap them and enjoy long term benefits from the various supplier development activities for instance how to access financial support and training to enhance their production capacity.

From the knowledge gained, other firms in Kenya would embrace the concept of SD and establish similar programmes to increase productivity and capabilities of their suppliers which would enable improve performance in their value chains.

The study will be a point of reference in the future to other scholars in procurement and SCM

1.6 Limitations of the study

The respondents took longer time than expected due to their tight schedules and were accorded more time to respond. To attain a higher response, follow ups were done through visits and phone calls which yielded results where 87.3% of the respondents returned their questionnaires duly filled. Use of introduction letter for research from the university was used to convince the respondents the study is purely academic. The information collected was treated confidentially and for academic purpose only.

1.7 Scope of the Study

The study focused on major membership based dairy firms in Nyandarua County with a capacity of processing at least 100,000 liters of milk per day and have a substantive SD program aimed at enhancing milk production in the County. The study assessed the effects of SD on supply chain performance of dairy firms in Nyandarua County. These dairy firms include Muki Farmers Cooperative Society limited, Nyala Dairy limited and Ol Kalou Dairy limited. This study specifically targeted the staff with an active role in supply chains in the respective dairy firms who include staff working in departments such as; procurement and stores, finance, transport, agro-vet sections, and the main factories/processing units.

1.8 Operational Definition of Terms

Financial support

Financial support refers to the buying firm's effort to develop their supplier by engaging in capital resources in form of loans or advance payment for investment in equipment and tools (Li et al, 2007).

Performance

Performance is the ability to fulfill an obligation, attain the set objectives, fulfill a requirement or accomplish something as promised or expected. Performance is the organization's ability to attain its goals by using resources in an effective and efficient manner (Daft, 2004).

Supplier development:

SD is a bilateral effort by both the buying and supplying organization to jointly improve the supplier's performance or capabilities in areas like; cost, quality, delivery time to market, environmental responsibility, and financial viability (Krause & Handfield (2006).

Supply chain performance

Supply chain performance is the level to which a supply chain fulfills the objectives of dependability, cost speed, quality, and flexibility (Slack, 2007).

Technical assistance:

Technical assistance is any initiative by the buyer aimed at provision of support facilities to suppliers with an aim of enhancing the supplier productivity (Krause & Ellram, 2007), for instance the majordairy firms has opened agro vets across the County for easier access of farm inputs and extension services to the farmers.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covers the review of theoretical literature, empirical literature review, conceptual framework, research gaps to be filled and summary of literature.

2.2 Theoretical Literature

Theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge (Abend, 2008). Theories are very essential in understanding the complex environment in which organizations operate in (Chicksand, Watson, Walker, Radnor, & Johnston, 2012).

In this section the study discussed theories related to supplier development and supply chain performance. Specifically the study examined the linkages between supply chain performances with SD programs and assessing how buyers can influence supply chain performance by enhancing supplier capacity.

2.2.1 Network Theory

As concluded by many studies, the network theory deals with the cooperation of firms with various entities, including suppliers and their customers throughout their supply chains (Wellenbrock, 2012). A network is a specific type of relationship that links up a defined set of individuals to achieve a specified goal (Harland (2006).

Traditional strategies considered firms to be independent entities which aim to build resources and market positions for achieving a competitive edge in the market (Zaheer, Gulati, & Nohria, 2010). Markets are viewed as a system of relationships among various entities in the network theory incorporating the clients, vendors, and manufacturers (Coviello & Munro, 2005). Firms that operate in network tend to gain advantage through the business relations and partnerships established through the network (Zaheer, *et al.*, 2010).

According to Coviello and Munro (2005), the theory was first introduced and developed from the focus on relationships between just two entities, or strategic

alliances, but has developed towards an approach which entails multiple relationships throughout the supply chain. In this study, the network theory describes the relationships in which companies, suppliers, customers or buyer are engaged in SD activities and its effects on supply chain performance.

2.2.1 Social Capital Theory (SCT)

SCT emerged from the concept that acknowledged the inherent value of social structures such as relationships and networks (Wagner, 2011). Central to the use of SCT in the study is the idea that interactions among supply chain actors facilitates creation of value (Wagner 2011). Social capital concept advocates for an investment in relationships through which parties gain access to strategic resources that enhance the expected returns through improved performance (Huggins, 2009).

The tenets of this theory consist of three processes which include; investing in social capital, access to and mobilization of social capital, and facilitating the creation of value within supply chains (Cropanzano & Mitchell, 2005). SCT is applicable to this study since it facilitates a better understanding of buyers efforts in SD which have been found to enhance the efficiency of buyer-supplier relationships resulting in the creation of opportunities that otherwise may not have been possible (Cousins *et al.*, 2006; Krause *et al.*, 2007; Lawson *et al.*, 2008 and Wagner 2011).

Benfine (2008), a critique of social capital theory opines that the theory is vague, hard to measure and poorly defined. He claimed that while it is presented as a tool of consensus for overcoming ideological divisions it is highly political in both neutralizing dissent and systematically disregarding key questions and issues concerning the social problem and perhaps not even a form of capital at all.

According to Woolcock (2008), there are a number of dimensions that have been unified as a single concept grounded in different sociological traditions trying to explain too much with too little. The theory relate well to the unique relationship established by the buyer through SD for mutual economic exchanges that is beneficial to both parties. The buyer empowers the supplier via financial support, technical and technological support and supplier training in return for product innovation, reduced risks of non-supply, reduced lead time, improved product quality and competitive pricing for the buyer.

2.2.3 Resource Based Theory

Steinle and Schiele (2008), points out that; suppliers can be regarded as resources if they are sufficiently bound to a particular firm. According to Li, (2007) there is sufficient theoretical evidence supporting the assertion that buyers' performance is enhanced by supplier quality and technological capabilities. When firms interact with suppliers and its customers on issues related to materials flow and quality, firms can expect better time-related performances in terms of speed of delivery (Cooper *et al.*, 1997, Mentzer *et al.*, 2001 and, Chen and Paulraj, 2004).

According to Junge (2014), on a study on Creating value through supplier development argued that a firm with the ability to accumulate strategic resources that are valuable, non-substitutable, and difficult to imitate will enable it achieve a competitive advantage that help the firm to capitalize on opportunities and ward off threats. According to Li (2007) SD can be considered as actions taken by a buying firm to strengthen the capability of its suppliers who becomes a valuable asset to the buying firm because an improvement in supplier performance through SD will create unique and strong relationships. This will become unique resources of the buying firm since the supply chains will reap benefits from SD efforts through improved efficiency, quality and supplier reliability (Chen, Lin and Huang, 2006).

Perry (2009), pointed out that gains from trade between trading partners are enhanced by investments in assets that are specialized to their exchange. Buying firms with a vibrant SD program expects to realize an advantage over competing firms (Li, 2007, Schoemaker, Amit, Toni and Nassimbeni, 2010). This theory helps in understanding how unique SD initiatives such as Maziwa 365, technical support and training programmes initiated by the dairy firms in Nyandarua County have affected their supply chain performance with respect to production cost, delivery times and milk quality.

2.3 Review of Empirical Literature

Cooperative business relations are significantly linked to reduced production cost, shorter lead times, higher productivity, and enhanced quality, as a result many organizations are developing closer ties with their suppliers (Li, Humphreys, Andy Yeung Cheng, 2011). According to Li, Humphreys, Yeung, and Cheng (2012), SD is a

kind of cooperation between a buyer and a supplier to seek continuous improvement in supplier performance and, at the same time, strengthen the buyer's competitive advantage (Hahn, 2008). According to Abdul, and Parthiban (2014), one of the primary goal of the purchasing function is to maintain a network of capable suppliers since suppliers have an explicit effect on quality, cost, and delivery performance in a firm. However, it is difficult to identify the specific efforts of SD that will uniquely contribute to a improved supply chain performance. SD program involves activities such as increasing supplier performance goals and providing suppliers with training, providing suppliers with equipment, technological support as well as evaluating supplier and rewarding suppliers for improvement (Chen and Xiang-yang, 2007).

We are now entering the era of supply chain competition where the prize will be taken by those organizations who can better structure, coordinate and manage their relationships with suppliers and customers (Christopher, 2008). The fundamental change from the old paradigm is that firms cannot operate or survive in isolation but instead need to create value delivery systems that are more responsive to the dynamic market and that are much more consistent and reliable in the delivery value to customers (Christopher, 2008).

For a long-term sustainable growth, the sector needs to transition from small scale semi-subsistence farming, to an industry that relies on fully commercial dairy farming systems. In regards to milk procurement and processing, the sector needs processors that invest in supply chain development for enhanced productivity and milk quality, offering credible long-term milk procurement contracts (Ettema, 2013).

The basic objective of supply chain management is to secure and organize the supply of quality materials whenever required in quantities needed (Monczka *et al* 2011). As such, no organization can operate in isolation, and therefore they have to engage in supplier capacity building in order to build and sustain a competent supply base. In Kenya, over seventy percent (70%) of organizations experience supply chain management challenges which have a negative impact on effective service delivery (Edward, 2008)

Suppliers' plays a critical role in a firm and their actions have a direct influence on buyer's performance (Jabbour & Jabbour, 2009). A number of studies suggested strategies to improve supplier performance and capacity which include, instigating competition among suppliers, supplier performance assessment, supplier certification programs, establishing training program and increasing supplier performance expectations (Krause, 1997).

Krause and Ellram (2007) suggest that supplier incentives such as increased business volume, priority consideration for future business and recognition of good supplier performance in the form of awards or certificate can be used to encourage continuous improvement by supplier. Such suppliers are more likely to continue business operations and open their facilities, extend their resource investment, including providing greater commitment in joint knowledge transfer (Modi & Mabert, 2007).

SD is an expensive initiative and requires capital and human investment and when successful rapid improvement in supply base performance is achieved. For instance, Deere company added 175 new strategic supply management professionals of which 100 were for SD, 50 for cost management and 25 for best practices to implement SD program. Similarly, at Honda, supply chain management unit employed over 400 professionals, many of whom were dedicated to SD initiatives (Sako, 2004). Supply chain management problems continue to persist in many well-known firms threatening shareholder wealth and leading firms to compete through supplier integration (Kull, & Narasimh, 2013).

However, it is worthwhile noting that many companies execute SD programs but fail at a surprisingly high rate (Borah and Nath, 2014). About 50% of SD programs are not successful due to poor implementation (Handfield, 2002).

2.3.1 Supplier Financial Support

According to Choi (2009), supplier financial support is the buyers' effort towards its suppliers to continuously spot financial weaknesses within its supply base and taking the necessary financial support to avoid supply disruptions and increase supplier financial health so as to meet his short-term and long-term financial obligations. Financial support is a critical success factor in supplier development and supplier

performance. Heide (2011), argue that financial support provides the buying firm with increased supplier competition in the global market and potentially reduces transportation and other logistical costs of suppliers.

Perry (2013) argues that gains from trade between trading partners are enhanced through investments in assets that are specialized to their exchange. This suggests that firms can seek advantages by creating assets that are specialized in conjunction with the assets of a trading partner. The buying firm expects to realize an advantage over competing firms by converting general assets (such as money, raw materials, commodities, general people skills) into specific assets and capability (Schoemaker and Amit (1994); DeToni and Nassimbeni (2000)).

Supplier Financial Support is a rare area of development that is most often deployed with sole-source suppliers. It may include paying on superior terms to finance a supplier's working capital needs, finance tooling, or investing capital in the supplier through a loan or equity financing to enhance suppliers' capacity to fulfill buyer's needs with regard to product quality, quantity and delivery times (Sucky, Eric, and Durst, 2013).

A supplier who is properly and adequately financially supported augment the buyers' ability to deliver high-quality and innovative products to its customers and thus reduces buyers operational risks. Supplier's financial support is critical in determining the supplier's ability to remain financially solvent (Wangner, 2006). Financial support enhances suppliers' capability and capacity to cope with the buyers' requirement and therefore strengthens the suppliers' capacity to meet resource requirements by the buyer

2.3.2 Supplier Training

Training is a systemic development of attitudes, know how, and skills pattern required by a person to adequately perform a given task (Armstrong, 1997). It includes: Providing new skills, updating with changes in the field, and to improve efficiency. Training and development of employees and suppliers helps in growth of an individual in terms of ability, understanding and awareness and can be regarded as a valuable asset and acts as a source of motivation.

An study by Heraty, and Morley, (2003) stated that supplier training is an essential factor in operational excellence of the buyer. Firms regarded as excellent in terms of supply chain management practices have a strong emphasis on the training its suppliers to ensure alignment and compliance to the set objectives and changing business environment (Heraty, and Morley, (2003). The authors further observed that as the rate of business environmental change increases, so does the need for the training and retraining of the workforce and suppliers

The training activities of suppliers can be training courses in new technology, cost-cutting project or product development (Krause et al., 2009). The goal of joint training is to build skills and competencies of employees, develop a relationship and foundation for growth between buyer and supplier, and to introduce continuous improvement programs (Bowersox 2010). In addition to milk marketing, dairy firms train farmers on feeding, breed quality dairy cows and farm management.

Dairy firms in Nyandarua County have realized that animal feeds nutrition is the major factor in milk production and incorporated has incorporated in their training programs to equip farmers with adequate knowledge on feed establishment, preservation and feeding. This intends to enable farmers make informed decision on how much to preserve to feed their dairy hers during drought, how to balance the feed available with physiological requirements of a cow and which concentrate to supplement feeding for the dairy firms to remain profitable.

Rodríguez, Hemsworth, and Lorente (2005), and Lappacher (2011) found out that direct supplier involvement activities like visits to supplier premises/factories and training of supplier personnel play a critical role in supplier performance improvement. More so, providing feedback can educate or train suppliers on developing solutions to problems hurting their performance.

2.3.3 Technical Assistance

Silveira and Arkade (2007), found out that technical capabilities are necessary when input from the supplier is given to certain specification. This is more important to engineering personnel and they must be a part of this type of SD so that they can

jointly undertake the functional and technical requirements necessary for producing innovative products (Yegon, Kosgei & Lagat 2015). This is consistent with study done by Carr and Pearson (1999) who reported the existence of a positive impact of supplier reward and recognition on the overall performance of supplier technical capability (Rodríguez, Hemsworth, & Lorente 2005).

According to Rodriguez (2005) technical capability relates to engineering issues and the supplier's capability to meet performance and technical specifications and requirements. Rytter, Boer, and Koch, (2007) argued that, activities related to the provision of technical support are fundamental to suppliers' performance. These technical assistance involves investing in equipment and model farms.

A study by Carr and Pearson, (2009), predicted existence of a positive relationship between technical support and buyers performance. This is because as the supplier put into use the acquired technical capability, it translates into product innovation and product quality. This leads to supply of superior products by the suppliers which in turn enhances the effectiveness and efficiency of performance on the part of the buyer. As a way of providing technical support to farmers, dairy firms in Nyandarua County have established agro vet units, cooling plants and dairy feeds processing firms to promote milk production with the objective of farmers getting high quality nourishment for their livestock, for high quality milk which is collected at the Dairy plant through Maziwa-365 days-initiative whose ultimate goal is to stabilize milk production across the year for years (Gethi, 2011). This initiative is farmer oriented and coupled with weekly or monthly follow ups. Farmers are mobilized into groups and inducted on aspects such as challenges in dairy herd feeding, Nutrition and supplements, fodder and concentrate cultivation and conservation, farm management, preventive medicine and breeding strategy (Milk farmers forum, 2012).

2.3.4 Technological support

Technology touches every aspect of our lives now, whether it's business or leisure, there are innovations and gadgets we simply can't do without (Jerome, 2010). According to Humphreys, Li, and Chan (2004) and SD efforts should focus on developing supplier future capabilities in technology and product development rather than on current quality and cost. Sillanpää, Shahzad and Sillanpää (2015), insisted that developing

supplier capability and flexibility would be the key to the success of SD. One of the essential ingredients of efficient supply chain management is the creation of a synchronized flow of materials and information from suppliers to the ultimate customer (Sillanpää, Shahzad & Sillanpää, 2015). Information sharing between partners is found to be the most vital driver for the presence of trust between them (Leverick & Cooper, 2008). Sanders et al. (2011), argue that buyer-supplier information sharing, and investment in inter-firm information technology are key enablers to better communication which is critical in achieving significant performance improvement across supply chains. Reed and Walsh, (2012) established that SD activities enhanced supplier technological capabilities and facilitated development of mutual trust between BMW and their suppliers (Hajmohammad, Vachon, & Stephan, 2016).

Finding suppliers who are ready to meet a buyer's needs and requirements for quality, quantity, and cost has proven to be unlikely (Hajmohammad, Vachon, & Stephan, 2016). Therefore, one way buying firms can meet this challenge is by developing their suppliers in ways that enhance their capabilities (Carr & Kaynak, 2007).

Li, Humphreys, Yeung, and Cheng (2012) posit that supplier performance problems are associated with multiple sources, such as manufacturing defects and missed delivery dates, production difficulties, and failures in adhering to the buying firm's schedules is attributed to technological and logistical challenges from suppliers' side. Deficient supplier's performance compromises the buying firms' competitive advantage.

Technological assistance to suppliers results in higher product availability, better delivery speed, and enhanced reliability of the buyer, which reduces the buying firm's uncertainty in operations, thus decreasing its total transaction costs in the long run (Li, Humphreys, Yeung, and Cheng, 2012). Technological support in the agricultural sector mainly focuses on digital platforms to enhance product marketing, provide linkages among industry players, online support and payment (Muriuki, 2013).

2.4.5 Supply Chain Performance and supplier development

The first step of SD is supplier's evaluation that identifies areas where improvement is needed. This step helps to point out the exact cause of the problem i.e. whether the problem is

in material or in design or in production process or in workmanship(Hartley & Choi, 2007). Suppliers are evaluated on the basis of parameters like technical capabilities, quality, cost, delivery, managerial capabilities (Hartley & Choi, 2007).

SD plays a critical role in driving supply chain performance improvement which contributes strategically to overall organizational effectiveness, therefore, there is an increasing interest in SD, which is driven primarily by the buyer's desires to improve supplier performance which is likely to reduce cost of materials and bring about greater efficiency across the entire supply chain (Li, Humphreys, Yeung, & Cheng 2012).

Handfield (2003), posits that there exist supply chain performance gaps between what supply chains are currently achieving and what they are capable of in cost and quality controls, and their responsiveness to changing customer needs. SD can be initiated to close this performance gap to meet the buying firm needs both in the present and in the future.

2.5 Research Gaps to be filled by the study

Li, (2007) opines that there is considerable theoretical evidence for the assertion that buyers' performance is enhanced through supplier development, especially investments in specialized assets. Li et al (2007), argued that, that firms that are able to accumulate resources and capabilities that are valuable, non-substitutable, and difficult to imitate will achieve a competitive advantage over competing firms. SD could be considered as actions taken by a buying firm to strengthen the competitive capability of its suppliers and ultimately, the buying firm will reap benefits from its SD efforts.

Literature supports that SD contributes to a company in terms of creating and maintaining a network of competent suppliers, with technical capacity, cost conscious mind for continuous improvement (Rajput and Bakar, 2012), However, The Kenyan dairy sector supply chain experiences a number of systemic bottlenecks, of which high cost of production and poor raw milk quality are perhaps the most pressing ones. High cost of production has been attributed largely to low skills and knowledge of farmers,

the low quality of feeds and forages, and the seasonality of supply. Addressing these issues requires intervention by buying firms to build their suppliers capacity.

This study would fill the gap in knowledge on effects of SD on supply chain performance by assessing the strength of relationship between various SD activities from supplier financial support, supplier training, technical and technological support to suppliers affects supply chain performance in the dairy sector and provide an analysis of how specific SD efforts impact on productivity through cost reduction, shorter lead times, quality improvement and customer satisfaction in the milk industry supply chains.

2.6 Summary of literature

The study is founded on three theories, Network theory, social capital theory and resource based theory to help conceptualize the concept of buyer-supplier relationships through supplier development. Supply chain management is an increasingly important organizational concern, and proper management of supplier relationships constitutes one of the essential element of business success (Rodríguez, Hemsworth, Lorente 2012, Fawcett and Fawcett, 2007; Giunipero and Brand, 2009).

Buying firms faced with problems of deficient supplier performance can implement a wide range of SD practices to upgrade the performance of the weak links in their supply chain (Krause and Ellram, 2007). Today many buying firms are pursuing aggressive strategies such as outsourcing to enable them focus more on their core competencies and areas of technical expertise to counter the competitive pressures brought about by intense global competition (Monnczka, Trent, & Callahan, 2005).

The growing competition is forcing firms to reduce their cost while improving on quality and customer service. Cooperation between the buying firm and its suppliers in SD can make suppliers more efficient and thus enable goods to be acquired at lower prices and also allow the buyer to focus on core competencies. According to Don (2008), great things happen when little things are done right, in this case, if small steps for SD are correctly deployed, then it can greatly contribute towards improvement in supply chain performance.

2.8 Conceptual framework

A conceptual framework displays the relationships between independent variables and dependent variables (Kothari, 2004). A buying firm can implement SD programs through financial support to suppliers, supplier training, technical assistance or technological support to improve supply chain performance as summarized in Figure 2.1.

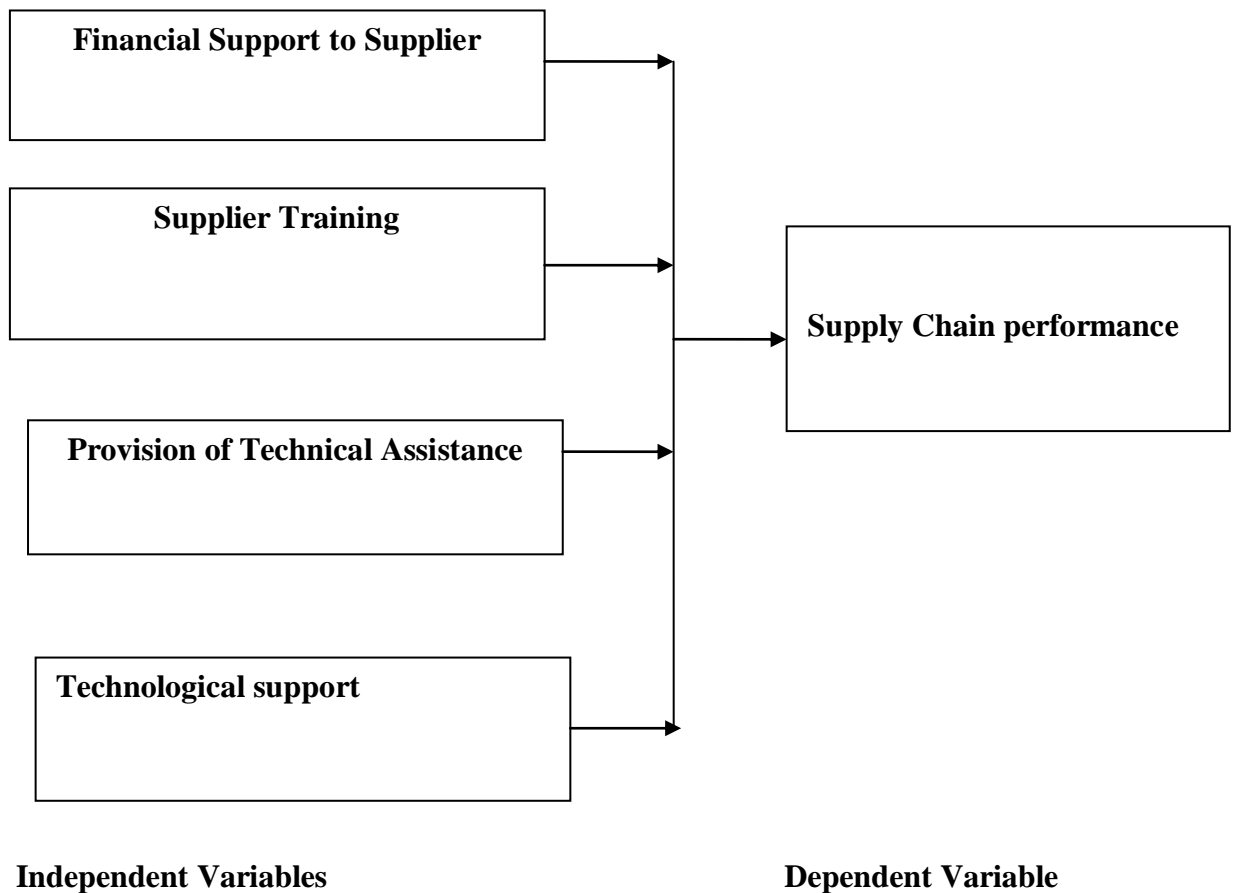


Figure 2.1: Conceptual Framework

2.8. 1 Operational Framework

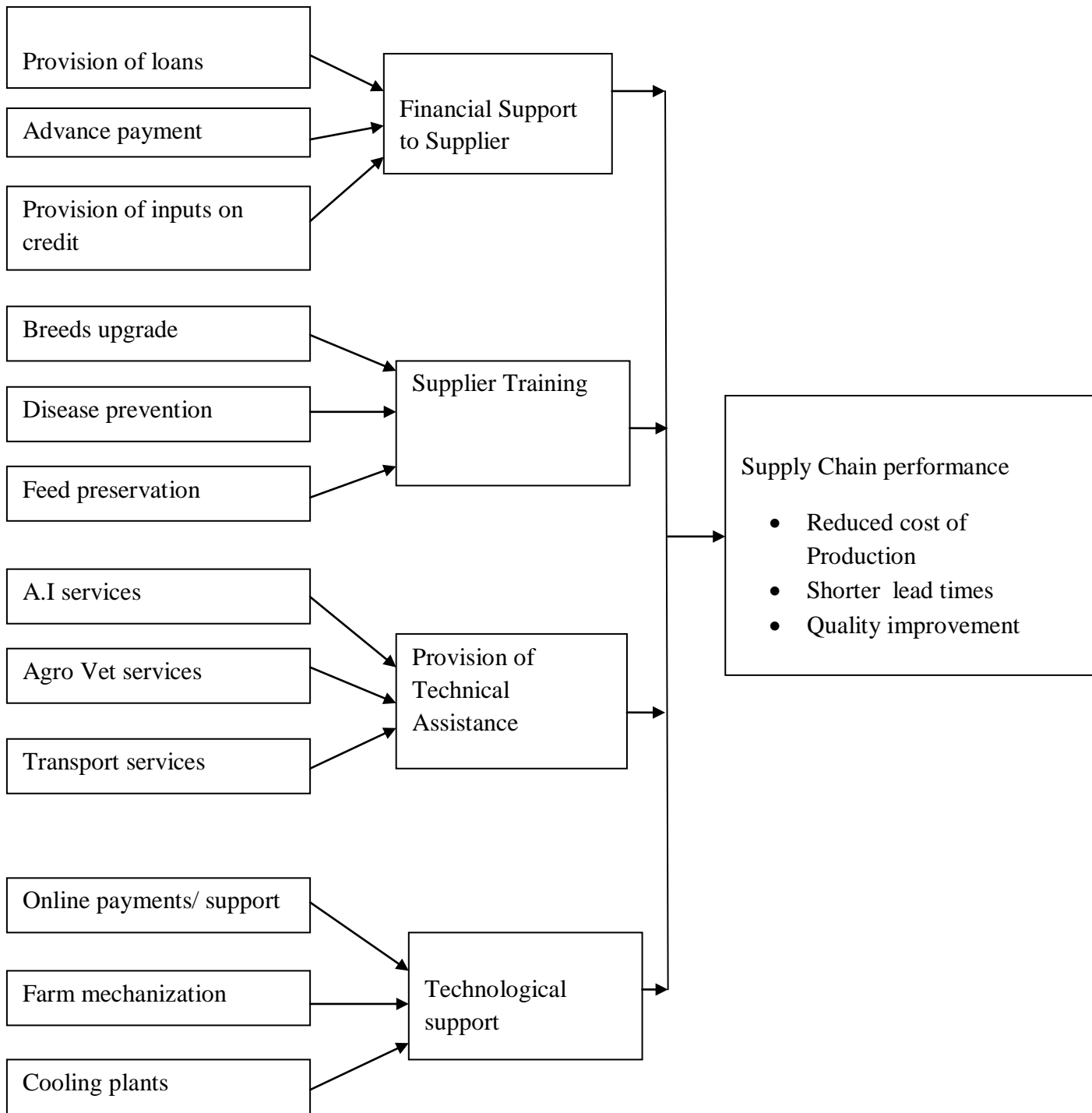


Fig 2.2: Operational Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section introduces study methodology adopted for the study. It covers study design, target population, sampling method, data collection procedures, pilot study, data analysis methods, and ethical issues to be observed.

3.2 Study Design

The study adopted a descriptive study design. A descriptive study design includes scientific surveys and fact-finding enquiries to provide a description of the state of affairs as it exists at present (Kothari, 2004). Descriptive study design was adopted since it deals with clearly defined objectives and it is easier to collect relevant data from a relatively large number of cases making it more representative (Mugenda & Mugenda, 2009). The method is also suitable for analyzing both qualitative and quantitative data to address the problem.

The study engaged the target population in assessing the effects of supplier development on supply chain performance in the dairy sector in Nyandarua County. Descriptive study design was successfully used by Lukhoba (2013), and Wanjuki (2014) and enabled them to draw credible conclusions.

3.3 Target Population

Target population is a collection of elements that possess the information sought by a study (Orodho, 2005). This study specifically majored on membership based dairy firms in Nyandarua County with a capacity to handle at least 100,000 liters of milk per day. Target respondents were the staff working on these dairy firms within procurement and stores, finance and transport departments, as well as agro vet staffs and factory workers who are important actors in the dairy sector supply chain and also key players in SD.

Table 3.1: Target Population

Population category	Name of the Dairy firm				Total
	Muki Cooperative	Nyala Dairy	OI Dairy ltd	Kalou	
Procurement and stores	18	13	7		38
Transport department	28	22	24		74
Finance department	12	9	14		35
Agro vet staff	13	11	8		32
Main factory staff		33	29	22	84
Total	104	84	75		263

3.4 Sampling Technique

Sampling design is a technique of selecting a sub-group that is representative of a larger group to participate in a study (Ogula, 2005). Slovin's formula was applied to draw the sample size

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

Where; n=sample size

N=total population i.e. 263

e=Error tolerance. The study used a confidence level of 95% which gave margin error of 5%

Therefore;

$$n = 263 / (1 + 263 * 0.05^2)$$

$$n = 263 / 1.66$$

$$n = 158$$

Sample size= 158 respondents

This translates to 60% of the target population. A representative sample is one which is at least 10% of the target population and the larger the sample the higher the reliability and precision (Kothari (2004). If the target population from which a sample is to be drawn does not constitute a homogeneous group, stratified sampling technique is applied in order to obtain a representative sample (Kothari (2004). Stratified random sampling technique was applied to draw sample from each stratum for inclusion in the sample size as indicated in table 3.2.

Table 3.1: Sample Size

Strata	Target	Formula	Sample	Percentage
Procurement and stores department	38	$38 \times 158 / 263$	23	15%
Transport department	74	$74 \times 158 / 263$	45	28%
Finance department	35	$35 \times 158 / 263$	21	13%
Agro vet staff	32	$32 \times 158 / 263$	19	12%
Main factory staff	84	$84 \times 158 / 263$	50	32%
Total	263		158	100%

3.5. Data Collection

Data collection is the process of gathering and consolidating information on targeted variables in a systematic way. An introductory letter was obtained from the University to proceed with the data collection and approval for data collection was sought from the management of the respective dairy firms before commencement of the exercise. Questionnaires were issued to the sampled population picked randomly collected after seven working days to allow respondents sufficient time to answer the questions appropriately.

3.5.1 Data Collection Instrument

Self-administered questionnaires were used as the for data collection. Questionnaire is a data collection tool in which the target respondents are required to respond to a similar set of questions in a predetermined sequence (Sekaran, 2006). The study used five likert scale structured questionnaires with a scale between 1-5 where, 5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, while 1=Strongly Disagree.

Information obtained by use of questionnaires is free from bias and researchers' influence (Kothari, 2008). According to Krishnaswamy, Sivakumar and Mathirajan (2006), using questionnaires as an instrument of data collection is good because anonymity and confidentiality of the respondents is assured which increase response rate and provision of complete and accurate information as the respondents

are able to complete them when it is convenient for them. Drop and pick method was used in data collection and follow ups was done through phone calls and visits to encourage the timely and higher response rate.

3.6 Pilot Study

A pilot study is a small scale preliminary study conducted to evaluate feasibility, time, cost, to predict appropriateness of research tools, clarity of questions, and study design prior to actual study (Hulley & Stephen, 2007). The importance of pilot study cannot be over-emphasized as you will certainly find some questions that people fail to understand or interpret in different ways, and questions that fail to elicit useful information (Newing, 2011).

Isaac and Michael (2005) suggested that 10 – 30 participants are sufficient for a pilot study. The study used the upper limit of 30 participants in the pilot study who were later excluded during data collection stage. The sample used in a pilot study should be large enough to enable the researcher gather reliable, complete and valid information (Mertens, 2010). The pilot study facilitated reliability tests for data collection instrument and the clarity of questions and ability to collect relevant information, the language used.

3.6.1 Reliability of Research Instruments

Testing the reliability and validity of the research instruments prior to actual data collection is paramount (Drost, 2011). To maintain accuracy, data reliability and validation was carried out. Data reliability is the degree to which a research instrument delivers consistent results after repeated experiments. (Ng'ang'a, Kosgei, & Gathuthi, 2008). A pilot study was done by administering the research instruments to 30 respondents who were excluded from the main study to ascertain the clarity of instructions and appropriateness of wording of the questions. A pilot study aims at refining the research instrument to minimize the chances of the respondents experiencing difficulties in answering the questions and also problems in data recording (Saunders, 2009).

Cronbach's alpha is the most commonly used measure of reliability and dependability (Johanson, & Brooks, 2010). The closer Cronbach's alpha coefficient is to 1.0 the

greater the internal consistency of the items in the scale. An Alpha values of 0.7 or above was considered to indicate that the instrument is reliable. The reliability analysis for test of reliability and consistency of the data items was conducted using the Cronbach's Alpha. The results of reliability are presented in table 4.2 in chapter four.

3.6.2 Validity of Research Instruments

Collected data not only need to be reliable but also precise, accurate and valid (Joppe, 2000). Validity is a measure of the extent to which a test measures what it was supposed to measure (Nachmias & Nachmias, 2006). According to Mugenda and Mugenda (2003), validity of an instrument can be improved through expert judgment. To improve on validity of research instrument two experts in supply chain management were consulted in developing the questionnaire.

Content and construct validation of research instruments was done in testing the suitability of the questions, the clarity of the instructions, sequence and relevance of questions presented to the respondents. After pilot study was done, the questionnaire was revised to incorporate the feedback provided. For instance, some of the respondents expressed concern that they may not have access to some data like average capacity utilization of the dairy firms. To address these concerns, instructions were given on the questionnaires indicating to whom the questions apply to.

3.7 Data Analysis Procedure

Oso and Onen (2005), defines data presentation as the process of organizing the collected data in a way that meaningful conclusion can be drawn. Both qualitative and quantitative data analysis approaches were used for study. Primary data from the questionnaire was coded to for computation. Descriptive statistics were analyzed with the support of Statistical Package for Social Sciences (SPSS) version 22.0 and presented in form of frequencies, mean, percentages and standard deviation using tables with explanatory discussion.

Inferential statistics, in form of Pearson correlation coefficient and ANOVA was used to measure the relationship between variables and significance of supplier SD in supply chain performance in the dairy sector in Nyandarua County.

The study used a 95% Confidence level. Multiple linear regression analysis was

applied to evaluate the relationship between the independent and dependent variables. Alan (2009), posits that, regression analysis is the suitable statistical tool for investigating relationships between variables and to ascertain the causal effect of one variable upon another by measuring the association between the dependent and independent variables. The following multi linear regression equation was adopted for the study

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

Where Y= Supply chain performance

β_0 = Intercept

X_1 = financial support

X_2 = supplier training

X_3 = technical support

X_4 = Technological support

$\beta_1, \beta_2, \beta_3, \beta_4$ = Coefficients

e= error term

The coefficients represent the unit change of dependent variable as a result of a change in the independent variables. Quantitative data from the findings was presented in tables while qualitative data was summarized and categorized into themes guided by the objectives of the study.

3.8 Ethical Issues

Ethical issues in research refer to the appropriateness of researcher's behavior in relation to the rights of those who become the subjects or informants of the research work, or are affected by it (Willis & Onen, 2005). According to Kombo and Tromp (2006), a researchers must consider the conduct by paying attention to the ethical issues associated with carrying out their research. According to Mugenda & Mugenda (2009), if the findings are sensitive, modalities of releasing them should be agreed upon rather than shelving the finding completely. In addition to being unethical, it is waste of resources to undertake study only to conceal the findings. As such, the findings will be availed to the dairy firms involved in the study upon request. The researcher maintained confidentiality and considered right to privacy of the respondents during the research process including the right to voluntary participation.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

The chapter presents statistical results gathered by the use of questionnaires administered to respondents from the three major dairy firms in Nyandarua County where the study's main objective was to assess the effects of supplier development on supply chain performance in the dairy sector in Nyandarua County. Specifically, the study investigated the effect of financial support to suppliers, supplier training, technical assistance to supplier and technological support on supply chain performance in the dairy sector in Nyandarua County. The data analysis was in line with the specific objectives where patterns were evaluated, interpreted and inferences drawn on them.

4.2 Response Rate

A total of 158 questionnaires were administered to the target respondents with the help of the management of the three dairy firms in Nyandarua. However, 138 questionnaires were properly filled and returned within the time given. This translates to a response rate of 87.3%. According to Mugenda and Mugenda (2003), a response rate of 50% or more is adequate to draw meaningful inferences.

Table 4.1: Response Rate

Response rate	Frequency	Percent
Returned	138	87.3%
Unreturned	20	12.7%
Total	158	100%

4.3 Results of Pilot Studies

The reliability of the questionnaire was tested using the Cronbach's Alpha correlation coefficient with the aid of SPSS software. As shown in Table 4.2 Cronbach alpha values for all the variables; financial support to suppliers, supplier training, technical assistance to supplier and technological support were greater than 0.7. According to Nachmias & Nachmias (2006) Cronbach Alpha value greater than 0.7 is regarded as satisfactory for reliability assessment.

Table 4.2: Pilot Study Reliability Test Results

Variables	Number of items	Cronbach's Alpha values
Supply chain performance	5	.813
Financial support to suppliers	4	.814
Supplier training	4	.939
Technical assistance	4	.813
Technological support	4	.852

From these findings it is evident that the constructs measured had the adequate reliability for the subsequent stages of analysis since all the Cronbach Alpha values were greater than 0.7.

4.4 Demographic Findings

The preliminary information gathered regarding the characteristics of the respondents was about; work experience, section of work and the name of the dairy firm.

4.4.1 Name of the Dairy Firm

The respondents were drawn from the following dairy firms.

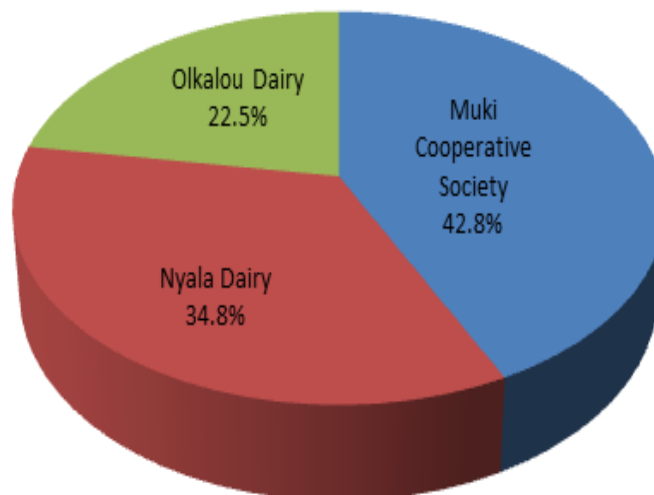


Figure 4.1: Name of the Dairy Firm

Figure 4.1 shows that 22.5% of the respondents worked for Ol-kalou Dairy, 34.8% worked for Nyala Dairy and 42.8% worked for Muki Cooperative Society. The findings imply that the respondents were well spread across all the three main dairy firms in Nyandarua County hence representative of the population thus enhancing accuracy of responses.

4.4.2 Work Station of the Respondents

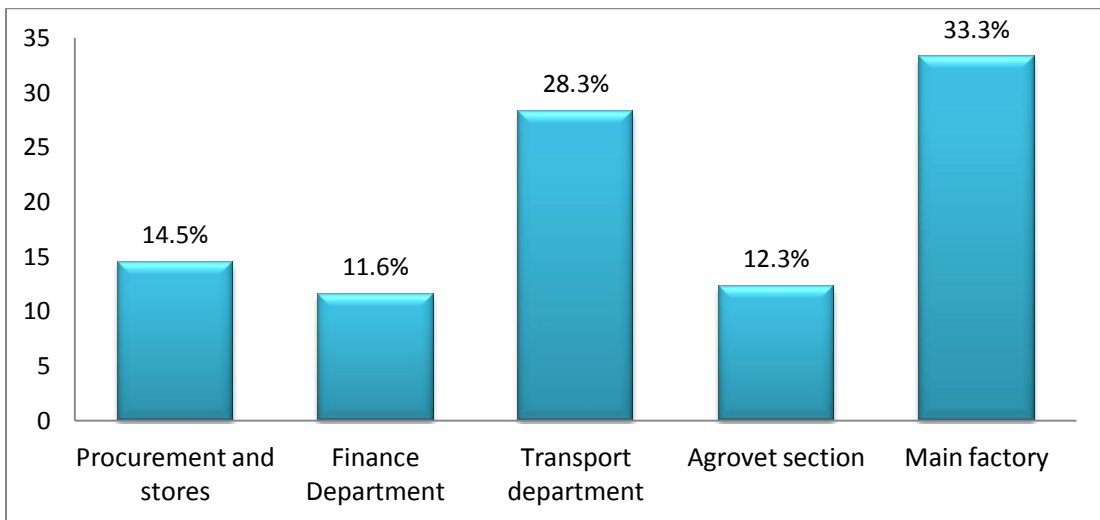


Figure 4.2: Work Station of the Respondents

Figure 4.1 presents the findings on the work station of the respondents working with dairy firms in Nyandarua County. The results indicated that all the sections within dairy firm were well represented ranging from procurement and store, finance, transport, agro-vet and the main factory which is an indication that the responses target every aspect of dairy firms supplier development and supply value chain. In modern business environment possession of unique and specialized knowledge has a direct link with performance and efficiency (Vugt,2006).

4.4.3 Duration in Dairy Firm

The study sought to establish the period the respondents have been in their current dairy firms.

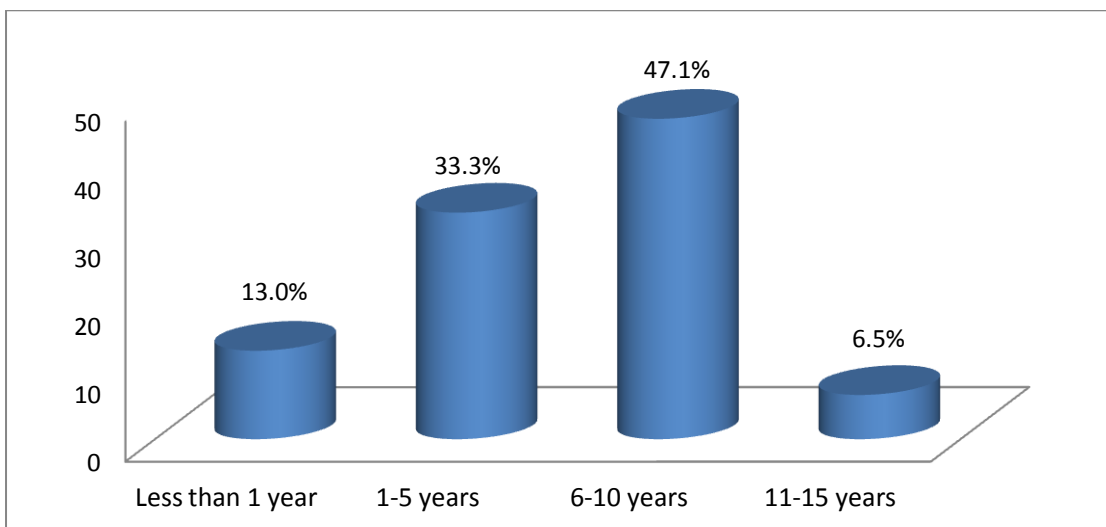


Figure 4.3: Duration in Dairy Firm

Figure 4.3 shows that 13.0% of the respondents have been in their dairy firms for less than 1 year, 33.3% indicated between 1-5 years, 47.1% indicated between 6-10 years and 6.5% indicated 11-15 years. The findings imply that the most of respondents have been in their respective dairy firms for duration periods of more than one year hence have knowledge about the issues the study was interested in. A worker having good experience in his job gives him an expert power and is more dependable and efficient too due to the tacit knowledge he possesses (Andrew, 2009).

4.5 Descriptive Analysis

The study carried out descriptive analysis for the dependent and the independent variables of the study. The results were discussed below

4.5.1 Descriptive Analysis for Financial Support to Suppliers

Financial support to suppliers in the dairy sector is either through provision of loans or advance payment which is both a marketing strategy by dairy firms to attract more suppliers and an incentive to farmers for increased production. It is in this light that the first objective of the study sought to assess the effect of financial support to suppliers on supply chain performance in the dairy sector in Nyandarua County. Descriptive statistics were done to determine the effect of various factors of financial support to suppliers.

Table 4.3: Descriptive Analysis for Financial Support To Suppliers

Financial support to suppliers factors	N	Mean	Std. Error	Std. Dev
Financial support extended to farmers has enabled farmers to increase milk production from their farms and upgrade their tools and equipment	138	4.5290	.05744	.67480
We provide farmers with farm inputs on credit to enhance milk production	138	4.2536	.06261	.73556
As a strategy for improving farmers productivity our dairy firm extends loans to dairy farmers to enhance their capacity	138	4.2464	.06240	.73307
Our firm provides advance payments to farmers for milk supplied as an incentive for increased production	138	4.0362	.06698	.78684
Valid N (listwise)	138			

It is evident from the study that financial support extended to farmers has enabled farmers to increase milk production from their farms and upgrade their tools and equipment with a mean score of 4.5290 and standard deviation of 0.67480. Dairy firm in Nyandarua provides farmers with farm inputs on credit to enhance milk production as well as loans as a strategy for improving farmers' productivity to enhance their capacity with a mean score of 4.2536 and 4.2464 respectively. In addition, dairy firm in Nyandarua provides advance payments to farmers for milk supplied as an incentive for increased production which had a mean score of 4.0362. The provision of loan, advance payments and inputs on credit to farmers is used to enable farmers increase milk production and enhance dairy cows' husbandry. This is in tandem with Wangner (2006), findings who indicated that supplier's financial support is critical as it enhances suppliers' capability and capacity to cope with the buyers' requirement.

4.5.2 Descriptive Analysis for Supplier Training

Ernst & Whitney (2009), stated that supplier training is a critical factor in operational excellence of the buyer. Based on this premise, the second objective of the study sought to evaluate the effects of supplier training on supply chain performance in the dairy sector in Nyandarua County. Descriptive statistics were done to determine the effect of various factors of supplier training.

Table 4.4: Descriptive Analysis for Supplier Training

Supplier training factors	N	Mean	Std. Error	Std. Dev
Training extended to farmers have leads to consistent improvement in milk quality and quantity	138	4.4783	.05747	.67508
We have been training farmers on dairy cattle breeding which has improved the quality of dairy cattle's in the region	138	4.2246	.05635	.66198
Our dairy firm has an elaborate farmers training program being implemented to increase milk production and quality	138	4.0435	.06245	.73365
We have adequate and trained staff for training farmers on modern dairy farming and milk safety standards, hygiene and animal diseases prevention	138	3.7971	.08917	1.04748
We train farmers on animal feed preservation to cushion them against long dry spells which has resulted to consistent milk production in the region	138	3.4638	.10293	1.20921
Valid N (listwise)	138			

Table 4.4 presents the analysis on the effects of supplier training on supply chain performance among dairy firms. The study indicated that training extended to farmers lead to consistent improvement in milk quality and quantity with a mean score of 4.4783 and standard deviation of 0.67508. Dairy firms in Nyandarua had been training farmers on dairy cattle breeding which has improved the quality of dairy cattle's in the region and had an elaborate farmers training program being

implemented to increase milk production and quality with a mean score of 4.2246, standard deviation of 0.66198 and 4.0435, standard deviation of 0.73365 respectively.

The study further revealed that dairy firms had adequate and trained staff for training farmers on modern dairy farming and milk safety standards, hygiene and animal diseases prevention with a mean score of 3.7971 and standard deviation of 1.04748. In addition, dairy firms train farmers on animal feed preservation to cushion them against long dry spells which has resulted to consistent milk production in the region had mean score of 33.4638.

It is evident from the finding of the study that dairy firms in Nyandarua have been training farmers on dairy cattle breeding, modern dairy farming and milk safety standards, hygiene and animal diseases prevention, animal feed preservation to cushion them against long dry spells with that aim of improving the quality of dairy cattle's, consistent milk production and consistent improvement in milk quality and quantity in the region.

Dairy firms in Nyandarua County have realized that animal feeds nutrition is the major factor in milk production and has incorporated it in their training programs to equip farmers with adequate knowledge on feed establishment, preservation and feeding. The training is meant to enable farmers make informed decision on how much to preserve to feed their dairy hers during drought, how to balance the feed available with physiological requirements of a cow and which concentrate to supplement feeding for the dairy firms to remain profitable.

4.5.3 Descriptive Analysis for Technical Assistance to Supplier

The third objective of the study sought to evaluate the effect of technical assistance to supplier on supply chain performance in the dairy sector in Nyandarua County. Descriptive statistics were done to determine the effect of various factors of supplier training.

Table 4.5: Descriptive Analysis for Technical Assistance to Supplier

Technical assistance to supplier factors	N	Mean	Std. Error	Std. Dev
Our Agro vets shops have made it easier for farmers to access quality animal feeds and supplements than before	138	4.6304	.04124	.48445
We have facilitated upgrade of dairy herds through provision of reliable Artificial Insemination services at subsidized rates to our members	138	4.6087	.04170	.48982
We provide efficient milk transport services at farm levels which has reduced time between milking and collection for processing	138	4.2899	.06440	.75651
Provision of the above technical support has helped farmers to reduce cost of milk production and improved milk quality and reduce milk wastage/spoilage	138	3.8333	.06389	.75051
Valid N (listwise)	138			

As shown in Table 4.5, dairy firms in Nyandarua have Agro vets shops that made it easier for farmers to access quality animal feeds and supplements than before with a mean score of 4.6304 and standard deviation of 0.48445. Moreover, dairy firms facilitated upgrade of dairy herds through provision of reliable Artificial Insemination services at subsidized rates to their members with a mean score of 4.6087 and standard deviation of 0.48982.

The provision of efficient milk transport services at farm levels which has reduced time between milking and collection for processing had a mean score of 4.2899 and standard deviation of 0.75651. In addition, provision of the above technical support that has helped farmers to reduce cost of milk production and improved milk quality

and reduce milk wastage/spoilage had a mean score of 3.8333 and standard deviation of 0.75051.

Therefore, farmers in Nyandarua County have been provide with technical assistance such as reliable Artificial Insemination services at subsidized rates, efficient milk transport services at farm levels and could access quality animal feeds and supplements in Agro vets shops to help in reducing cost of milk production, reduce time between milking and collection, upgrade dairy herds, improve milk quality and reduce milk wastage/spoilage.

4.5.4 Descriptive Analysis for Technological Support

The fourth objective of the study sought to evaluate the effect of technological support on supply chain performance in the dairy sector in Nyandarua County. Descriptive statistics were done to determine the effect of various factors of supplier training.

Table 4.6: Descriptive Analysis for Technological Support

Technological support factors	N	Mean	Std. Error	Std. Dev
Inadequate infrastructure (road network, electricity and water) is a major hindrance to application of modern farming techniques and installation of cooling plants in Nyandarua County	138	3.4855	.10246	1.20362
Technological support has facilitated linkage between farmers, animal feed processors, service providers and opened new marketing channels for dairy products	138	2.4783	.08740	1.02678
We have established an online service portal to bring services closer to the farmers and allow sharing knowledge	138	2.3478	.08076	.94870

Our firm supports dairy farmers in Modernizing their farming techniques through provision of tools and equipment eg milking machines, shaft cutters, mastitis test kits to improve efficiency in milk production	138	2.2101	.08993	1.05646
Valid N (listwise)	138			

As shown in Table 4.6, inadequate infrastructure (road network, electricity and water) was cited as major hindrance to application of modern farming techniques and installation of cooling plants in Nyandarua County with a mean score of 3.4855 and standard deviation of 1.20362. Technological support that facilitated linkage between farmers, animal feed processors, service providers and opened new marketing channels for dairy products had a mean score of 2.4783 and standard deviation of 1.02678. The establishment of an online service portal by dairy firms to bring services closer to the farmers and allow sharing knowledge had a mean score of 2.3478 and standard deviation of 0.94870. In addition, support given to dairy farmers in modernizing their farming techniques through provision of tools and equipment such as milking machines, shaft cutters, mastitis test kits to improve efficiency in milk production had a mean score of 2.2101 and standard deviation of 1.05646.

The study therefore revealed that there has been low technological support in terms of establishment of an online service portal, modernizing their farming techniques through provision of tools and equipment eg milking machines, shaft cutters, mastitis test kits to improve efficiency in milk production. This may be attributed to high cost of machinery and equipment.

4.5.5 Descriptive Analysis for Supply Chain Performance

a) Frequency of shortage or excess milk supply

The study sought to establish the level of shortage or excess milk supply. The results are shown in Table 4.7.

Table 4.7: Descriptive Analysis for Frequency of shortage or excess milk supply

Shortage or excess milk supply	N	Mean	Std. Error	Std. Dev
Short	138	3.3768	.07572	.88954

Excess	138	1.8913	.04899	.57547
Valid N (listwise)	138			

As shown in Table 4.7, there times when dairy firms in Nyandarua experience high shortage of milk with a mean score of 3.3768 with a standard deviation of 0.88954. the excess of milk in Nyandarua is very minimal with a mean score of 1.8913 with a standard deviation of 0.57547. The finding of the study is consistent to a study by Food and Agriculture Organization (FAO) of the United Nations (2011) on Dairy development in Kenya who concluded that, milk industry supply chains in Kenya experiences inconsistent supply of milk which can be attributed to lack capacity by suppliers and high cost of milk production which are attributed by low quality of feed and fodder, and the lack of year-round availability of quality forages, animal diseases, and low quality breeds. According to KDB, (2012), many local milk processors suffer milk fluctuations between dry and rainy seasons, resulting in low capacity utilization of between 40-60%. To overcome this challenge, major dairy firms in Nyandarua County has embarked on an projects aimed at enhancing small scale farmers capacity by improving farm-management skills in production, mechanization and preservation, introducing feeds varieties, provision of veterinary services, financial support, improving quality of breeds to enhance small scale farmers capacity to produce more and quality milk

b) Trend analysis on average annual capacity and liters of milk collected per year

The trends indicated that average annual capacity was constant between the year 2013 to 2014 followed by an increase in year 2015 which remained constant in the year upto year 2016. The trend further indicated that average liters of milk collected per year has been in the increasing trend for a period between 2013 to 2016. The implication is that annual capacity for the dairy firms in Nyandarua County was adjusted between 2014 and 2015to accommodate the high milk collected from the farmers as shown in Figure 4.4 below.

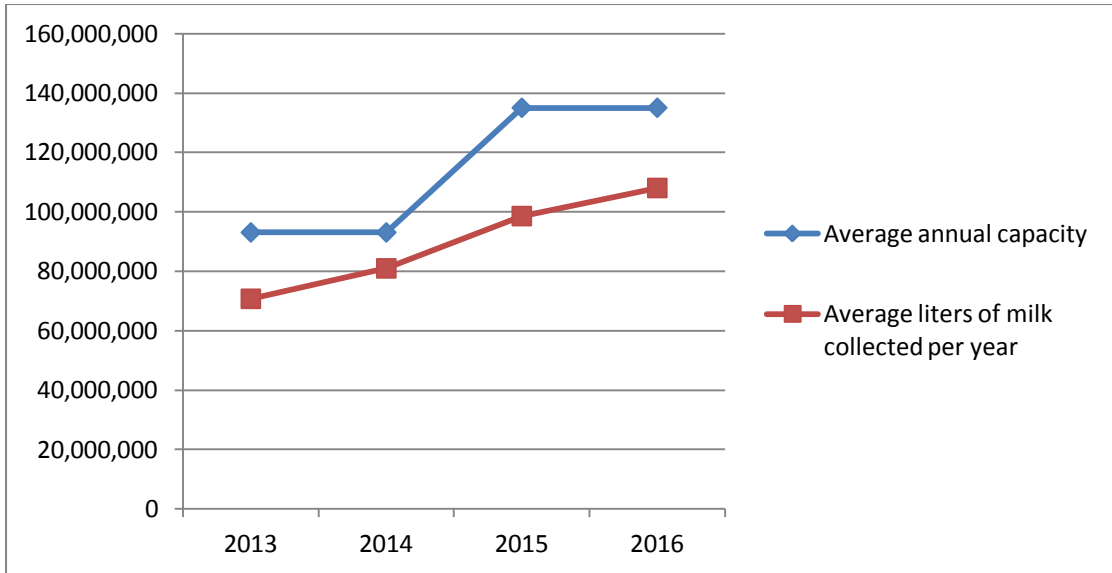


Figure 4.4: Average liters of milk was collected and processed

c) Capacity utilization level

The trends indicated that capacity utilization level increased between the year 2013 to 2014. This forced the firms to increase their capacity in 2015 which again indicate a decrease level of utilization in year 2015. However there was a further increase in the capacity utilization in year 2016 which can be attributed to increased productivity by suppliers as a result of continued SD efforts. The implication is that capacity utilization level for the dairy firms in Nyandarua County fluctuates depending on the average annual capacity available in the dairy firms as shown in Figure 4.5 below.

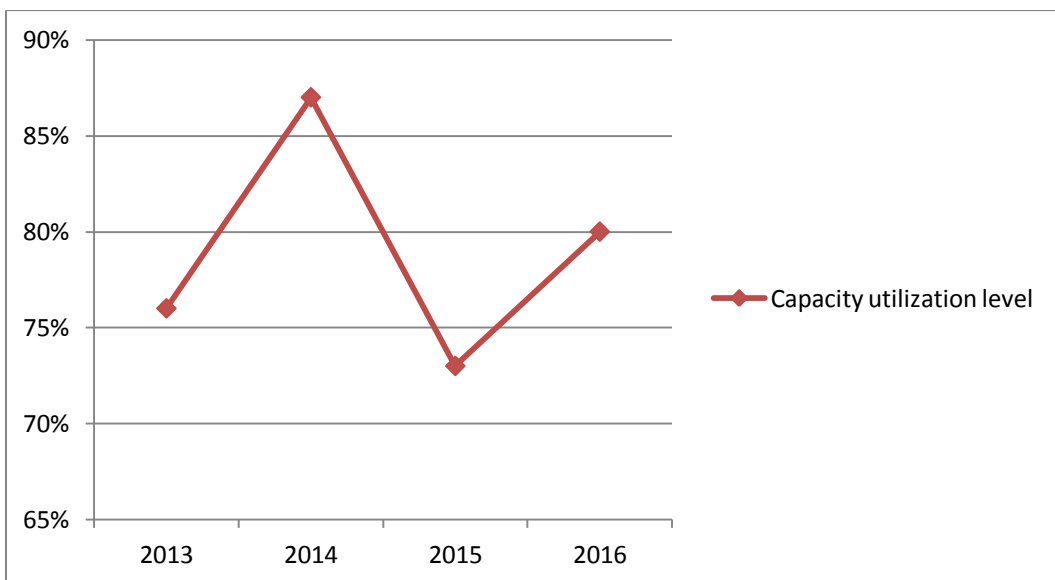


Figure 4.5: Capacity utilization level

d) Average cost of processing the collected milk

The trends indicated that average cost of processing the collected milk has been in the decreasing trend for a period between 2013 to 2016. The implication is that training and technical support provided to the farmers has brought about quality and efficient services which resulted to reduction in processing cost the as shown in Figure 4.5 below.

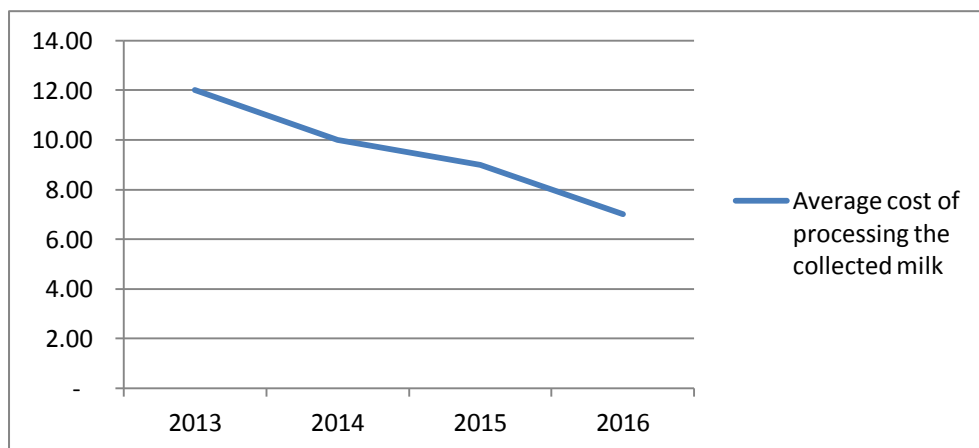


Figure 4.6: Average cost of processing the collected milk

e) Average number of hours it take to collect milk from farmers to the cooling facilities or factory

The trends indicated that average number of hours it take to collect milk from farmers to the cooling facilities or factory been in the decreasing trend for a period between 2013 to 2016. The implication is that the time it takes to transport milk from the farmers as shown in Figure 4.7 below.

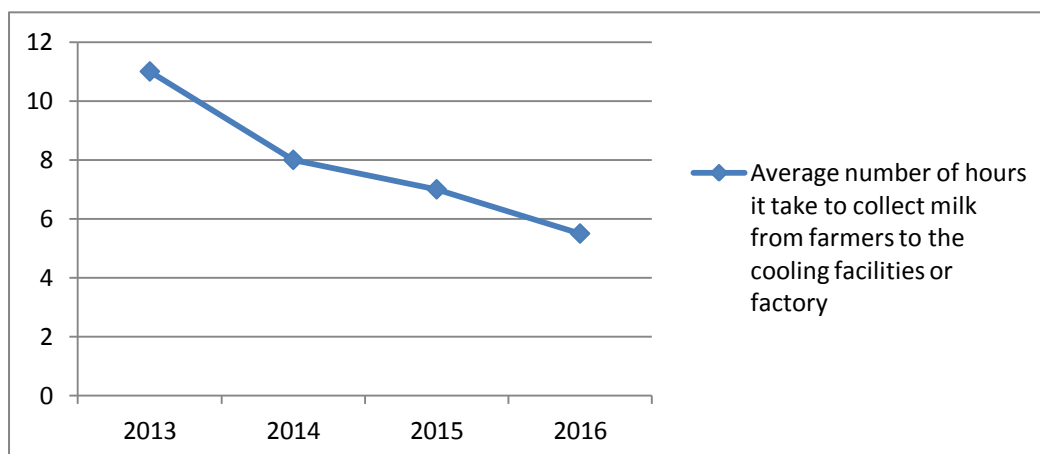


Figure 4.7: Average number of hours it take to collect milk

f)Average milk rejected before it could reach the factory

The trend analysis drawn indicated that the annual average milk rejected on the basis of low quality or spoilt in transit before it could reach the factory has been in the declining trend from year 2013 to 2016. The implication was that the quality of milk had improved over time which implies that SD objective are realized

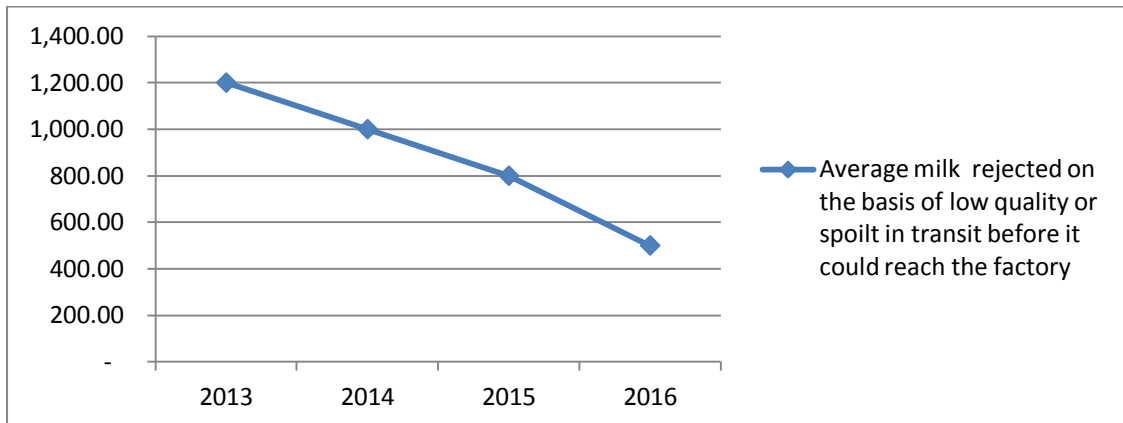


Figure 4.8: Average milk rejected

4.6Regression Analysis

The bivariate linear regression analysis results of financial support to suppliers on the on supply chain performance in the dairy sector were as shown in Table 4.8 to 4.10

Table 4.8: Financial Support to Suppliers Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.401 ^a	.161	.155	1.09519

a. Predictors: (Constant), financial support to suppliers

From the regression results in Table 4.8, the R value was 0.401 indicating that there is a relationship between financial supports to suppliers on the supply chain performance in the dairy sector in Nyandarua County. The R squared (R²) value of 0.161 shows that 16.1 percent of the supply chain performance is explained by financial support to suppliers all other factors held constant. The remaining 83.9 percent is explained by other factors.

Table 4.9: Financial Support to Suppliers Model ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	31.347	1	31.347	26.135	.000 ^b
1	Residual	163.124	136	1.199		
	Total	194.471	137			

a. Dependent Variable: supply chain performance

b. Predictors: (Constant), financial support to suppliers

The model was significant with the F ratio = 26.135 at p value $0.000 < 0.05$. This is an indication that financial supports to suppliers when considered singly have a significant effect on the supply chain performance in the dairy sector in Nyandarua County.

Table 4.10: Financial Support to Suppliers Model Coefficients

Model		Unstandardized		Standardized		
		Coefficients		Coefficients		
		B	Std. Error	Beta	T	Sig.
	(Constant)	2.025	.301		6.738	.000
1	financial support to suppliers	.398	.078	.401	5.112	.000

a. Dependent Variable: supply chain performance

Financial support to suppliers had positive and significant effect on supply chain performance with $\beta = 0.398$ at p value 0.000 which is less than 0.05. From Table 4.10, the bivariate linear regression model equation fitted using un-standardized coefficients is; $Y = 2.025 + 0.398X_1 + e$

2.025 is the constant

X_1 is financial support to suppliers index

This means that financial support to suppliers positively and significantly influence supply chain performance in the dairy sector in Nyandarua County. It also means that an increase of one unit of X_1 increases Y by 0.398. The indication was that financial support to suppliers is a major factor that affects supply chain performance. The finding of the study concurs with Heide (2011), who opined that financial support is a

critical success factor in SD and supplier performance. He argued that financial support provides the buying firm with increased supplier competition in the global market and potentially reduces transportation and other logistical costs of suppliers.

4.7 Influence of Supplier Training on Supply Chain Performance

The bivariate linear regression analysis results of supplier training on the on supply chain performance in the dairy sector were as shown in Table 4.10 to 4.12

Table 4.10: Supplier Training Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.463 ^a	.215	.209	1.05961

a. Predictors: (Constant), supplier training

From the regression results in Table 4.10, the R value was 0.463 indicating that there is a relationship between supplier training on the supply chain performance in the dairy sector in Nyandarua County. The R squared (R²) value of 0.215 shows that 21.5 percent of the supply chain performance is explained by supplier training all other factors held constant. The remaining 88.5 percent is explained by other factors.

Table 4.11: Supplier Training Model ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	41.774	1	41.774	37.206	.000 ^b
1	Residual	152.697	136	1.123		
	Total	194.471	137			

a. Dependent Variable: supply chain performance

b. Predictors: (Constant), supplier training

The model was significant with the F ratio = 37.206 at p value $0.000 < 0.05$. This is an indication that supplier training when considered singly have a significant effect on the supply chain performance in the dairy sector in Nyandarua County.

Table 4.12: Supplier Training Model Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
	(Constant)	1.746	.299		5.838	.000
1	supplier training	.467	.077	.463	6.100	.000

a. Dependent Variable: supply chain performance

Supplier training had positive and significant effect on supply chain performance with $\beta = 0.467$ at p value 0.000 which is less than 0.05. From Table 4.12, the bivariate linear regression model equation fitted using un-standardized coefficients is;

$$Y = 1.746 + 0.467X_1 + e$$

1.746 is the constant

X_1 is supplier training index

This means that supplier training positively and significantly influence supply chain performance in the dairy sector in Nyandarua County. It also means that an increase of one unit of X_1 increases Y by 0.467. The indication was that supplier training is a major factor that affects supply chain performance. Ernst & Whitney (2009), stated that organizations regarded as “excellent” in terms of supply chain management practices have a strong emphasis on the training and re-training of its suppliers to ensure alignment and compliance to the set objectives and changing business environment.

4.8 Influence of Technical Assistance to Supplier on Supply Chain Performance

The bivariate linear regression analysis results of technical assistance to supplier on the on supply chain performance in the dairy sector were as shown in Table 4.13 to 4.15

Table 4.13: Technical Assistance to Supplier Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.335 ^a	.112	.106	1.12670

a. Predictors: (Constant), technical assistance

From the regression results in Table 4.13, the R value was 0.335 indicating that there is a relationship between technical assistance to supplier on the supply chain performance in the dairy sector in Nyandarua County. The R squared (R²) value of 0.112 shows that 11.2 percent of the supply chain performance is explained by technical assistance to supplier all other factors held constant. The remaining 88.8 percent is explained by other factors.

Table 4.14: Technical Assistance to Supplier Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.826	1	21.826	17.194	.000 ^b
	Residual	172.645	136	1.269		
	Total	194.471	137			

a. Dependent Variable: supply chain performance

b. Predictors: (Constant), technical assistance

The model was significant with the F ratio = 17.194 at p value $0.000 < 0.05$. This is an indication that technical assistance to supplier when considered singly have a significant effect on the supply chain performance in the dairy sector in Nyandarua County.

Table 4.15: Technical Assistance to Supplier Model

Model		Unstandardized		Standardized		
		Coefficients		Beta	T	Sig.
		B	Std. Error			
1	(Constant)	2.512	.254		9.906	.000
	technical assistance to suppliers	.301	.073	.335	4.147	.000

a. Dependent Variable: supply chain performance

Technical assistance to supplier had positive and significant effect on supply chain performance with $\beta = 0.301$ at p value 0.000 which is less than 0.05. From Table 4.10,

the bivariate linear regression model equation fitted using unstandardized coefficients is; $Y = 2.512 + 0.301X_1 + e$

2.512 is the constant

X_1 is technical assistance to supplier index

This means that technical assistance to supplier positively and significantly influence supply chain performance in the dairy sector in Nyandarua County. It also means that an increase of one unit of X_1 increases Y by 0.301. The indication was that technical assistance to supplier is a major factor that affects supply chain performance. According to Rodriguez (2005) technical capability relates to engineering issues and the supplier's capability to meet performance and technical specifications and requirements. A study by Carr and Pearson, (2009), predicted a positive relationship between technical support and buyer performance. This is because as the supplier put into use the acquired technical capability, it translates into product innovation and product quality.

4.9 Influence of Technological Support on Supply Chain Performance

The bivariate linear regression analysis results of technological support on the on supply chain performance in the dairy sector were as shown in Table 4.16 to 4.18

Table 4.16: Technological Support Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.115 ^a	.013	.006	1.18791

a. Predictors: (Constant), technological support

From the regression results in Table 4.16, the R value was 0.115 indicating that there is a weak relationship between technological support on the supply chain performance in the dairy sector in Nyandarua County. The R squared (R^2) value of 0.013 shows that 1.3 percent of the supply chain performance is explained by technological support all other factors held constant. The remaining 98.7 percent is explained by other factors.

Table 4.17: Technological Support Model ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.556	1	2.556	1.811	.181 ^b
	Residual	191.915	136	1.411		
	Total	194.471	137			

a. Dependent Variable: supply chain performance

b. Predictors: (Constant), technological support

The model was significant with the F ratio = 1.811 at p value $0.181 > 0.05$. This is an indication that technological support when considered singly has a insignificant effect on the supply chain performance in the dairy sector in Nyandarua County.

Table 4.18: Technological Support Model Coefficients

Model		Unstandardized		Standardized		
		Coefficients		Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	2.898	.448		6.473	.000
	technological support	.145	.108	.115	1.346	.181

a. Dependent Variable: supply chain performance

Technological support had positive but insignificant effect on supply chain performance with $\beta = 0.145$ at p value 0.181 which is greater than 0.05. From Table 4.18, the bivariate linear regression model equation fitted using unstandardized coefficients is; $Y = 2.898 + 0.145X_1 + e$

2.025 is the constant

X_1 is technological support index

This means that technological support positively and significantly influence supply chain performance in the dairy sector in Nyandarua County. It also means that an increase of one unit of X_1 increases Y by 0.145. The indication was that technological support does not have a major effect on supply chain performance in the dairy sector in Nyandarua County. According to Muriuki (2013), technological support in

the agricultural sector mainly focus of digital platform to enhance product marketing, provide linkages among industry players, online support and payment

4.10 Overall Regression Analysis

The study carried out multiple regression analysis between the independent and dependent variables of the study. In order to conduct multiple regression analysis the set of items that measured each independent variable were aggregated by computing the average. Multiple linear regression analysis was then used to test whether there existed interdependency between independent variables (financial support to suppliers, supplier training, technical assistance and technological support) and dependent variable (supply chain performance). The findings of the multiple regression analysis for each of the four independent variables are discussed in Table 4.19 to Table 4.21.

Table 4.19: Effects of SD on SC Performance Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.552 ^a	.305	.284	1.00808

a. Predictors: (Constant), technological support , technical assistance , financial support to suppliers , supplier training

From the regression results in Table 4.19, the R value was 0.552 indicating that there is a relationship between financial support to suppliers, supplier training, technical assistance and technological support on the supply chain performance in the dairy sector in Nyandarua County. The R squared (R^2) value of 0.305 shows that 30.5 percent of the supply chain performance is explained by supply development factors. The remaining 69.5 percent is explained by other factors.

Table 4.20: Effects of SD on Supply Chain Performance Model ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
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	Regression	59.314	4	14.829	14.592	.000 ^b
1	Residual	135.157	133	1.016		
	Total	194.471	137			

a. Dependent Variable: supply chain performance

b. Predictors: (Constant), technological support , technical assistance , financial support to suppliers , supplier training

The model was significant with the F ratio = 14.829 at p value $0.000 < 0.05$. This is an indication that SD factors under consideration have a significant effect on the supply chain performance in the dairy sector in Nyandarua County.

Table 4.21: Effects of SD on Supply Chain Performance Model Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
	(Constant)	.046	.518		
Financial support to suppliers	.290	.082	.276	3.521	.001
Supplier training	.467	.087	.463	5.341	.000
Technical assistance	.163	.078	.155	2.078	.040
Technological support	.134	.074	.149	1.793	.075

a. Dependent Variable: supply chain performance

Financial support to suppliers, supplier training and technical assistance had positive and significant effect on supply chain performance with $\beta_1 = 0.290$ at p value 0.001, with $\beta_2 = 0.467$ at p value 0.000 and $\beta_3 = 0.163$ at p value 0.040 which are less than 0.05. Technological support had positive but insignificant effect on supply chain performance with $\beta = 0.134$ at p value 0.075 which is greater than 0.05.

The optimal regression equation for this study can be stated as:

$$Y = 0.046 + 0.467X_1 + 0.290X_2 + 0.163X_3 + e.$$

Where 0.046 is the constant,

X_1 is, supplier training index

X_2 is financial support to suppliers index

X_3 is technical assistance index

Technological support had positive but insignificant effect on supply chain performance in the dairy sector in Nyandarua County and therefore dropped from the optimal regression equation.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study as guided by specific objectives and research questions, conclusions reached based on the findings of effects of SD on supply chain performance in the dairy sector in Nyandarua County as well as recommendations for further research.

5.2 Summary of the Major Findings

This study aimed at establishing the effects of SD on supply chain performance in the dairy sector in Nyandarua County. The specific objectives of the study were to assess the effects of: financial support to suppliers, supplier training technical assistance and technological support to suppliers on supply chain performance in the dairy sector in Nyandarua County. In order to achieve the objective the respondents were required to rate the effects of each component of SD considered in the study.

5.2.1 Financial Support to Suppliers on Supply Chain Performance

In order to ascertain the relationship between financial support to suppliers and supply chain performance the study conducted a bivariate and multiple regression where the results indicated that financial support to suppliers had positive and statistically significant effect on supply chain performance in the dairy sector in Nyandarua County at 95% confidence level. The study further established that financial support extended to farmers has enabled farmers to increase milk production as well as enabled them upgrade their farm tools and equipment. In addition, dairy firms in Nyandarua extend loans to dairy farmers as a strategy for improving farmers' productivity and capacity. The provision of advance payments and inputs on credit to farmers for milk supplied is used as an incentive for increased production.

5.2.2 Supplier Training on Supply Chain Performance

In order to ascertain the relationship between supplier training and supply chain performance the study conducted a bivariate and multiple regression where the results indicated that supplier training had positive and statistically significant effect on supply chain performance in the dairy sector in Nyandarua County at 95% confidence

level. The study further indicates that dairy firms in Nyandarua County have an elaborate farmers training program on dairy cattle breeding, modern dairy farming and milk safety standards, milk hygiene and animal diseases prevention, and animal feed preservation to cushion farmers against long dry spells. These training programmes aim at improving the quality of dairy cattle, achieve consistent milk production and consistent improvement in milk quality in the region.

5.2.3 Technical Assistance to Supplier on Supply Chain Performance

In order to ascertain the relationship between technical assistance to supplier and supply chain performance the study conducted a bivariate and multiple regression where the results indicated that technical assistance to supplier had positive and statistically significant effect supply chain performance in the dairy sector in Nyandarua County at 95% confidence level. The study further established that dairy firms in Nyandarua have provided technical assistance to farmers by opening up agro vets shops across the county which has made it easier for farmers to access quality animal feeds and supplements than before.

In addition, the dairy firms have facilitated upgrade of dairy herds through provision of reliable Artificial Insemination services at subsidized rates to their members. They have also provide efficient milk transport services at farm levels as well as establishing milk cooling plants in strategic locations which has reduced time between milking and collection for processing. All these are geared towards helping the farmers to reduce cost of milk production and reduce milk wastage/spoilage previously resulting from time taken to collect the milk.

5.2.4 Technological Support on Supply Chain Performance

In order to ascertain the relationship between technological support and supply chain performance the study conducted a bivariate and multiple regression where the results indicated that technological support had positive but statistically insignificant effect supply chain performance in the dairy sector in Nyandarua County at 95% confidence level. The study further found out that inadequate infrastructure (road network, electricity and water) are the major hindrance to application of modern farming techniques and installation of cooling plants in Nyandarua County.

In addition, there has been low technological support to farmers in terms of establishment of online support service portal, modernizing farming techniques through provision of tools and equipment such as milking machines, shaft cutters as well as linkage of key milk industry players. This may be attributed to high cost of machinery and equipment but failure to tap into technology in this sector could be partly blamed to the relatively high cost of milk production in Nyandarua County.

5.2.5 Supply Chain Performance

The effectiveness of supply chain was reviewed and study revealed that despite deliberate effort by the dairy firms in Nyandarua County to offer financial support to suppliers, training and technical assistance there are times when dairy firms in Nyandarua experience high shortage of milk. However this was attributed to some factors beyond the control of the dairy firms such as adverse climatic weather condition even though there is need to put more emphasis on technological support which was found to be inadequate.

5.3 Conclusion of the Study

The study findings revealed that financial support to suppliers has a positive and significant effect on supply chain performance in the dairy sector in Nyandarua County. Farmers in Nyandarua County are able to access financial support in form of loan and advances as well as get inputs on credit. This has greatly enabled farmers to increase milk production from their farms and upgrade their tools and equipment and ultimately this leads to improved farmers' productivity and increased production.

The results indicated that supplier training had positive and significant effect on supply chain performance in the dairy sector in Nyandarua County. It is evident from the study that farmers in Nyandarua County have benefited from an elaborate training program on dairy cattle breeding, modern dairy farming and milk safety standards, hygiene and animal diseases prevention, animal feed preservation to cushion them against long dry spells which is aimed at improving the quality of dairy cattle's to ensure consistent milk production and consistent improvement in milk quality and quantity in the region.

In addition the training has enabled farmers to learn how they can preserve animal feeds to cushion them against dry spell that experienced at times in the region to sustain consistent milk supply throughout the year for years. However, fluctuations in milk production are still experienced.

Technical assistance to supplier had positive and significant effect on supply chain performance in the dairy sector in Nyandarua County. The study established that farmers are able to access quality animal feeds and supplements from the Agro vets shops which are conveniently located across the region. In addition, dairy farmers are provided with reliable Artificial Insemination services at subsidized rates with the aim of upgrading their breeds. This is coupled with efficient milk transport services at farm levels which has reduced time between milking and collection for processing. All these are geared towards helping the farmers to reduce cost of milk production and improved milk quality and reduce milk wastage/spoilage.

Technological support had positive but insignificant effect on supply chain performance in the dairy sector in Nyandarua County. There has been low technological support to farmers as there is no program in place to avail support through technology. For instance their lack of an elaborate system established to provide an online service portal, provision of tools and equipment such as milking machines, shaft cutters to modernize farming techniques. This may be attributed to high cost of machinery and equipment.

5.4 Recommendations of the Study

Following the findings of this study, a number of recommendations can be made.

Dairy firms should device strategies of effectively ensuring that financial support is sustainable and accessible by all the farmers. This will enable the farmers to continuously enhance their milk production capacity which in turn will allow utilization of idle capacity in the factories and translate to more income to both the farmers and the dairy firms in Nyandarua County.

Dairy firms should ensure that supplier training is sustained to upgrade farmers knowledge on dairy breeds upgrade, disease prevention and feeds preservation to enhance farmers productivity and cost reduction. This will minimize shortage of milk

during dry spell and encourage phasing out of poor milk breeds and outdated farming techniques in region.

Dairy firms should lobby the support of the County and national government to ensure the region has an elaborate infrastructure such as road network, electricity and water as these were cited as the factors that hinder application of modern farming techniques and installation of cooling plants in Nyandarua County. The aspect of value addition should also be looked into where the government can support establishment of mega milk processing and packaging industry to take advantage of the enhanced milk production in the County and the ever increasing demand for milk and milk products worldwide. This will have a multiple effect as it will increase income, create jobs, and enhance food security in the country.

To sustain consistent milk production in Nyandarua County, the dairy firms should pull resources together and establish a feed processing firm that has the capacity to produce quality animal feeds and sell to farmers at reasonable prices to enable farmers lower their cost of production which will be an incentive to farmers to increase their production capacity.

5.5 Suggestions for Further Research

The study established, there has been low application of technological support in the dairy sector such that linkage between farmers, milk processors, feeds processors and farm equipment manufacturers. The study recommends a study to be undertaken to find out the potential impacts technological assistant to suppliers in supply chain performance in the dairy sector in areas such as speed of delivery, transaction costs, milk production cost, milk quality, animal disease prevention and animal feeds processing and preservation.

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Appendix I: Questionnaire

INTRODUCTION

Supplier development is any effort a buying firm expends on a supplier to increase the performance and capabilities of the supplier to meet the buying firm's own short-term or long-term supply needs.

Please respond to the following by ticking in the space provided. Thank you.

SECTION A: GENERAL INFORMATION

1. Kindly indicate the name of the name of the dairy firm you work for
 - a) Muki Cooperative Society Limited
 - b) Nyala Dairy
 - c) Ol Kalou Dairy limited

2. Kindly indicate by ticking the department/ section you work in
 - a. Procurement and stores
 - b. Finance department
 - c. Transport department
 - d. Agro vet section
 - e. Main Factory

3. For how long have you been working in the dairy sector?
 - a) Less than 1 year
 - b) 1 – 5 years
 - c) 6 – 10 years
 - d) 11-15 years
 - e) 16 years and above

SECTION B: FINANCIAL SUPPORT

NOTE: From this section, kindly use the scale given below to indicate your level of agreement with the following statements 5- *Strongly Agree*, 4-*Agree*, 3- *Neutral* 2- *Disagree*; 1- *Strongly Disagree* by placing a tick (√) in the appropriate box

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
As a strategy for improving farmers productivity our dairy firm extends loans to dairy farmers to enhance their capacity					
Our firm provides advance payments to farmers for milk supplied as an incentive for increased production					
We provide farmers with farm inputs on credit to enhance milk production					
Financial support extended to farmers has enabled farmers to increase milk production from their farms and upgrade their tools and equipment					

SECTION C: SUPPLIER TRAINING

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Our dairy firm has an elaborate farmers training program being implemented to increase milk production and quality					
We have been training farmers on dairy cattle breeding which has improved the quality of dairy cattle's in the region					
We have adequate and trained staff for training farmers on modern dairy farming and milk safety standards, hygiene and animal diseases prevention					
We train farmers on animal feed preservation to cushion them against long dry spells which has resulted to consistent milk production in the region					
Training extended to farmers have lead to consistent improvement in milk quality and quantity					

SECTION D: TECHNICAL SUPPORT

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
We have facilitated upgrade of dairy herds through provision of reliable Artificial Insemination services at subsidized rates to our members					
Our Agro vets shops have made it easier for farmers to access quality animal feeds and supplements than before					
We provide efficient milk transport services at farm levels which has reduced time between milking and collection for processing					
Provision of the above technical support has helped farmers to reduce cost of milk production and improved milk quality and reduce milk wastage/spoilage					

SECTION E: TECHNOLOGICAL SUPPORT

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
We have established an online service portal to bring services closer to the farmers and allow sharing knowledge					
Our firm supports dairy farmers in Modernizing their farming techniques through provision of tools and equipments eg milking machines, shaft cutters, mastitis test kits to improve efficiency in milk production					
Inadequate infrastructure (road network, electricity and water) is a major hindrance to application of modern farming techniques and installation of cooling plants in Nyandarua County					
Technological support has facilitated linkage between farmers, animal feed processors, service providers and opened new marketing channels for dairy products					

SECTION F: SUPPLY CHAIN PERFORMANCE

(Kindly respond to the questions applicable to you)

Statement	Applicable to:	2013	2014	2015	2016
How many liters of milk was collected and processed during these periods	Procurement, finance, Transport & factory workers				
How much did it cost the firm to process the collected milk over the same period?	Factory manager & finance				
How long does it take to collect milk from farmers to the cooling facilities or factory?	Procurement & Transport department				
On average, how many times much milk was rejected on the basis of low quality or spoilt in transit before it could reach the factory?	Factory workers & procurement				
What was the average utilization of available factory capacity over the indicated years	Factory workers & procurement				

Kindly indicate by ticking how often you firm experiences shortage or excess milk supply (Applicable to factory workers and procurement)

	Always	Very often	Often	rarely	Never
Shortage					
Excess					

THE END

THANK YOU FOR YOUR COOPERATION

Appendix II: Introductory Letter