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Is there a Link between Supply Chain Design Practices among Milk Processing Firms and Business Performance? Evidence from in Kenya

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Abstract

Many firms who have implemented the use of various Supply Chain Design practices have had nothing short of enjoying the fruits of their investments. This project set out to establish the relationship between SC design practices and business performance among milk processing firms in Kenya. It also sought to determine the SC design practices commonly used by milk processing firms in Kenya. The research adopted a cross-sectional descriptive survey of Milk Processing Firms in Kenya. The descriptive approach was used to determine the various SC design practices used by Milk Processing Firms in Kenya. A census study of 42 Milk Processing Firms was carried out. Data was collected from the field through the use of questionnaires and then analyzed using Statistical Package for Social Scientists (SPSS) and presented in tables and figures with the results well interpreted and discussed. The study revealed that the milk processing firms had invested resources towards the SC and used it as a strategic weapon to beat the competition. The researcher concluded from the findings of the study that SC design helped companies to understand where the value is being created and destroyed. The regression model on the relationship between SC Design Practices and overall firm's performance indicated that SC Design Practices contributed by 30% towards the performance of the firms. Despite this being a small percentage it should be noted that it was positive, and so had a positive contribution towards business performance. However, a T-test showed no significant relationship between the dependent variable and the independent variables. The researcher concluded that SC Design Practices contributed positively towards a firm's overall performance. The study recommends that in order to have a successful SC in terms of total SC costs and service performance to the customer, companies need to design their SCs such that they match the type of products they are selling with the type of distribution channels delivering them. It also recommends that it is important to measure performance to determine achievement of goals and alignment of objectives with organizational strategy.

Keywords: Supply Chain Design Practices, Business Performance, Milk Processing & Kenya.

Introduction

In today's market, firms don't compete; SCs do (Crimi and Kauffman 2001). Firms realize that SC design is crucial in gaining competitiveness. In designing SC to align capabilities directly with enterprise strategy, the results tend to be superior performance and a strong market position. Every successful company should have an operational design and management style tailored to its purpose and strategy. This calls for designing SCs to suit and to enable achievement of the firm's goals (Kauffeld, Mueller and Michaels 2013).

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The management of a firm's Supply Chain (SC) is its competitiveness in the global economy. Increasing competitive pressures drive companies to focus on core competencies for their competitiveness. Consumer demand for superior service, increased value, and competitive price bring ever greater pressure for efficiency gains and performance improvement (Wight and Kelly 2012).

A supply chain is a set of activities and resources store and move a product package (goods and/or services) from the suppliers through manufacturers to the final customers. These activities and resources should support the transformation and conversion of resources, raw materials, and components into a finished product that is delivered to the end customer (Nagurney A., 2006). Supply Chain design has a myriad of benefits as follows: It helps companies understand where the value is being created and destroyed. It helps build closer relationships with customers and suppliers. It facilitates smooth flow of materials and products. Lead time is reduced. Opportunities to improve profits are identified; decision making supports the profitability of the entire company. Alternate strategies are compared quantitatively, and cost tradeoffs are modeled accurately. A good SC design helps firms to understand agility required to serve the customer cost-effectively and to segment the SC response to deliver the required strategy (Alexandre, 2008; Wight and Kelly, 2012). Various problems are experienced in designing SCs. One problem addresses how to configure a new product's SC where the product's design has already been fixed. Another problem addresses part selection for multi-generation products, and the other problem considers the impact of quality of the supplier manufacturer relationship. The issue in all the problems is to select the options that minimize the total SC cost (Willems, 1999).

Supply chain design is deploying assets in ways that enhance profitability and shareholder value. Market and sourcing strategies that generate the best financial performance, optimal number of plants, warehouses and distribution centers are considered to maximize long-term profit (Alexandre, 2008). Supply Chain design practices are strategies tailored to suit and enable deployment of assets in the most profitable ways for optimal operational and financial performance in the SC of a firm. There should be a clear sequence of events in designing an effective SC beginning with Market and Product Strategy (Wight and Kelly, 2012). The SC Design practices to be covered in this study are: Design for the Product, Design for the Customer, Design for the Market, Design for Profitability, Design for SC, Design for Life Cycle and Design for the Environment.

This is the extent to which an organization can meet the needs of its stakeholders and its needs for survival. It can be viewed in terms of financial and non-financial perspectives (Santos, et al., 2007). Jones and Oliver (2006) posit that organizations in all sectors should focus their efforts towards effective and effiecient use of the supply chain resources in order to meet their business objectives. Effectiveness is measured by the extent to which stakeholders or customers' requirements are met over time; while efficiency is measured in terms of how economically the organization's resources are utilized in providing a given level of stakeholder/customer satisfaction. The key aspects of business performance include financial performance, operational performance, and SC performance. Financial measures include profitability, return on investment, liquidity ratios, return on capital employed while the operational measures include productivity, capacity utilization, cost reduction and the SC performance measures include inventory turnover, lead time, product cycle time and speed to market.

Kenya is one of the largest producers of milk in Africa. According to the e-dairy project (2011) 20% of the national milk production is from large-scale dairy farming while the largest deliveries of 80% are from small-scale farming. Thus the need to upgrade the dairy value chain to eliminate inefficiencies and lower production and processing costs while simultaneously increasing milk quality from farm to the consumer to meet acceptable domestic and international standards. The project further posits that the sector, however, faces some challenges that hinder competitiveness both locally and in the regional market.

The Milk Processing Industry in Kenya has evolved over time, and the design of its SC is increasingly becoming a challenge. This is due to the perishability of their products and taking care of the segmentations of its customers. One of the reasons for slow growth of the concept of SC management is failure to broaden the vision of SC beyond the firm's internal value chain and also failure to cooperate metrics to guide the design of the SC networks. There is, therefore, a need to conduct a study in order to determine the SC design practices used by milk processing firms in Kenya and to establish the extent to which they can improve the firms' business performance. Challenges in the Milk Processing firms include: ensuring that all products in the firm's local dairy case are fresh, safe, and produced in the most efficient and environmentally-friendly way. Although the country has the capacity to process about a million litres a day, a large percentage of fresh pasteurized milk has a short shelf-life.

The market for fresh pasteurized milk is also fairly constant and cannot be easily expanded in the short run. As a solution, milk is incorporated into the National Food Strategic Reserve, which helps to keep safety stock to cushion the firms in times of short supply or in times of scarcity (softkenya.com/farming/dairy-farming-in-Kenya/).

Review of Empirical Literature

According to Watson *et al.*, (2012) the SC infrastructure design process depends on forecasts of the future that will not all prove to be accurate; e.g. customer demand, competitors' actions, cost of raw materials and transportation. Those who recognize the uncertainty of the data that drives their business planning can use SC to explore opportunities through well thought courses of action and make quality management decisions which can lead to optimized returns. Planning is a strategic part of SC Management. Firms need to manage their resources strategically for competiveness in meeting the customer needs for them to gain profitability. Considering that milk and its products are perishable, the SC should be designed to bring out efficiency and effectiveness. Activities like milk collection from farmers at various centers are planned in advance to ensure that milk reaches the factories at the right time for processing to ensure that it remains in good consumption condition despite its perishability. Processing of the milk and its various products in the factories is also planned in advance so that there is a continuous flow of operations (e-dairy project, 2011). Successful SC design is about deploying assets in ways that enhance profitability and shareholder value (Wight and Kelly, 2012). Good Milk processing practices are an important practical tool used world-wide in supporting milk firms to produce and market safe, quality milk and milk products to satisfy the expectations of the food industry and consumers (e-dairy, 2011). SC design practices include:

Design for the Product Practices: This is a product's configuration, composition, and style. The design ensures that the product is aesthetically pleasing and fashionable; often requires considerable consumer research, artistic creativity and product planning (Zikmund and d'Amico, 2000). Fisher (1997) embraced designing SCs according to different product characteristics. He distinguished between functional and innovative products. Innovative products required a responsive SC, and functional products required an efficient one hence the SC should be designed accordingly. Payne and Peters (2004) had a different view and argued that, in order to have a successful SC in terms of total SC costs and service performance to the customer, companies need to design their SCs such that they match the type of products they are selling with the type of distribution channels delivering them.

Design for the Customer Practices: This refers to aligning SC infrastructure with customer demands. According to Lee (2004), a great deal of useful customers and demand information is captured and processed as well, for the design of SCs which must be aligned with the customer demands. The design is done as per the voice of the customer (Lysons and Farrington, 2006). Customer Relationship Management (CRM) is a one-to-one type of marketing approach which leverages the relationships to arrive at an understanding of the needs and priorities of each customer (Gronroos, 1990; Collins *et al.*, 2009). Understanding the processes that consumers and businesses use to make purchase decisions is critical to the development of long-term mutually beneficial relationships with customers (Fererell, Michael and Hartline, 2000). According to Lysons and Farrington (2006) SC is designed to get the product to the right place at the right time in the right quantities at the lowest possible cost all for the convenience of the customer. Ernest and Young (2012) posit that the SC design practice for the customer considers through which channels are various customers going to be served, their needs and existing trading terms.

Design for the Market Practices entails designing seeking opportunities for business growth in new or existing markets. It broadly categorizes alternative opportunities in terms of basic strategies for market growth and serves as a planning tool (Zikmund and d'Amico, 2000). In designing for the market, the business should consider customers' likes, wants or preferences (Farerell, Michael and Hartline, 2000). The SC is designed as per the market segments. Marketing strategies start with segmentation, targeting and positioning; and the SC is designed to suit each market segment (Kotler, 2012). Design for Market Practice considers how products are manufactured, sold and transported to respective markets. It also considers tax and incentive implications of selling in different market jurisdictions so that the design suits the most economical practices (Ernest and Young, 2012). A good design for the market eliminates market mediation costs that are costs associated with the imbalance of demand forecatis against the supply. The inability to match demand with supply can lead to obsolescence and losses (Perez, 2013).

Design for Profitability Practices: Managing the SC is a core competence that an organization must possess to deliver profit and return on investment (ROI) for it has a major impact on organizational objectives and effectiveness in achieving those objectives (Hines, 2004). Maximizing SC network effectiveness is the key to individual and SC profitability (Dyer, 2000). Although low-cost country sourcing is considered a strategy, a comprehensive approach to procurement requires that companies also consider total SC costs and lead times that are the most profitable source. Sourcing strategies must take into account how quickly suppliers can deliver parts and materials to the manufacturer. Sourcing from a low-cost country makes sense, if only lead-time constraints do not offset any cost advantages. A wise sourcing strategy, therefore, will consider total costs and lead times as well as balance supply with demand to create a globally distributed supply network that best meets the company's business objectives of maximizing profitability (Ellis, 2008). Designing for profitability means illustrating a scenario in which the company produces its ideal product portfolio with the most collaborative supplier base, employing high quality labour, the use of the right and current production technology and optimized delivery sustems to the final customers.

Design for SC Practices: Design for SC is the process of optimizing the fit between SC capabilities and product designs (Domin, Wisner and Marks, 2007). It creates product configurations that address infrastructure limitations and use SC capabilities as they evolve throughout the life of the product. In today's SC, minimal component costs are still a competitive weapon, but the SC that delivers a surplus for all partners while minimizing the total system-wide costs which deffrentiate the firm firm in the market place. The SC approach considers the roles of suppliers, producers, distributors and end users to see how each adds value to and benefits to the final product (Elzel, Walker, and Stanton, 2013).

Design for Life Cycle Practices: The product is designed to be SC friendly to the potential component or infrastructure changes throughout the product lifecycle through continuous product improvement, cost reduction and price reviews in line with technology or infrastructure advances. Product Development Teams (PDTs) determine which of the product's components are likely to be changed throughout the product's lifecycle and facilitate eventual change with minimum impact in the SC. After deciding on the changes that are likely to occur, PDT designs without interrupting the the supply chain operations. The product design proactively transitions out the old technology while introducing new technology. The product design must consider forward and backward compatibility - not just from a customer viewpoint, but also for parts in the SC (https://www.supplychainonline.com/). Shorter product lifecycles should in addendum to level of technology, customer needs, purchasing power, change and trends in the market demand.The design for life cycle puts all these into consideration to ensure effectiveness and efficiency (Hines, 2004).

Design for the Environment Practices: Economies embrace new environmentally responsible values, beliefs, and behaviors, to green the entire SC (Mohammed, 2012). 'Going green' is a concept for people to learn how to make environmentally friendly choices, make quality management decision that are responsive to the environment without pollution and degradation (Blanchard, 2010). The design for environment practice entails the green strategy that features cross-functional collaboration, emphasis on innovation, and strategic focus on SC and enterprise as a whole. Such a framework emphasizes network redesign, packaging changes, and business collaboration that promotes a smaller carbon footprint and generates cost saving (Babu, 2011). The drivers of going green include market demand where consumers are already aware of the concept, regulatory pressure where organizations have been restricted by governments to ensure that they go green, economic competitiveness where the concept assists in the reduction of costs as well as operational efficiency giving a company competitive advantage and environmental regulations which include ISO 1400 which advocates for an environment free from pollution (Easty and Winston, 2006). Designing for the environment practice has a myriad of benefits which include: improved public image for the organization, improved products quality, product differentiation and competitive advantage, sustainability of resources and positive impact on financial performance i.e. lowered costs and increased efficiency (Blanchard, 2010).

The output of the processes enabled by the SC design must be measured and compared with a set of standards to meet business objectives. The measurement of business performance is the act of quantifying the performance criteria (metrics) of organizational units and services, processes, people and other business activities (Johnson *et al*., 2006). Performance measures are a critical factor for effective management. It is important to measure performance to determine achievement of goals and alignment of objectives with organizational strategy (Delaney *et al*., 2006). Business performance in this study is viewed from the financial and non-financial perspectives. The Balanced Scorecard that offers both qualitative and quantitative measures that acknowledge the expectations of different stakeholders and related assessment of performance in a choice of strategy has been used.

It is a worldwide strategic planning and management system that is used extensively to manage the firm's performance against set goals while focusing on the firm's vision, mission, operating environment and objectives. This is the framework for performance measurements and helps planners identify what should be done and measured in order to balance the financial perspective (Kaplan and Norton, 1996). The Balanced Scorecard has been used in this study to measure performance because it provides a holistic measure of business performance.

Problem of Research

The milk SC includes activities and processes from production, processing, trading and consumption (Ngigi *et al*., 2000). Opportunities exist in production of high quality powdered milk, cheese, and butter; provision of affordable small-scale processing and packaging technologies that can tap the milk that currently goes into an informal sector or to waste (www.kdb.co.ke). Milk is processed to produce high-value milk products such as Farm Fresh Products; Long Life Products e.g. powdered milk; Cultured Products e.g. fermented milk and Creamy products like butter (Africa-Do-Business.Com, 2010). Pasteurization of milk is one of the possible heat treatments being used to kill the entire population of pathogenic bacteria and to reduce the total number of micro-organisms strongly. Milk cooling is done in extensive and trendsetting range of milk cooling tanks with different refrigeration systems such as ice water cooling, direct expansion, and instant cooling, and different control and cleaning systems. Supply Chain Design influences the ability of the firm to respond to the customer needs and the value delivered to the customers. This will in turn affect the revenues and the level of optimization of the entire SC (Alexandre, 2008).

Some studies have been done on SC design and business performance. Meixell and Gargeya (2005) carried out a study on decision support models for the design of global SCs and practical issues of global SC design. They found out that few models address the practical global SC design problem in its entirety; hence the need to study further on SC design and address the gap in knowledge the study revealed. Various past studies in milk processing firms considered different variables from those explored in this study. The research findings by Kemokai (2012) indicated that deterioration in milk production, poor supplier relationship management, poor management of inventory and pilferage of inventory were among the causes of SC failure. Although the study was on milk processing firms in Kenya, it did not match the current study because it addressed SC failures while current study addresses SC design practices. Other studies conducted in the SC had one similar variable to that considered in this study, yet it was considered against different ones hence lacking the exact match with those in the current study. Magutu (2013) carried out a study on 'SC Strategies, Technology and Performance of Large-scale Manufacturing Firms in Kenya'. The study set out to establish the role of technology in the relationship between SC strategies and overall firm performance. Study findings indicated a significant relationship between SC strategy and firm's SC performance. Magutu's study and this current one both explore impacts of different variables on overall firm's performance, but the two studies are in different industries. Also, his study is on SC strategies but not on SC design practices.

Studies done in SC design include that on 'How to design the right SCs for your customers' by Jari, Helsinki, Finland, Eloranta and Ian (2009). The researchers found out that by deploying three different SCs have a profound relationship with customer satisfaction and firm effectiveness. This study was on SC design for the customer; it did not extend to other SC designs covered in this study. Also their study was in industrial engineering and management but not in the milk processing industry. Still in the SC design, Nuri, Kim and Bryan (2010) carried out a study on "Development of a simultaneous design for SC process for the optimization of the product design and SC configuration problem". The study investigated and quantified the potential benefits of the design for SC focusing on product design. Study findings were that the concurrent optimization provided better visibility and higher profits. This study was in engineering while this current study is in the milk processing industry. It was on design for the product only hence did not address other design practices addressed in this current study.

Research Focus

Firms are currently searching for new and innovative ways for competiveness especially in speed in product design, transformation and delivery while minimizing costs and the total environmental impact of the firm's products (Razmi and Ghodzi, 2012). Organizations increasingly find that they must rely on effective SCs, or networks, to compete in the global market and networked economy. This calls for appropriate and effective designs of SCs.

A firm's SC allows it to move products from the source to the final point of consumption. Leading firms around the world, from large retailers to high-tech electronics manufacturers, have learned to use their SC as a strategic weapon. The strategic location of the supply chain facilities especially on the number of such facilities is a critical success factor for the firm's supply chain. The most successful companies place significant emphasis on strategic planning by determining the best facility locations and product flows. The discipline used to determine the optimal location and size of facilities and the flow through the facilities is called SC network design (Watson, Lewis, Cacioppi and Jayaraman 2012).

Wight and Kelly (2012) posit that despite continued economic uncertainty and increasing global competition, customer demands remain to be a major focus for businesses. There is a constant demand for superior service, increased value, and competitive price. This brings greater pressure for efficiency gains and performance improvement ever. Every business entity strives to meet the needs of the customer and to achieve this it requires an optimization of the entire SC. The benefits to be gained from developing formal relationships and collaborative partnerships with key suppliers and customers throughout the SC are too significant to be ignored. Optimized SCs deliver high-class service at minimal cost and to achieve this, good SC design practices must be embraced.

In the past, researchers and practitioners have primarily investigated the various processes within individual SCs. Of late, there has been increasing attention placed on the performance, design, and analysis of the SC as a whole. This attention is largely a result of the rising costs of sourcing, production, distribution, shortened product life cycles and the globalization of the market economy.

Milk processing firms in Kenya have had a little reward for their owners and employees in terms of output and revenue. The few studies were done in the industry underscore the full potential of the milk processing firms in Kenya hence the need to research further on the industry and explore all the conceptual constructs in the current study. To achieve this, the study, therefore, seeks to answer the following questions: What are the SC design practices commonly used by milk processing firms in Kenya? Is there any relationship between the SC design practices and business performance of milk processing firms in Kenya? The objectives of this study will be:

(i) To determine the SC design practices commonly used by milk processing firms in Kenya; and
(ii) To establish the relationship between SC design practices and business performance among milk processing firms in Kenya.

Methodology of Research

General Background of Research

The study adopted a descriptive research design. This permitted the collection of primary data by use of a questionnaire. The questionnaire method required asking respondents for information, using written questioning (Zikmund, 2011). The survey approach was adopted because it provided a quick, inexpensive, efficient, and accurate means of assigning information about the population (Setlltiz *et al*., 2008). In addition it is considered authoritative by people in general and since it researched on many firms it helped determine the many SC practices used in the various firms hence it was easy to compare performance among them, explain and understand easily.

Sample of Research

The population of the study was all milk processing firms in Kenya. According to Kenya Dairy Board (2013), there were 42 Milk processing firms from which a census study was carried out. A census is an investigation of all the individual elements that make up the population i.e. a total enumeration rather than a sample (Zikmund 2011). The choice of census method was to fulfill the requirements of effectiveness, total representativeness, reliability and accuracy (Kothari, 2004).

Instrument and Procedures

Primary data was used in this study. Data collection was done through the use of closed-ended questionnaires. Closed-ended questions are conclusive in nature as they are designed to create data that is easily quantifiable. The questions are easy to code, and this makes them particularly useful when trying to prove the statistical significance of a survey's results (Penwarden, 2013).

The questionnaire had three sections: section (i) will deal with general information on the Milk processing firms; Section (ii) sought information on the various SC design practices used by Milk processing firms in Kenya; section (iii) sought information on business performance and performance measurements. The respondents to the questionnaires were procurement and SC managers, procurement officers (or their equivalents) at the various Milk processing firms. The questionnaires were administered on 'drop and pick later' method and also through e-mail. Follow up and reminders were done through telephone calls and e-mails.

Data Analysis

Data was collected and analyzed using Statistical Package for Social Scientists (SPSS). In order to achieve the objective of determining the SC design practices commonly used by milk processing firms in Kenya, descriptive statistics analysis such as the use of means and standard deviation were used to analyze the data. Factor analysis was used in determining the benefits of SC design practices to the Milk Processing firms. To achieve the objective of determining the relationship between SC design practices and business performance, the regression model below was in analysis of data;

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon$$

In this case:

Y= was a dependent variable to measure business performance

α, β_1, β_2, β_3, β_4, β_5, β_6, β_7 are constants that showed the relationship between SC design practices and business performance

X_1 - Design for the Product Practices
X_2 –Design for the Market Practices
X_3 - Design for the Customer Practices
X_4 –Design for Supply Chain Practices
X_6 –Design for Life Cycle Practices
X_7 - Design for Profitability Practices
X_7 –Design for Environment Practices
ε was the error term of the model

Results of Research

This chapter presents descriptive analysis using means, standard deviation, and factor analysis to determine the extent to which various variables and SC design practices are used in the various firms. Regression analysis was used to explain the relationship between SC design practices and the business performance.

Out of the 42 questionnaires distributed to the firms, 37 questionnaires were returned giving a response rate of 88%. This response rate was high and satisfactory as Babbie (2002) observes that in descriptive research, a response rate of above 50% is adequate for analysis. Two of the 37 questionnaires were partially filled in as respondents claimed that information required was sensitive and highly confidential hence not authorized to submit. However, the two questionnaires were still deemed usable. 5 questionnaires were not returned; reasons being that data required was confidential and also others simply did not fill them in despite constant follow-up through phone calls and e-mails. The high response rate was attributed to use of online data collection methods like use of e-mails in addition to physical 'dropping and picking later method' of questionnaire administration. Milk Processing firms located far in the countryside were easily and quickly reached through e-mails and phone calls hence enabling data collection from many firms.

In business, firms usually apply various strategies in order to enhance their competitiveness. In this study, respondents were asked to indicate the extent to which their firms used SC in enhancement of their businesses on a likert scale (1 - Very Great Extent, 2 - Great Extent, 3 - Moderate Extent, 4 - Small Extent and 5 - Very Small Extent). The results are as shown on the table below:

Table 1: Firm's Supply Chain Management

Firm's Supply Chain Management	Mean	Std. Dev.
The firm has invested resources to ease the movement of products to the point of consumption	1.54	.803
The firm incorporates suppliers and customers in its service delivery, quality and feedback	1.57	.765
The firm uses the SC as a strategic weapon to beat the level of competition in the milk industry	1.84	.834
Overall mean and standard deviation	1.65	0.800

Source: Research data (2014)

From the results in table 1 above, to a very great extent (Mean = 1.65, Std. Dev. = 0.800) the SC design process is influenced by the three factors which include: investing resources to ease the movement of products to the point of consumption, using SC as a strategic weapon to beat the level of competition and incorporating suppliers and customers in service delivery, quality and feedback. This is in agreement with Watson, Lewis, Cacioppi, Jayaraman (2012) who comply that a firm's SC allows it to move products from the source to the final point of consumption and also emphasize on strategic planning to determine the best facility locations and product flows.

Factors influencing SC Design Process

There are many factors that can influence the design of a SC in a manufacturing entity. These factors can be internal or external. The respondents indicated the extent to their firm's the SC design process has been influenced by the following factors on a Likert scale (1 - Very Great Extent, 2 - Great Extent, 3 - Moderate Extent, 4 - Small Extent and 5 - Very Small Extent). The results are as shown in the table below:

Table 2: Factors influencing SC Design Process

Factors influencing SC Design Process	Mean	Std. dev.
Formal relationships and collaborative partnerships with key suppliers and customers have influenced the design of the firms SC design process	1.69	.631
The level of customer demand has influenced the design of the firm's SC design process	1.73	.769
Total SC response time has influenced the design of the firms SC design process	1.74	.780
Adoption of technology by your firm has influenced the design of the firms SC design process	1.83	.655
Prices for products have influenced the design of the firms SC design process	1.89	.667
Sourcing processes have influenced the design of the firms SC design process	1.92	.770
Competition actions in the milk industry have influenced the design of the firm's SC design process	1.92	.759
Cost of raw materials in the processing of the milk has influenced the design of the firms SC design process	2.19	.889
Overall mean and standard deviation	1.86	0.74

Source: Research data (2014)

From the results in Table 4.2 above, to a great extent (M=1.86, Std. Dev. = 0.74) the SC design process is influenced by the eight factors which include: Formal supplier/customers relations and collaborations, level of customer demand, SC response time, adoption of technology, prices for products, sourcing processes, competition actions and the cost of raw materials. This is in agreement with Wight and Kelly (2012) who posit that the benefits to be gained from developing formal working supplier/customers relations and collaborations SC are too significant to be ignored.

Design for the Product Practices

Business firms employ various SC design practices in their efforts to improve business performance. Respondents were asked to indicate the extent to which their firms employed the design for Product Practices in enhancement of their businesses on a Likert scale (1 - Very Great Extent, 2 - Great Extent, 3 - Moderate Extent, 4 - Small Extent and 5 - Very Small Extent). The results were as shown in the table below:

Table 3: Design for the Product Practices

Design for the Product Practices	Mean	Std. Dev.
The firm has ensured that the milk products are aesthetically pleasing and fashionable	1.51	.731
The firm has ensured that its product design practice embraced/considered predictable demand	1.81	.710
The firm has ensured through research that the milk product designs/varieties consider consumers' preferences	1.81	.668
The firm has used different product characteristics in its product SC design	1.82	.716
The firm in its product design practice embraced/considered thin contribution margin (small increases in profit)	2.03	.985
The firm has ensured that its product design practice embraced/considered a long product life cycle	2.15	.744
Overall mean and standard deviation	1.855	0.759

Source: Research data (2014)

From the results in Table 3 above, the design for the Product Practices are used to a very great extent (M = 1.855, Std. Dev. = 0.759) as indicated by the six factors which include: aesthetically pleasing and fashionable milk products, embracing predictable demand, milk product designs/varieties which considered consumers' preferences, different product characteristics, consideration of thin contribution margin and consideration of a long product life cycle. This is in agreement with (Zikmund and d'Amico 2000) who argued that the product should be aesthetically pleasing and fashionable. However, it is in contrast to Fisher (2007) who embraced designing products according to different product characteristics by distinguishing between functional and innovative products.

Design for the Customer Practices

The researcher wanted to establish the extent to which design for the Customer Practices were used by the various Milk Processing firms. The respondents indicated the extent to their firm's the SC design process has been influenced by the following design for Customer Practices in enhancement of their businesses on a Likert scale (1 - Very Great Extent, 2 - Great Extent, 3 - Moderate Extent, 4 - Small Extent and 5 - Very Small Extent). The results were as shown in the table below:

Table 4 Design for the Customer Practices

Design for the Customer Practices	Mean	Std. Dev.
The firm has aligned its SC with customer preferences such that products are available as per the customer demands	1.57	.689
The firm has considered existing trading terms in the management of its SC	1.77	.770
The firm focuses on Customer Relationship Management (CRM) as a marketing strategy	1.84	.688
The firm has determined customer responsiveness to its services (feedback) through market research	1.89	.658
The firm has ensured that different customers are served through different distribution channels	2.05	.815
Overall mean and standard deviation	1.824	0.724

Source: Research data (2014)

From the results in Table 4 above, the design for the Customer Practices are used to a very great extent M = 1.824, Std. Dev. 0.724) as indicated by the five factors which include: aligning SC with customer preferences, considering existing trading terms in management of SC, focusing on Customer Relationship Management (CRM), determining customer responsiveness through market research and serving different customers through different distribution channels.

This is in line with (Lee 2004) who argued that a great deal of useful customers and demand information for the design of SCs must be aligned with the customer demands. It is also in agreement with (Gronroos, 1990; Collins et al., 2009; Fererell, Michael and Hartline, 2000), all of whom emphasize on the importance of Customer Relationship Management (CRM) and the need to understand the needs and priorities of each customer.

Design for the Market Practices

The researcher further sought to establish the extent to which the firms employed the design for Market Practices in the enhancement of their businesses. Respondents were asked to indicate on a Likert scale (1 - Very Great Extent, 2 - Great Extent, 3 - Moderate Extent, 4 - Small Extent and 5 - Very Small Extent). The results were as shown in the table below:

Table 5: Design for the Market Practices

Design for the Market Practices	Mean	Std. Dev.
The firm has focused on existing markets for business growth and expansion	1.73	.769
The firm has focused on establishing itself in new markets for business growth and expansion	1.75	.806
The firm has served its customers according to various market segments	2.06	.674
The firm has considered how products are manufactured sold and transported to respective markets in serving various customer markets	2.11	.854
The firm has incurred costs associated with imbalance of demand and supply (market mediation costs)	2.89	1.369
Overall mean and standard deviation	2.108	0.8944

Source: Research data (2014)

From the results in Table 5 above, the design for Market Practices are used to a great extent (M = 2.108, Std. Dev. = 0.894) as indicated by the five factors which include: focusing on existing markets for business growth and expansion, establishing itself in new markets, serving customers according to various market segments, considering how products are manufactured, sold and transported to respective markets and costs associated with imbalance of demand and supply. This is in agreement with Ernest and Young (2012), who argue that a good design for the market eliminates market mediation costs i.e. the costs associated with an imbalance of demand and supply. It is still in line with Perez (2013) whose view is that obsolescence and losses are as a consequence of imbalances in demand forecasts and actual supply. The results are further in agreement with Kotler (2012) who argues that the SC should be designed to suit each market segment.

Design for Profitability Practices

Still on the SC Design Practices, the researcher further sought to establish the extent to which the firms used the design for Profitability Practices in enhancing their businesses competitiveness. Respondents were asked to indicate on a Likert scale (1 - Very Great Extent, 2 - Great Extent, 3 - Moderate Extent, 4 - Small Extent and 5 - Very Small Extent), and the results were as shown in the table below:

Table 6: Design for Profitability Practices

Design for Profitability Practices	Mean	Std. Dev.
The firm has strategized on sales volume increases to acquire profitability	1.51	.731
The firm has controlled product price increase to ensure increased sales	1.54	.767
The firm has focused on management of total SC costs (costs of sourcing, manufacturing and distribution) to acquire profitability	1.62	.681
The firm has focused on management of lead time costs (period between when an order is placed up to when it is received) to acquire profitability	1.78	.672
The firm has made available product offers that attract new buyers even in saturated markets	1.83	.811
The firm has balanced supply with demand for milk and other products	1.97	.763
The firm 's lead time constraints have increased costs of availing products to customers e.g. delivering a product earlier than firm's scheduled time increases cost	2.89	1.410
Overall mean and standard deviation	1.877	0.833

Source: Research data (2014)

From the results in Table 6 above, the design for Profitability Practices is used to a very great extent (M = 1.877, Std. Dev. = 0.833) as indicated by the seven factors which include: sales volume increases, controlled product price increases, management of total SC costs, management of lead time costs, product offers, balanced supply with demand for milk and other products and firms' lead time constraints. This is in agreement with Ellis (2008) who advocated for a wise sourcing strategy that considered total costs and lead times as well as balancing supply with demand. However, the results are in contrast with Dyer, (2000) who argued that maximizing SC network effectiveness is the key to individual and SC profitability.

Design for Life Cycle Practices

The researcher further sought to establish the extent to which the firms employed the design for Life Cycle Practices in the enhancement of their businesses. Respondents were asked to indicate on a Likert scale (1 - Very Great Extent, 2 - Great Extent, 3 - Moderate Extent, 4 - Small Extent and 5 - Very Small Extent). The results were as shown in the table below:

Table 7: Design for Life Cycle Practices

Design for Life Cycle Practices	Mean	Std. Dev.
The firm has made available products that are designed to transition out old technology while introducing new technology	2.05	.621
The firm has designed risk mitigation plans for low volume parts to avoid excess inventories or reduction service leveling when technology is going end of life.	2.16	.834
The firm has ensured that product changes are implemented with minimum disruption to the SC	2.16	.866
The firm has made available product development teams that are used throughout the products' life cycle.	2.46	1.120
The firm's products require modification or improvement to suit its SC at different stages of their life cycle.	2.74	1.379
Overall mean and standard deviation	2.314	0.964

Source: Research data (2014)

From the results in Table 6 above, the design for Life Cycle Practices is used to a great extent (M = 2.314, Std. Dev.0.964) as indicated by the five factors which include: products designed to transition out old technology while introducing new technology, risk mitigation plans for low volume parts, product changes implemented with minimum disruption to the SC, product development teams, modification or improvement to suit firm's SC at different stages of the life cycle. This is in agreement with Hines (2004) who supports all the above factors.

Design for the Environment Practices

Still on the SC Design Practices, the researcher further sought to establish the extent to which the firms used the design for Environment Practices in enhancing their businesses. Respondents were asked to indicate on a Likert scale (1 - Very Great Extent, 2 - Great Extent, 3 - Moderate Extent, 4 - Small Extent and 5 - Very Small Extent), and the results were as shown in the table below:

Table 8: Design for the Environment Practices

Design for the Environment Practices	Mean	Std. Dev.
The firm has aligned its SC with customer preferences such that products are available as per the customer demands	1.30	.571
The firm has ensured that spoilt or expired milk is returned to the firm for disposal	1.41	.644
The firm has ensured the practice of green SC (practices that reduce waste and pollution)	1.46	.558
The firm has considered existing trading terms in the management of its SC	2.11	.737
The firm has ensured that it collaborates with cross-functional firms (firms carrying out different functions)	2.16	.727
The firm has ensured that packaging materials are recycled	2.44	1.182
Overall mean and standard deviation	1.813	0.736

Source: Research data (2014)

From the results in Table 4.6 above, the design for Environment Practices is used to a very great extent (M =1.813, Std. Dev.0.736) as indicated by the six factors which include: alignment of SC with customer preferences, return of spoilt/expired milk to the firm for disposal, practice of green SC, consideration of existing trading terms in the management of firm's SC, collaboration with cross functional firms and recycling of packaging materials. This is in agreement with Easty and Winston (2006) who advocates for an environment free from pollution. It is also in line with Blanchard (2010) who supports the 'Going green' concept that entails making environmentally friendly choices that help reduce waste and pollution.

Factor Analysis of SC Design Practices

The factor analysis carried out was to reduce data into key information that was to guide in its method of data reduction. The variability in the variables that have been accounted for in this study is given in form of communalities. Small values indicate variables that do not fit well with the factor solution, and should possibly be dropped from the analysis and once they are dropped what remains will be for the factors to be tested and thus the table below:

Table 9: Communalities – Supply Chain Design Practices

Communalities – Supply Chain Design Practices	Initial	Extraction
The firm has ensured that product changes are implemented with minimum disruption to the SC	1.000	.852
The firm's products require modification or improvement to suit its SC at different STAGES of their life cycle	1.000	.791
The firm has ensured business collaboration with other firms e.g. outsourcing some services and products	1.000	.790
The firm has designed risk mitigation plans for low-volume parts to avoid excess inventories or reduction service levels when technology is going end of life	1.000	.785
The firm has made available products that are designed to transition out old technology while introducing new technology	1.000	.763
The firm has ensured the practice of green SC (practices that reduce waste and pollution)	1.000	.713
The firm has made available product development teams that are used throughout the product's life cycle	1.000	.709
The firm has ensured that spoilt or expired milk is returned to the firm for disposal	1.000	.701
The firm has ensured that its design for demand and supply planning gives customers flexibility in choosing exactly the services they desire	1.000	.682
The firm has ensured that it can take in extra milk when there is excess supply	1.000	.675
The firm has ensured that it collaborates with cross-functional firms (firms carrying out different functions)	1.000	.630
The firm has ensured that packaging materials are recycled	1.000	.604
The firm has ensured that it can meet customer demand even when there are changes in the amounts of products ordered	1.000	.480
The firm has observed environmental regulations e.g. ISO 1400 which advocates for environment free from pollution	1.000	.435
Extraction Method: Principal Component Analysis.		

Source: Research data (2014)

Communalities in the column labeled 'extraction' reflect the common variance in the data structure. Therefore, 85.2% of the variance relating to the firms has shown that "product changes are implemented with minimum disruption to the SC" is a common variance. Similarly, 79.1% of the variance in the "firms' products require modification or improvement to suit their SC at different stages of their life cycle" comes from a second variance.

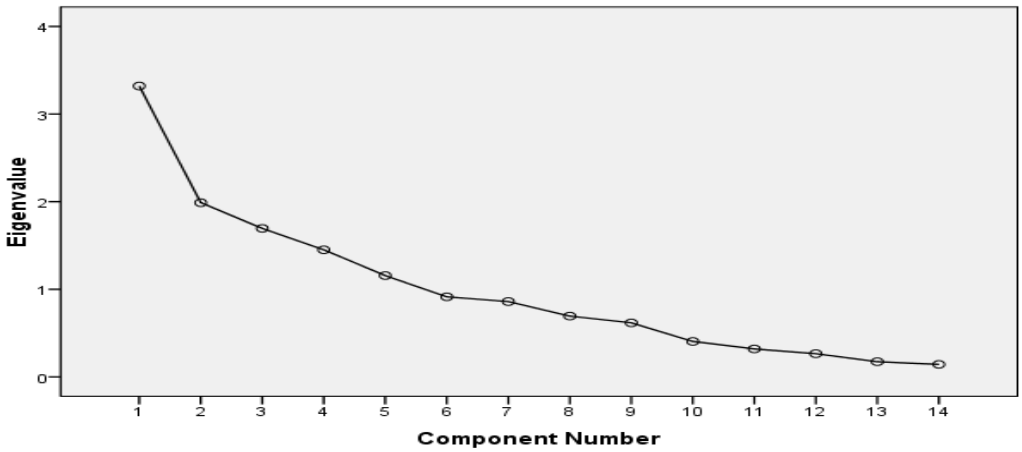
Table 10: Supply Chain Design Practices (Total Variance Explained)

Component	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.320	23.715	23.715	3.320	23.715	23.715
2	1.988	14.202	37.917	1.988	14.202	37.917
3	1.695	12.108	50.024	1.695	12.108	50.024
4	1.451	10.362	60.387	1.451	10.362	60.387
5	1.156	8.260	68.647	1.156	8.260	68.647
6	.914	6.529	75.176			
7	.860	6.143	81.319			
8	.694	4.956	86.275			
9	.617	4.407	90.681			
10	.404	2.889	93.570			
11	.319	2.281	95.851			
12	.265	1.892	97.744			
13	.173	1.236	98.980			
14	.143	1.020	100.000			
Extraction Method: Principal Component Analysis.						

Source: Research data (2014)

Table 10 shows that the first five factors explain a total of 68.647% of the total variance, and this shows their significance in the analysis. Since these five factors have all factors with Eigen values greater than 1, they are used in further analysis. The rotation has the effect of optimizing the factor structure and one consequence for these data is that the relative importance of the five factors is equalized. For example factor, one before rotation accounted for 23.715% of the variance and after rotation it accounted for 23.715% of the variance.

Figure 1 Scree Plot: Supply Chain Design Practices



Source: Research data (2014)

Figure 1 above shows the Scree Plot with an inflexion point after the 9th component. This shows that for Supply Chain Design Practices, we could justify the retention of the nine (9) components for further analysis.

Table 11 Rotated Component Matrix - Supply Chain Design Practices

Rotated Component Matrix - Supply Chain Design Practices	Component				
	1	2	3	4	5
The firm has ensured that its design for demand and supply planning gives customers flexibility in choosing exactly the services they desire	-.242	.673	.241	-.270	-.198
The firm has ensured that it can meet customer demand even when there are changes in the amounts of products ordered	-.562	.289	-.090	.267	.036
The firm has ensured that it can take in extra milk when there is excess supply	-.547	.478	-.109	.286	-.231
The firm's products require modification or improvement to suit its SC at different STAGES of their life cycle	.799	.038	.034	-.277	.271
The firm has made available product development teams that are used throughout the product's life cycle	.369	.670	.271	-.166	.152
The firm has ensured that product changes are implemented with minimum disruption to the SC	.499	.146	-.445	.466	.409
The firm has made available products that are designed to transition out old technology while introducing new technology	.241	.463	-.546	-.174	-.403
The firm has designed risk mitigation plans for low-volume parts to avoid excess inventories or reduction service levels when technology is going end of life	.591	.229	.329	.274	-.447
The firm has ensured the practice of green SC (practices that reduce waste and pollution)	-.691	.045	.372	.128	.281
The firm has ensured that spoilt r expired milk is returned to the firm for disposal	-.422	.273	-.536	-.015	.401
The firm has ensured that packaging materials are recycled	.175	.635	.168	-.050	.374
The firm has ensured business collaboration with other firms e.g. outsourcing some services and products	.237	.038	.599	.598	.132
The firm has observed environmental regulations e.g. ISO 1400 which advocates for environment free from pollution	-.642	.004	.122	.059	-.067
The firm has ensured that it collaborates with cross-functional firms (firms carrying out different functions)	.247	.073	-.333	.647	-.187
Extraction Method: Principal Component Analysis. a. 5 components extracted.					

Source: Research data (2014)

This is achieved by looking at the unobservable or latent variables that are seen as manifest variables in observed variables.

Table11: Supply Chain Design Practices

	Design for the Product Practices
F1	The firm has ensured that the milk products are aesthetically pleasing and fashionable
F2	The firm has ensured through research that the milk product designs/varieties consider consumers' preferences
F3	The firm has used different product characteristics in its product SC design
F4	The firm has ensured that its product design practice embraced/considered predictable demand
F5.	The firm has ensured that its product design practice embraced/considered a long product life cycle
F6.	The firm, in its product design practice embraced/considered thin contribution margin (small increases in profit)
	Design for Customer Practices
F7	The firm has aligned its SC with customer preferences such that products are availed as per the customer demands
F8	The firm focuses on Customer Relationship Management (CRM) as a marketing strategy
F9	The firm has determined customer responsiveness to its services (feedback) through market research
F10	The firm has ensured that different customers are served through different distribution channels
F11	The firm has considered existing trading terms in the management of its SC
	Design for the Market Practices
F12	The firm has focused on existing markets for business growth and expansion
F13	The firm has focused on establishing itself in new markets for business growth and expansion
F14	The firm has served its customers according to various market segments
F15	The firm has considered how products are manufactured, sold and transported to respective markets in serving various customer markets
F16	The firm has incurred costs associated with imbalance of demand and supply (market mediation costs)
	Design for Profitability Practices
F17	The firm has focused on management of total SC costs (costs of sourcing, manufacturing and distribution) to acquire profitability

F18	The firm has focused on management of lead time costs (period between when an order is placed up to when it is received) to acquire profitability
F19	The firm has controlled product price increases to ensure increased sales
F20	The firm has strategized on sales volume increases to acquire profitability
F21	The firm has balanced supply with demand for milk and other products
F22	The firm's lead time constraints have increased costs of availing products to customers e.g. delivering a product earlier than firm's scheduled time increases cost.
F23	The firm has made available product offers that attract new buyers even in saturated markets
F24	The has ensured that different departments concentrate on their respective functions for effectiveness and efficiency
	Design for the Supply Chain Practices
F25	The firm has ensured that its product configurations address infrastructure limitation throughout the products' life
F26	The firm has ensured that its SC offers highest performance at the lowest overall cost for sustainable differentiation
F27	The firm has made available products that require inventories in large stocks to maintain service levels.
F28	The firm's SC requires reduction in complexity
F29	The firm has ensured that suppliers deliver raw milk to production facilities/collection centers on time and in good condition.
F30	The firm has made available product offers that attract new buyers leading to increased sales
F31	The firm has ensured that its design for demand and supply planning gives customers flexibility in choosing exactly the services they desire.
F32	The firm has ensured that it can meet customer demand even when there are changes in the amounts of products ordered
F33	The firm has ensured that it can take in extra milk when there is excess supply
	Design for Life Cycle Practices
F34	The firm's products require modification or improvement to suit its SC at different STAGES of their life cycle.
F35	The firm has made available product development teams that are used throughout the product's life cycle.
F36	The firm has ensured that product changes are implemented with minimum disruption to the SC.
F37	The firm has made available products that are designed to transition out old technology while introducing new technology
F38	Firm has designed risk mitigation plans for low-volume parts to avoid excess inventories or reduced service levels when technology is going end of life
	Design for the Environment Practices
F39	The firm has ensured the practice of green SC (practices that reduce waste and pollution)
F40	The firm has ensured that spoilt or expired milk is returned to the firm for disposal
F41	The firm has ensured that packaging materials are recycled
F42	The firm has ensured business collaboration with other firms e.g. outsourcing some services and products
F43	The firm has observed environmental regulations e.g. ISO 1400 which advocates for environment free from pollution
F44	The firm has ensured that it collaborates with cross-functional firms (firms carrying out different functions)

Source: Research data (2014)

Component 1 loads highly with the factors: The firm's products require modification or improvement to suit its SC at different stages of their life cycle and the firm has ensured the practice of green SC (practices that reduce waste and pollution). Component 2 loads highly with the factors: The firm has ensured that its design for demand and supply planning gives customers flexibility in choosing exactly the services they desire and the firm has made available product development teams that are used throughout the product's lifecycle. Component 3 loads highly with the factor: The firm has ensured business collaboration with other firms e.g. outsourcing some services and products and the firm has made available products that are designed to transition out old technology while introducing new technology. Component 4 loads highly with the factor: The firm has ensured that it collaborates with cross-functional firms (firms carrying out different functions), and the firm has ensured business collaboration with other firms e.g. outsourcing some services and products. Component 5 loads highly with the factors: The firm has designed risk mitigation plans for low-volume parts to avoid excess inventories or reductions in service levels when technology is going end of life and the firm has ensured that product changes are implemented with minimum disruption to the SC.

Regression on the Relationship between SC Design Practices and Performance

Table 13 - Regression Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.548a	.301	.088	239636086.234
Predictors: (Constant), The firm, has ensured the practice of green SC (practices that reduce waste and pollution), The firm has focused on management of total SC costs (costs of sourcing, manufacturing and distribution) to acquire profitability, The firm has focused on establishing itself in new markets for business growth and expansion, The firm has ensured that its SC offers the highest performance at the lowest overall cost for sustainable differentiation, The firm focuses on Customer Relationship Management (CRM) as a marketing strategy, The firm has ensured through research that the milk product designs/varieties consider consumers' preferences, The firm's products require modification or improvement to suit its SC at different STAGES of their life cycle				

Source: Research data (2014)

This first table of Dependent variable 'Business Performance 2010' against the other predictors above especially to quantity the variance that can be explained by the above predictor variables. The first statistic that is 0.548 is the multiple correlation coefficients between all of the predictor variables and the dependent variable (Profit 2010). The model value of 0.548 indicates that there is a great deal of variances shared by the independent variables and the dependent variable. R Square is simply the squared value of R that describes the goodness-of-fit or the amount of variance explained by the above set of predictor variables. In our case, the value 0.301 indicates that the independent variables explain 30.1 % of the variance in the dependent variable in the model. This shows that for the above case the business performance for the year 2010 is explained by 55% of the above predictor variables of the Supply Chain Design Practices.

Table 14: Coefficients **of SC Design Practices**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-730709051.281	450651441.189		-1.621	.119
The firm has ensured through research that the milk product designs/varieties consider consumers' preferences	-58166633.909	90904775.144	-.152	-.640	.529
The firm focuses on Customer Relationship Management (CRM) as a marketing strategy	128240234.867	78855491.233	.358	1.626	.118
The firm has focused on establishing itself in new markets for business growth and expansion	152082092.670	70124490.029	.497	2.169	.041
The firm has focused on management of total SC costs (costs of sourcing, manufacturing and distribution) to acquire profitability	55136200.219	73148111.580	.157	.754	.459
The firm has ensured that its SC offers the highest performance at the lowest overall cost for sustainable differentiation	695321.348	73991225.312	.002	.009	.993
The firm's products require modification or improvement to suit its SC at different STAGES of their life cycle	85158240.394	48904738.320	.480	1.741	.095
The firm has ensured the practice of green SC (practices that reduce waste and pollution)	47026897.553	103320966.601	.106	.455	.653
a. Dependent Variable: Business Performance _ 2010					

Source: Research data (2014)

The coefficients table provides information about the effects of individual variables. The unstandardized coefficients indicate the increase in the value of the dependent variable for each unit increase in the value of the predictor variable. The standardized coefficients or beta are based on data expressed in the standardized or Z-score form. In our case we can see that "The firm has focused on establishing itself in new markets for business growth and expansion" is a more predictor variable (0.497) as compared to the variable "The firm's products require modification or improvement to suit its SC at different stages of their life cycle" (0.40).

Summary of the Findings

The study found out that firms have invested resources to ease the movement of products to the point of consumption and also have used the SC as a strategic weapon to beat the level of competition in the milk industry. Respondents agreed that the firms incorporated suppliers and customers in their service delivery, quality and feedback. Increasing competitive pressures drive companies to focus on core competencies for their competitiveness. Consumer demand for superior service, increased value, and competitive price bring greater pressure for efficiency gains and performance improvement ever. From the findings the cost of raw materials in the processing of the milk greatly influenced the design of the firms SC design process and that the actions of competitors in the milk industry have influenced the design of the firms' SC design process, the level of customer demand influenced the design of the firms' SC design process. Formal relationships and collaborative partnerships with key suppliers and customers influenced the design of the firms SC design process. Companies need a strategy for managing all the resources that go toward meeting customer demand for their product or service.

Considering that milk and its products are perishable, the SC should be designed to bring out efficiency and effectiveness. The study also found that firms ensured their products design practice embraced/considered a long product life cycle, embraced/considered thin contribution margin (small increases in profit), the firms also embraced/considered predictable demand and that milk products are aesthetically pleasing and fashionable. Product lifecycle, which is continually getting shorter in response to the speed of change in technology, fashion, and consumer product trends, affects the predictability of demand and market mediation costs. The design for life cycle puts all these into consideration to ensure effectiveness and efficiency. Milk processing firms have ensured that different customers are served through different distribution channels. The firms also determined customer responsiveness to their services (feedback) through market research and considered existing trading terms in the management of their SC. The firms also aligned their SCs with customer preferences such that products are available as per the customer demand.

On design for the market practices, the study found out that the firms incurred costs associated with imbalance of demand and supply (market mediation costs) to a great extent, the respondents also greatly agreed that the firms considered how products were manufactured sold and transported to respective markets in serving various customer markets; the firms also focused on establishing themselves in new markets for business growth and expansion, the firms focused on existing markets for business growth and expansion. A good supply chain design helps firms to understand agility required to serve the customer cost-effectively and to segment the supply chain response to deliver the required strategy. It helps build closer relationships with customers and suppliers. It facilitates smooth flow of materials and products. Lead time is reduced. Opportunities to improve profits are identified; decision making supports the profitability of the entire company. Alternate strategies are compared quantitatively, and cost tradeoffs are modeled accurately.

On design for profitability practice, the firms' lead time constraints increased costs of availing products to customers, for example delivering a product earlier than firm's scheduled time increased cost. The firms balanced supply with demand for milk and other products; the firms controlled product price increases to ensure increased sales and they strategized on sales volume increases to acquire profitability. On design for life cycle practices, the study found that the firms' products required modification or improvement to suit their SCs at different stages of their life cycles to a great extent as shown by a mean score of 2.74, the firms made available product development teams that were used throughout the product's lifecycle to a great extent as shown by a mean score of 2.46. The firm also designed risk mitigation plans for low-volume parts to avoid excess inventories or reduction in service levels when technology was going end of life and also the firm ensured that product changes were implemented with minimum disruption to the SCs, the firms made available products that were designed to transition out old technology while introducing new technology. The firms ensured packaging materials were recycled and that there existed collaboration with cross functional firms (firms carrying out different functions). The firms also ensured that spoilt or expired milk was returned to the firms for disposal, the firms aligned their SCs with customer preferences such that products were available as per the customer demands. Some of the challenges in the milk processing firms included: ensuring that all products in the firm's local dairy case were fresh, safe, and produced in the most efficient and environmentally-friendly way.

Conclusions

From the research findings, the study concludes that SC design helps companies understand where the value is being created and destroyed. The study also concludes that a good supply chain design helps firms to understand agility required to serve the customer cost-effectively and to segment the supply chain response to deliver the required strategy. It helps build closer relationships with customers and suppliers. It facilitates smooth flow of materials and products. Supply chain design deploys assets in ways that enhance profitability and shareholder value. Market and sourcing strategies that generate the best financial performance, optimal number of plants, warehouses and distribution centers are considered to maximize long-term profit. Also, the study concludes that SC design practices are strategies tailored to suit and enable deployment of assets in the most profitable ways for optimal operational and financial performance in the SC of a firm. There should be a clear sequence of events in designing an effective SC beginning with market and product strategy. This refers to aligning SC infrastructure with customer demands. According to Lee (2004), a for the design of SCs, a great deal of useful customers and demand information is captured and processed as well, which must be aligned with the customer demands. The design is done as per the voice of the customer. Understanding the processes that consumers and businesses use to make purchase decisions is critical to the development of long-term mutually beneficial relationships with customers. SC is designed to get the product to the right place at the right time in the right quantities at the lowest possible cost all for the convenience of the customer. The study also concludes that SC design practice for the customer considers the specific channels that various customers are going to be served, their needs and existing trading terms.

Recommendations and Suggestions for Further Study

The study recommends that SCs should be designed according to different product characteristics. Innovative products require a responsive SC, and functional products require an efficient one. The study also recommends that in order to have a successful SC in terms of total SC costs and service performance to the customer, companies need to design their SCs such that they match the type of products they are selling with the type of distribution channels delivering them. The study further recommends that performance measures are a critical factor for effective management. It is important to measure performance to determine achievement of goals and alignment of objectives with organizational strategy. This study investigated supply chain design practices and business performance among milk processing firms in Kenya. Further studies should be done on supply chain design practices and business performance in other firms in Kenya.

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