SUPPLY CHAIN DESIGN DECISIONS AND OPERATIONAL PERFORMANCE OF LARGE MANUFACTURING FIRMS IN KENYA

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DECLARATION

I declare that this research project is my original work and has not been submitted to any institution for any award of diploma or degree.

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

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D61/74336/2014

DECLARATION BY THE SUPERVISOR:

This research project has been submitted for examination with my approval as University supervisor.

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

MR. MICHAEL K. CHIRCHIR

UNIVERSITY SUPERVISOR

DEDICATION

I dedicate this work to my lovely parents Mr. and Mrs. Mwilitsa, and friends, for their emotional and financial support, encouragement and their inspiration throughout my studies.

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I would like to pass my sincere gratitude to Almighty God for the guidance through the whole process. My gratitude to The Nairobi University for giving a chance to pursue the degree in Master of Business Administration. Thanks to my supervisor, Mr. Michael Chirchir of School of Business for making my work to be successful. I appreciate the support of my family, friends and classmates for their big encouragement in doing the work.

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ABBREVIATION AND ACRONYMS

GDP - Gross Domestic Product

GOK - Government of Kenya

ISO - International Organization for Standardization

KAM - Kenya Association of Manufacturers

KIPPRA - Kenya Institute for Public Policy Research and Analysis

KNBS - Kenya National Bureau of Statistics

PDT - Product Development Teams

RBV - Resource Based View

SC - Supply Chain

SCD - Supply Chain Design

SCM - Supply Chain Management

TQM - Total Quality Management

WIP - Work in Process

ABSTRACT

The study sought to examine supply chain design decisions and operational performance of large manufacturing firms in Kenya. The study was guided by three specific objectives which were to establish the extent to which supply chain design decisions are implemented by large manufacturing firms in Kenya; to determine the relationship between supply chain design decisions and operational performance of large manufacturing firms in Kenya and to find out the challenges faced in the implementation of supply chain design decisions by large manufacturing firms in Kenya. The study used descriptive cross-sectional design. The study targeted 455 large manufacturing firms in Kenya and a sample of 98 was obtained. Primary data was collected using a questionnaire. Data was analysed using descriptive statistics with the use of Statistical Package for Social Sciences (SPSS). The study found out which supply chain design decisions are implemented by large manufacturing firms in Kenya. All the variables were found to have a positive influence on performance of large manufacturing firms in Kenya with customer relationship having the highest effect followed by inventory control, then flexibility, product design and finally postponement. The study found that the firms face challenges such as lack of proper coordination within the supply chains and poor integration of decisions along the supply chains. This study recommends that manufacturing firms should strengthen their supply chain management by putting greater effort to the implementation of some key best practices. This should be done by keeping all practices updated. Monitoring and further improvements for specific supply chain decisions that showed a moderate extent of application should be done to ensure full adoption and appreciation of these practices. The study involved a large sample size and it was extremely tedious and time consuming. The study also faced financial limitations. The study recommends that future studies can be conducted on the same topic that is to examine supply chain design decisions and operational performance but they should use different sectors other than manufacturing which was used in this study to achieve possible generalization of the results.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Competitive pressures in the markets have driven firms to adopt the implementation of supply chain design to minimize supply chain costs. Firms adopt extensive perceptions, outside their limits and restructure their supply chain to improve product quality and production efficiency (Baiman, Fischer & Rajan, 2001). Managers in manufacturing firms are therefore managing supply chains by coming up with optimal supply chain design decisions. By streamlining supply chain design, firms will gain competitive advantage, improved customer service levels, reduction in inventory cost, increased productivity and economies of scale. The concept of supply chain design plays a critical role of not only delivering the most ideal platform to enable the operations of a competent and well-structured supply chain management but also bridging the connection between the strategies and the operationalization of supply chain (Sharifi, Ismael & Reid, 2006).

The supply chain design enables a firm to be in a position to know how to deploy its assets to enhance a better operational and financial performance and impacts on the ability of the firm to compete in the market. Thus, the creation and improvement of teams with interrelated roles helps the organization to align process-oriented arrangements and thereby achieving an efficient flow of resources. These teams stimulate improved supply chain efficiency by reducing the departmental restrictions and therefore, eliminating the demerits of distinctive commitment. Supply chain design is a source of competitive advantage as competition between organizations has slowly shifted to supply chains competition (Reeve & Scrinivasan, 2005).

Resource-based view (RBV) emphasizes that important determinants of competitive advantage and performance are firm's resources. According to Barney (2001) firms consists of a collection of heterogeneous resources which lead to competitiveness. The theory explains that amount of resources employed by an organization to implement supply chain design determines its success. Another theory is goal setting theory. Firm implements its practices based on the appropriate goals it seeks to achieve.

1.1.1 Supply Chain Design Decisions

The supply chain management concept signifies the progressive process of development and evolution of the procurement and purchasing processes in the corporate environment. According to Helen & Juttner (2000), a supply chain is the harmonised connection of mutually dependent organisations as well as self-governing market-sensitive enterprises. The supply chain comprises of the stakeholders in a given market setting such as producers, merchants, transporters, warehouses, retailers, and customers (Chopra & Meindl, 2007). If a firm using high cost suppliers tries to venture into a marketplace, where only low costs decide who acquires a tender, the firm will face quite a number of challenges.

Fine, (2000) defines supply chain design as a way of selecting skills and competences to capitalise in, develop and implement with consideration of suppliers' growth. This supply chain design is also a determination of how well supply chains can be structured to sustain and improve the valuation and objectives of the organization. Therefore, it is a proactive methodology of attending to clients relative to pursuing their ever-changing desires. Through the utilisation of promotion and procurement approaches that lead to a better financial performance, expansion of production plants,

increased number of warehouses as well as the dissemination centres are considered to capitalize on the long-run profitability of an organisation (Alexandre, 2008). The supply chain design decisions are long-term and it's expensive to reverse and is based on the mode transportation of products, locations and capacities of facilities, information systems and the products made and stored at different locations.

Vonderembse, Uppal, Huang & Dismukes (2006), established the diverse features of design which are the organizational arrangement, the method of selecting suppliers, the portfolio policies, time between customer orders and delivery , the production focus, product design plan, market demand designs and the capabilities of human resources. The SC design decisions covered in this study were: Customer relationship management, product design, Flexibility, inventory control and postponement. Designing an effective supply chain needs a clear sequence of events starting with market and product strategy (Wight and Kelly, 2012).

1.1.2 Operational Performance

Operational performance is the performance of an organization against its set standards such as waste reduction, productivity, cycle time, environmental responsibility and regulatory compliance (O'Brien, 2009). Operational performance focuses on improving efficiency and effective systems which are reliable and can ensure excellent which exceed customer expectations. The operational performance can be appraised by its dimensions which are customer satisfaction, capacity utilization, product quality, and return on investment, supply chain cost, responsiveness, operational flexibility, sales and market growth and margin on sales. Performance measurement networks are hence developed to monitor and maintain

operational control which is the process that ensures a firm is able to pursue action with a purpose of achieving the overall objectives and goals (Hubbard, 2009).

Performance is the combination of both the financial and the non-financial elements which categorise the results of a project in consideration to the pre-set objectives (Lebans & Euske, 2000). Performance management and measurement brings up any incorporated, methodical strategy used to expand firm's performance, realise pre-set goals and stimulate the mission and principles of an organisation (Salem, 2003). Effectiveness is the extent to which customers' requirements are met that is doing the right things, while efficiency is defined as a degree of how well economical firms' assets are utilized that is doing things right first time and always. Efficiency, effectiveness productivity and quality impact should be measured (Oakland, 2000).

Firms need cross-functional and cross-firm relationships to maximize information sharing, close partnering and coordination for it to ensure effective coordination of operational activities in the supply chains (Leuschner, Rodgers & Charvet, 2013). Mutunga (2014) study states that for a firm to achieve an efficient SC, that is, minimum total SC costs and an excellent customer service delivery performance, their SCs should be designed such that their products match the channels of distribution they employ to deliver these products. Additionally, these SCs performance should be measureable so as to help determine their effectiveness in achieving the goals of the firm.

1.1.3 Large Manufacturing Firms in Kenya

Kenya's manufacturing sector includes the transformation of cultivated raw supplies into consumable final products. Sugar refining, milling of wheat flour and cornmeal, tea and coffee processing, fruit and meat canning are all examples of agricultural manufacturing activities carried out in Kenya. Vehicle assembling, production of electronics, processing of cement and soda ash are also part of activities found in the manufacturing sector in Kenya. Manufacturing sectors has influenced the country's growth in various sectors of its economy hence improving its competitiveness globally

Manufacturing firms fall under the umbrella of Kenya Association of Manufacturers (KAM). The manufacturing sector contributes 70 % to Kenya's GDP as indicated by KIPPRA (2017). The manufacturing sector, on average, accounts for 66.0 per cent of the industrial sector's real GDP and 10.7 per cent of national GDP (KNBS, 2017). According to (UNIDO, 2015), manufacturing sector in Kenya compares favourably with other countries such as Uganda and Tanzania whose GDP share is less than 10%. Growth in manufacturing sector in Kenya is mainly enhanced by manufacture of tobacco, food and beverages which recorded 6.5% growth in 2011-2016 as compared to 2.3% in the same period in non-food sub-sector (KIPPRA, 2017).

Manufacturing sector is a major of source employment in Kenya both locally and globally. It currently employs 300,900 people, who represent 11.8% of the total formal employment, (KNBS, 2017) and another 2.5 million jobs in the informal sector accounting to 88.2% of the total jobs in the manufacturing sector. Manufacturing in public sector accounts for 26, 600 jobs while the private sector creates 274,300 jobs (KNBS, 2017). Informal sector however, is a major contributor to employment that

grows by 6.5% in 2016 to 2.7 million persons. KIPPRA (2017). However, exports improved to KSh 63.1 billion in 2016 which signified 3.7 per cent rise while local trades rose to KSh 5.6 billion from KSh 4.0 billion in 2015 (KNBS, 2017).According to KIPPRA, (2017) major manufactured exports are food, chemical, on-metallic, metal, textiles, pharmaceuticals and botanical products. The manufactured products which are consumed locally are estimated 82% while those exported locally is 6.1% and those exported to the rest of the world is 12%.

Nonetheless, Kenya's manufacturing sector faces a number of challenges which include: plant and equipment are out dated, overvalued and inefficiently used, the cost of doing business in Kenya is high due to corruption and poor infrastructure, currency is unstable, insecurity, political uncertainty and investment levels are low and declining (World Bank, 2008). Firms generally face a number of challenges in their operations within the supply chains which hinder them from being competitive in the market if they do not put into consideration designing their supply chains accordingly. The problems may include: poor coordination of efforts, incompatible information systems, customer service issues, having lower than the optimal profits, communication problems between departments and external partners and excessive waste and environmental degradation (Fawcett, Ellram & Ogden, 2007).

Moreover, lack of alignment between business goals and information technology is also among the issues in the supply chains. The EPZs in this sector also face challenges such as unfavourable custom regulation, shortage of raw materials for immediate inputs, high costs of electricity and shortage of land to develop industries (EPZ Authority, 2015). For manufacturing firms to handle uncertainties and demand in the market they need to focus on becoming efficient and effective in manufacturing methods.

1.2 Research Problem

SCD, which is a demanding and complex process, is amongst the major challenge facing the manufacturing organizations (Fawcett et al 2007). For achievement of an improved performance, supply chain design and management aims at obtaining optimal global performance. Managers in the manufacturing industries are therefore trying to manage the supply chains by coming up with appropriate SCD decisions and planning resolutions. According to Graves & Willems, (2004) SCD decisions are categorized into; traditional design, decisions that permit reaction to ambiguity and unpredictability, product and process design resolutions.

Globalization and intense competition of supply chains has forced manufacturing firms to look for better manufacturing methods to remain competitive. Therefore, supply chain design practices play a major role on their performance despite the nature of competition in the market they operate in both locally and globally. It is thus, important for the manufacturing sector in Kenya to adopt implementation of supply chain design decisions to improve overall performance of the firm. According to Awino, (2002), manufacturing industry in Kenya has an important role in the country's growth in the general economy which leads to improvement in the global competitiveness. An organization should be in a position to address the wants of its consumers, select the most appropriate supply chain approach and ensure that the supply chain structure is configured. According to Vonderembse et al. (2006), organizational structure, lead time and manufacturing focus, choosing suppliers, inventory strategy demand patterns, product design strategy and human resources are the distinct aspects of a design.

Several studies that related to the supply chain design decisions and performance have been done. Meixell & Gargeya (2005) studied research works previously conducted on the commonly used supply chain design internationally. They found out that global supply chains have unique risks such as regulatory environment changes, political instability and currency exchange rates which impact the performance. Jacobus (2010) carried out a study on formulating a theoretical structure to analyse the SCD practices. The study found out that a conceptual framework can be utilised in the analysis of a firm's SCD practices respectively. Dreyer, Strandhagen, Thomassen, Romsdal & Gran (2014) carried out the study on supply chain design and mechanism principle in food industry in Norway. The study revealed that companies should ensure that they design their supply chains in order to gain better market access and should develop generic designs to enhance its performance. Other studies on SCD were by Govindan, Fattahi & Keyvanshokooh, (2017) whose study provided a comprehensive review and future research directions on supply chain network design under uncertainty. The paper reviewed studies on optimization approaches which are developed for designing SC, closed-loop supply chain and reverse logistics networks under uncertainty.

Locally, Magutu (2013) conducted a study on SC strategies, technology and performance of large-scale manufacturing firms in Kenya. His study set out to examine the impact of technology in the association concerning SC approaches and the overall performance of a firm. The research found out that there is a relationship between the SC strategies and the performance of the firm. Mutunga (2014) carried out a study on the supply chain design strategies and the commercial activities of milk processing industry. This study identified a connection between the supply chain design practices and the business performance though it failed to provide information

on the operational performance on large manufacturing firms in Kenya as the current study. Ambehi (2016) conducted a research study on factors affecting supply chain integration in large-scale manufacturing companies in Kenya. Her study found an existing strategic partnership between large manufacturing firms and suppliers. The study stated factors such as technology, supply chain relationships, environmental uncertainty, flexibility and quality. It also found out that there should be a cross-functional integration in supply chain and firms should maintain a long-term relationship with their suppliers to meet their customers' needs effectively.

Although most of these studies focused on strategies and overall supply chain design and performance in different sectors in the industry there was a gap on supply chain design decisions and operational performance of large manufacturing companies in Kenya. The research aimed to provide answers to the following research questions: To what extent is supply chain design decisions implemented by large manufacturing firms in Kenya? What is the relationship between supply chain design decisions and operational performance of large manufacturing firms in Kenya? What are challenges faced in the implementation of supply chain design decisions by large manufacturing firms in Kenya?

1.3 Research Objectives

The objectives of this study were:

i) To establish the extent to which supply chain design decisions are implemented by large manufacturing firms in Kenya.

ii) To determine the relationship between supply chain design decisions and operational performance of large manufacturing firms in Kenya.

iii) To find out the challenges faced in the implementation of supply chain design decisions by large manufacturing firms in Kenya.

1.4 Value of the Study

The findings and conclusions will be important to the stakeholders of the large manufacturing industry. It will give information and knowledge on the implementation of the supply chain design practices to improve the operational performance of large manufacturing firms. The study was valuable to the government and regulators of manufacturing industry in Kenya. The results obtained by the study will help the government to enact policies that supports manufacturing companies to effectively implement their supply chain design decisions to boost their operational performance.

Other firms will also gain from this study as they will learn on the importance of designing their supply chain accordingly for them to be competitive in the market. It will impact on implementation of their supply chain design decisions respectively which will enable the firms to comprehend the importance of efficiently deploying their financial assets for an ideal functioning and profitability.

The study may also provide further studies in the formulation and application of the supply chain design in firms for global competitiveness and better overall performance. Academicians and researchers may also use the findings from this study as a point of reference when conducting their own research and conducting further research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this chapter, the theoretical framework, supply chain design practices, empirical literature review, challenges in implementation of supply chain design decisions and conceptual framework will be discussed.

2.2 Theoretical Framework

The theoretical perspectives that have been employed by scholars in both developed and emerging economies that are relevant to supply chain design and operational performance are Goal Setting Theory and Resource Based Theory. These are discussed next.

2.2.1 Goal Setting Theory

According to this theory there is an evident connection between goal setting and enhanced production performance. Locke & Latham (2006) defines a goal as the objective or a duty that an individual knowingly desires to attain. People revise their strategies or raise skills when they find out the current performance is not attaining expected objectives (Locke & Latham, 2006). The goal setting concept is founded on the thought that most of the human behaviours are decisive, they are affected by mindful goals. Goal seeking theory informs the current study that for supply chain design decisions to be implemented successfully, the organization has to have appropriate and achievable goals that it seeks to achieve.

Performance is improved by specific and ambitious goals in comparison to easy or general goals. If an employee accepts a set goal, is capable of attaining it and is not disoriented by goals that conflict, the expected outcome is a positive linear

relationship between goals and performance. The goal seeking theory informed the current study in that for supply chain design decisions to be implemented successfully, the firm has to have a goal that it seeks to achieve. Locke & Latham (2006) suggested five principles of goal setting which include; clarity, challenge, commitment, feedback and task complexity. Their study also states that ambitious goals may enhance appropriate performance than the easy goals. Therefore, in order to implement an effective SCD in firms, generally appropriate and achievable goals should be set.

2.2.2 Resource- Based View Theory

The theory states that the main determinants of competitive advantage and performance are the resources in the firm. Firm's resources may be tangible or intangible such as information and knowledge and need to be processed in bundles in order to drive performance (Newbert, 2007). According to RBV, supply chain is a unique collection of resources which provide participants sustainable competitive advantage. It also explains efficiency gains from effective SCD and enables analysts and participants identify forces that inhibit innovation.

RBV philosophers claim that companies comprise of a pool of varied resources that give rise to competitiveness (Barney, 2001). RBV explains that the firm's competitive advantage is a result of the firm's valued resources that cannot be duplicated, substituted nor imitated by its rival firms. This study was informed by resource based theory in that the amount of resources employed by an organization to implement their supply chain design decisions respectively determines its success.

2.3 Supply Chain Design Decisions

There are numerous Supply chain design decisions that a firm can implement. Supply chain design decisions covered in this study were customer relationship management, product design, flexibility, inventory control and postponement. They are discussed next.

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 (Collins, Eldranta & Holmenin, 2009). Therefore, close relationships help the organization to get information on their preferences and they become responsive (Vickery, Jayaram, Droger, & Calanton, 2003). Design of a supply chain is concerned on the voice of the customer and it's designed to get the product in the right quantities, place, time and at the lowest cost to the customer (Lysons & Farrington, 2006).

Manufacturing firms should design their products considering their customer needs. If a product is designed poorly it increases the cost for redesign and release to the customers is slow. Long supply chain lead times, product availability and poor component greatly affect the performance of the supply chain as well as the time it takes to reach the market (Monczka, Trent & Handfield, 2005). Design for the product is when a product is intended to be SC responsive to possible constituents or organisational variations throughout its lifespan. Product Development Teams (PDTs) dictate what components of a product are changeable all the way through the product's lifecycle with least effect in the SC design (Mutunga, 2014). According to Christopher & Towil, (2001) new products need a more responsive SC while the older products need more efficient supply chain.

Flexibility involves supply chain flexibility dimensions such as the flexibility of the product which is defined as the capacity of a firm to timely produce numerous innovative designs within a minimum cost, sourcing flexibility which is changing the supply of a product based on the demand of the customers, production flexibility which is the capacity to come up with different types of goods and bulk timely and at an efficient cost, delivery flexibility which is defined as the capability of the firm to change the delivery dates to its consumers within a conventional time and cost (Pujawan, 2004). Structural supply chain flexibility comprises of administrative competences which adapt the SCD to respond positively to business environment changes. On the other hand, strategic supply chain flexibility includes the administrative competences to introduce new goods and services to the consumers, strategically changing the supply chain and restructuring value chain through business design and structure. This decision also focuses on the transportation flexibility which involves establishing coalitions with numerous transporters to promptly change carriers in the level of disruption and various route for assurance of smooth flow of materials along the supply chain (Colicchia, Dallari & Melacini, 2010).

Inventory control decisions focuses on how a supply chain maintains its stock in the warehouse. It is basically knowing what product is out there, how much you have each item and where it is. Some companies have transformed to upstream inventory decisions and control from traditional supply chains which inventory decisions are done by downstream nodes. According to Pohlen & Goldsby (2003), vendor managed inventory comprises harmonized management of finished product inventories outbound from a manufacturer, distributor to a retailer or other merchandiser. However, VMI strategy leads to better reaction to unpredictable variations in demand which decreases the bullwhip. Firms who implement the VMI strategy also benefit in

reduction of the manufacturing and transportation costs (Disney, Potter & Gardner 2003).

The last decision is postponement which is the process of moving forward some activities in the supply chain until customer orders are received. According to Vankatesh & Swaminathan (2002), this process entails delaying the conversion of a raw material into an end product which results to a leverage gain from the efficient asset utilization in risk-prone setting. The decision enhances firm's flexibility in producing different versions of a product and to differentiate a product to meet the ever-changing customer needs (Waller, Dabholker & Gentry 2000). Postponement maybe considered in conditions which involve innovative products, little delivery occurrence and markets with high demand improbability.

2.4 Empirical Literature Review

Meixell & Gargeya (2005) studied research works previously conducted on the commonly used supply chain design internationally. The paper sought to review literature for supply chain design problems globally. Their study found out that global supply chains have unique risks such as regulatory environment changes, political instability and currency exchange rates which impact the performance. This research was basically specified on global supply chain design; it did not give information on the specific SCD practices in different sectors such as large manufacturing firms in Kenya as the current study. Nuri, Kim & Bryan (2010) studied the formulation of supply chain with a simultaneous design of product design optimization. The study found out that concurrent optimization provided higher profits and better visibility. However, the study only focused on design for product it did not consider other

supply chain design practices. It was also based in engineering while the current study was in large manufacturing firms in Kenya.

Jacobus (2010) carried out a study on formulating a theoretical structure for analysing the activities involved in supply chain design. He gave an analysis on the phases in the supply chain design which include; Phase 1: the process of identifying and formulating ways to meet the needs of the consumers. Phase 2: choosing the exact supply chain strategy such as minimizing costs and optimizing value. Phase 3: scoping the SC structure that is selecting SC partners, SC drivers and key performance indicators. However, there is need for further research on the conceptual framework for it to be more elaborate and to be specified on other sectors in the economy such as in service industry as the research was basically on conceptual framework used in supply chains of tangible goods.

Tozay (2012) carried out a study on the relationship between design decisions and the location of warehouse in large manufacturing companies in Nairobi, Kenya. The findings of the study were on factors to be determined while locating a warehouse which are; host community, space availability, security and utilities like electricity while those to be determined when designing the warehouse include; availability of space, cost effectiveness, the type of product, safety and accessibility. It also found out that challenges faced by large manufacturing firms in Nairobi, Kenya were; globalization, lack of expertise, poor transportation network and space availability. The research was carried out on warehouse location and design decision the unit of analysis being large manufacturing firms in Nairobi therefore there is need to extent the research on other firms across country.

Magutu (2013) studied the supply chain policies, technology and performance of large manufacturing companies in Kenya. The study's general objective was to establish the association between supply chain strategies and the performance of large manufacturing companies in Kenya and in the process identify the moderating effect of the supply chain technologies and the connection between SC strategies and the profitability of such firms. His study found out that there is a strong correlation between SC strategies, technology and firm performance which make 92.9% of the changes in supply chain performance outcome. It also covered the benefits of SCT implementation in the overall performance of firms. This study focused on supply chain strategies and technology and firm performance it did not specifically consider the operational performance of these large-scale manufacturing companies in Kenya. From this research gap, this study focused on supply chain design decisions and operational performance of manufacturing firms in Kenya.

Mutunga (2014) carried out a study on supply chain design practices and business performance among milk processing firms in Kenya. The aims of her research study included to identify the SC design practices commonly used in milk processing firms in Kenya. Another objective was to determine the nature of the association between supply chain design practices and business performance in milk processing firms in Kenya. Mutunga (2014) study found out that supply chain design practices such as design for the product, design for the market, design for customer, design for life cycle, design for profitability and design for environment have a positive effect on the overall performance of firms. However, the study focused on impact of SCD practices on business performance only it did not focus on operational performance and was based only on milk processing firms in Kenya as a sub-sector therefore; there was

need to research on the supply chain design practices implementation on the whole sector like the manufacturing firms in Kenya.

Dreyer et al. (2014) carried out a study on SC design and control principles in local food production in Norway. The research study analysed logistical challenges facing the way local food chain is designed and controlled such as, producers running production with limited information on demand situation as forecasts are based on the historical sales and experience due to lack of demand information exchange like plans, changes in demand among producer and customers; low volume and capacity restrictions which are seen in deliveries, frequencies and distribution services. This study focused on local food production a sub-sector of manufacturing firms at Norway region, it did not focus on the other sector as a whole in manufacturing firms and it also did not give information based on the supply chain design practices.

Ambehi (2016) studied on factors affecting SC integration in large manufacturing firms in Kenya. Objectives were: to examine the extent of SC integration on large manufacturing firms is influenced; to determine factors that affect integration of SC of large manufacturing firms in Kenya; to establish effects of factors identified in SC implementation on manufacturing firms in Kenya. The study found out that there is a strategic partnership between large manufacturing firms and suppliers and firms should maintain a long-term relationship with their suppliers to meet their customers' needs effectively thus leading to gaining of competitive advantage. The study focused on implementation of supply chain integration in large manufacturing firms therefore there is need for further study on other sectors such as service industry to give clear impact of supply chain integration.

2.5 Challenges in Implementation of Supply Chain Design Decisions

According to Monczka et al. (2003), incorporation of various structures in the global supply chains plays a very important role in competitive strategy as it's difficult to duplicate a well-coordinated global supply chain. Lack of proper coordination of functions within the supply chains is a challenge to most firms (Bellmunt & Torres, 2013). The absence of a proper supply chain coordination may result to recurrent changes in the manufacture programs, delays in the distribution process due to late shipments and transfer of products, unnecessary stock run outs, poor delivery of customer service leading to deteriorating the product's demand.

Meixell & Gargeya (2005) found out matters of the global supply chain design such as high transportation costs due to the distance which leads to prolonged lead time in supply chains. Incorporation of resolutions in the supply chain is another challenge in the implementation of supply chain design. Fawcett, et al. (2007) highlighted the following challenges; variation in cost levels, cultural difference, communication between geographical region, information sharing, technological competence, political and economic stability and delivery reliability which also affects the supply chain designs implementation by manufacturing firms.

Supply chain performance is affected by a number of challenges including environmental uncertainty, technology in terms of manufacturing technology, distribution technology and supply chain technology, flexibility and quality, competition and SC relationships (D`wived & Butcher, 2009). Other factors that influence the supply chain design implementation include; the macroeconomic which is in terms of exchange rates, taxes, custom duties and interest rates will impact the success or the failure of a supply chain network design; political factors also affects

the implementation as it affects the location of the plants as firms prefer to place themselves in a stable state in order to have clarity in terms of trade rules and ownership.

2.6 Conceptual Framework

The independent variables in this study are SCD decisions; Customer relationship management, product design, flexibility, inventory control and postponement. The dependent variable in the study is operational performance indicators which are; customer satisfaction, responsiveness, supply chain cost, operational flexibility, and dependability.

Figure 2.1: Conceptual Model

Independent Variables	**Dependent Variable**
SUPPLY CHAIN DESIGN DECISIONS - Customer Relationship Management - Product Design - Flexibility - Inventory control - Postponement	**OPERATIONAL PERFORMANCE** - Customer Satisfaction - Responsiveness - Supply Chain Cost - Operational Flexibility - Dependability
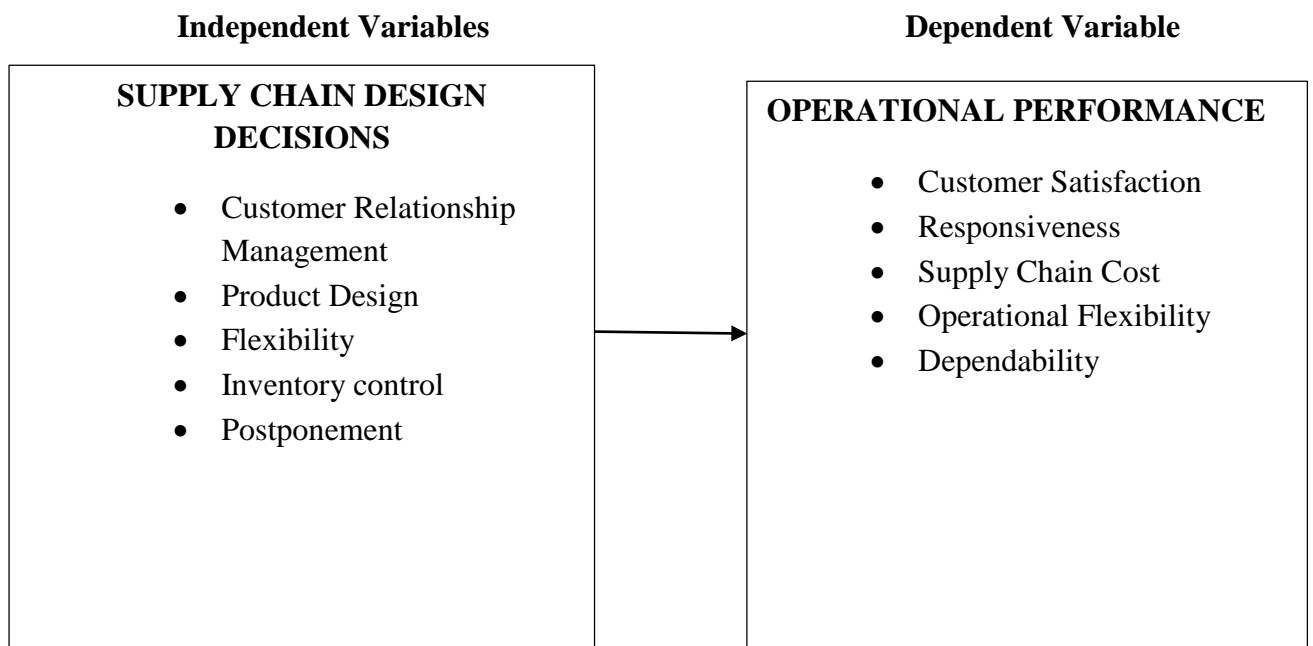
Source Author, (2017)

Hypothesis

Null Hypothesis

H_0: There is no relationship between supply chain design decisions and operational performance.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology used in this study. It discusses research design, the population and sample, data collection and data analysis methods or techniques.

3.2 Research Design

Descriptive cross-sectional design was used in this study. This is because it enabled the researcher to use quantitative techniques of analysing data in order to produce reliable results. According to Mugenda & Mugenda (2003) cross-sectional studies are suitable in studies that seek to identify if there is a significant association among various variables.

3.3 The Population and Sample

The population of this study was large manufacturing firms in Kenya and according to KAM business directory there are 455 large manufacturing firms in Nairobi. The sample was selected using stratified random sampling method. A 10% sample of the population was an acceptable method for selecting samples (Stanley & Gregory 2001). The appropriate sample size was determined by factors such as i) the estimated percentage prevalence of the population of interest -10% based on the prevalence by Stanley and Gregory, ii) the desired level of confidence, iii) the acceptance margin error.

The sample size was calculated using the following formula;

$$n = \frac{t^2 \times p(1-p)}{m^2}$$

Where;

n= required sample size

t= confidence level at 90% (standard value of 1.645)

p= estimated percentage prevalence of the population of interest-10%

n= margin of error at 5% (standard value of 0.05)

The sample size was therefore computed as follows;

$$n= \frac{(1.645)^2 \times 0.1(1-0.1)}{(0.05)^2}$$

$$n= \frac{2.71 \times 0.09}{0.0025}$$

$$n= \frac{0.2439}{0.0025}$$

n= 97.56

n= 98

Table 3.1: Sampling Design

Sector	Number of Firms	Percentage in Industry	Respondents
Building	6	1.3	1
Chemical	62	13.6	14
Energy	42	9.2	9
Food, Beverages	100	22	22
Leather	8	1.8	2
Metal and Allied	38	8.4	8
Motor Vehicle	17	3.7	4
Paper products	48	10.5	10
Pharmaceutical	20	4.4	4
Plastics and Rubber	54	11.9	11
Textile and Apparels	38	8.4	8
Wood and Furniture	22	4.8	5
Total	**455**	**100**	**98**

Source; Kenya manufactures and Exporters (2016)

3.4 Data Collection

The study utilised primary data for its analysis. Questionnaire as a data collection instrument was preferred since the information acquired through it is unbiased and it is free from the influence of the researcher therefore accurate and valid data (Kothari, 2004). The questionnaire used a Likert scale to obtain information from respondents. The questionnaire was divided into four sections: section A had questions on the general profile of the respondents and the organization; section B contained questions on the extent to which supply chain design decisions are implementation by large manufacturing firms in Kenya Section C contained questions on the relationship between supply chain design decisions and operational performance of large manufacturing firms in Kenya. Section D contained questions on challenges facing large manufacturing firms in Kenya on the implementation of supply chain design

decisions. The respondents in the study were heads of supply chain, procurement officers or their equivalents at various large manufacturing firms. The questionnaires were administered by a drop and pick later method and electronic mail.

3.5 Data Analysis

Descriptive statistics were used to analyse the data collected from the field of study. The measures of central tendency and dispersion mean and standard deviation was done by use of the relevant computer software such as Statistical Package for Social Sciences (SPSS) program.

Table 3.2: Summary of How Data was Collected and Analysed

Objectives	Questionnaire	Data Analysis
General Information	Section A	Descriptive Statistics
Extent to which Supply chain design decisions are implemented by manufacturing firms in Kenya	Section B	Descriptive Statistics
Relationship between supply chain design decisions and operational performance of large manufacturing firms in Kenya.	Section C	Correlation and Regression Analysis
Challenges facing implementation of supply chain design decisions by manufacturing firms in Kenya.	Section D	Descriptive Statistics

Source (Author, 2017)

The study used a linear regression model to show the relationship between supply chain design decisions and operational performance of large manufacturing firms in Kenya.

The study was guided by the function below;

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \varepsilon$$

Where:

Y= Operational performance,

β_0 = a constant,

β_1….. β_4 represents regression coefficients

X_1 = Customer relationship management,

X_2 = product design,

X_3 = Flexibility,

X_4 = Inventory control

X_5 = Postponement,

ε = Error term.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND INTERPRETATION

4.1 Introduction

This chapter presents the research findings on an investigation of supply chain design decisions and operational performance of large manufacturing firms in Kenya. The data was gathered exclusively from the questionnaire as the research instrument. The results of the study are presented according to the objectives and research questions. The findings in this chapter were also arrived at by analyzing and interpreting the available data using SPSS software. All the responses are presented in terms of frequencies and percentages which are displayed in tables. A total of 98 questionnaires were distributed to procurement staffs in the manufacturing companies of which 93 were returned fully filled. The response rate for the distributed questionnaires was therefore 94%. This is a very high response rate which is good for research as any response rate above 70 % is good and adequate for analysis and reporting (Mugenda 2003).

4.2 General Information

This section outlines information about the respondents of the large manufacturing firms for this research. The findings have been presented as below.

4.2.1 Position in the Firm

The researcher sought to find out the respondents position in the firm

Table 4.1: Position in the Firm

Position	Frequency	Percentage
Supply Chain Manager	45	48.4
Assistant Supply Chain Manager	27	29.0
Supply Chain Officer	21	22.6
Total	**93**	**100.0**

The findings in table 4.1 show that 48.4% of the respondents were supply chain managers, 29% were assistant supply chain manager while 22.6% were supply chain officers.The findings conclude that majority of the respondents were in a position to give reliable information with regard to supply chain design decisions how it contributes to and operational performance of large manufacturing firms in Kenya.

4.2.2 Gender of the Respondents

The respondents were asked to show their gender. The results of the study are presented in the table below.

Table 4.2: Gender of the Respondents

Gender	Frequency	Percentage
Male	63	68
Female	30	32
Total	**93**	**100**

The results as shown in the table 4.2 show that majority of the respondent were male at 68% while female was 32%. The results indicate that majority of staff in the large manufacturing firms were male thus the results might be influenced by gender imbalance.

4.2.3 Respondents' Age Group

This area of the study, the researcher sought to know the age category of the respondents. Table 4.2 shows that the study findings.

Table 4.3: Respondents' Age Group

Age Group	Frequency	Percentage
Less than 30 years	4	4
31 – 40 years	35	38
41 – 50 years	26	28
51-60 years	19	20
Above 60 years	9	10
Total	**93**	**100**

The findings show that majority 38% of the respondents were aged between 31 – 40 years, followed by 28% who were aged 41 – 50 years, 20% were aged over 50 years, 10% were aged over 60 years while 4% were aged less than 30 years. From these findings, most of the respondents belong to an age category of 31-40 years. This is the most active age group hence they are actively involved in running of procurement department, therefore they had rich experiences, could also appreciate the importance of the study.

4.2.4 Period served in the Organization

The respondents were asked to indicate the number of years they had worked in the organization. The results are shown in table below.

Table 4.4: Period served in the Organization

Period served in the Organization	Frequency	Percentage
Less than 5 years	13	14
5 -10 years	54	58
11 – 15 years	17	18
16 – 20 years	6	6
Over 20 years	3	4
Total	**93**	**100**

Table 4.4 above shows that majority 58% of the respondents had served for 5-10 years, 18% had served for 11-15 years, 14% had served for   Less than 5 years, 6% had served for 16 – 20 years while 4% had served for over 20 years. The findings therefore indicated that majority of the respondents had worked in the firm for a considerable period of time and thus were familiar about the supply chain design decisions how it contributes to and operational performance.

4.2.5 Level of Education

The researcher sought to find out on the level of education of respondents. The table below shows the findings.

Table 4.5: Level of Education

Level of Education	Frequency	Percentage
Certificate	2	2
Diploma	6	6
Degree	48	52
Post graduate	37	40
Total	**93**	**100**

The table 4.5 shows that majority 52% of the respondents were degree holders, this was followed by 40% who had attained their post graduate degree, 6% were diploma holders while 2% were certificate holders. This implies that the respondents had the technical capacity to competently answer the questions in the questionnaire.

4.3 Extent to which Supply chain design decisions are implemented

The researcher sought to find out the extent to which the organizations have implemented the supply chain design decisions to improve operational performance. Table 4.6 below shows the analysis.

Table 4.6: Extent to which supply chain design decisions are implemented

Variable	Avg Mean	Std. Deviation
Customer Relationship Management	4..4285	0.7316
Product Design	4.4768	0.7795
Flexibility	4.2304	0.6795
Inventory control	3.9071	0.6919
Postponement	2.7595	0.6509

The study found that Customer Relationship Management is used in supply chain decisions to a high extent as shown by a mean of 4.4285. Understanding and meeting consumer needs has principal importance in SCM as a way of optimizing value to customers and improving return to all stakeholders in the supply chain.

The study found that product design is used in supply chain decisions to a high extent as shown by a mean of 4.4768. This shows that supply chain management has recently concentrated on closer relationships between parties involved in the flow of goods from the supplier to the end-user. The findings thus established that product system design has been adopted by the large manufacture ring companies in ensuring that the operations go on smoothly

The study found that flexibility is used in supply chain decisions to a high extent as shown by a mean of 4.2304. The firm focuses on producing large number of customized products and deliver them to the market. The firm has considered production flexibility (ability to produce different volume at an acceptable cost and time). The findings reflect those of Nuri, Kim & Bryan (2010) that a flexible company is willing to try new approaches, even when the old ways are working fine. Continuously refining company's policies helps you identify new and better ways of getting things done and fostering innovation. Over time, the organization becomes more efficient, meaning higher profits and lower costs.

The study found that Inventory control is used in supply chain decisions to a high extent as shown by a mean of 3.9071. The firm manages its inventory in the warehouse and the firm has shifted from traditional supply chains where inventory decisions are made by downstream nodes to upstream inventory decisions and control. The firm embraces the system of which the suppliers monitors the inventory by encouraging storage of consignment goods This implies that inventory control is a process that is continuous in the organization and therefore there is always need for managing inventory throughout using a certain technique. Good inventory management can lead to good performance in an organization.

The study found that postponement is used in supply chain decisions to moderately as shown by a mean of 2.7595. The firm products are designed for modular assembly. The firm delays the final product assembly activities until customer orders have been received and the firm delays final assembly activities until last possible position in supply chain. The postponement strategy effectively reduces inventory obsolescence and takes out the risk and uncertainty costs associated with having undesirable products, but it requires an integrated and agile supply chain to ensure that the latest

demand forecasts can be frequently created and propagated through the supply chain to produce or allocate the right products for their customers.

The findings agreed with those of Magutu (2013) who indicated that postponement dictates that the firms should postpone the creation or delivery of the final product as long as possible. For retailers, this takes the shape of postponing the delivery of the final product to its destination, while for assemble-to-order manufacturers this means postponing the final assembly of the product. For manufacturing scenarios like build-to-stock, the postponement strategy may drive pushing the packaging or final assembly of the products, allowing the manufacturer to personalize, configure finished products to customer orders, and change the final product mix to suit any changes in demand.

4.4 Relationship between Supply Chain Design decision and Operational Performance

The study sought to determine the relationship between supply design decisions and operational performance of the firm. The regression model was used to analyse the relationship between supply chain design decisions and operational performance of large manufacturing firms in Kenya. The model specifically connects the average values of y for various values of the x-variables. Table 4.7 below shows the correlation coefficients.

Table 4.7: Correlation Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		(P-
	B	Std. Error	Beta	(z)	value)
(Constant)	0.723	.715		5.226	.002
Customer relationship management (X_1)	.354	.081	.489	3.334	.000
Product design (X_2)	.116	.089	.665	4.498	.000
Flexibility (X_3)	.144	.065	.798	4.053	.000
Inventory control(X_4)	.287	.045	.435	3.876	.000
Postponement(X_5)	.099	.056	.392	2.060	.002

a. Dependent Variable: Operational performance

The established multiple linear regression equation becomes:

$$Y = 0.723 + 0.354X_1 + 0.116X_2 + 0.144X_3 + 0.287X_4 + 0.099X_5$$

The study found that Customer relationship management, product design, Flexibility, Inventory control and Postponement have significant influence on operational performance since Customer relationship management β= .354, Product design β= .116, Flexibility β=.11, Inventory control β=.287 and Postponement β=0.099. The P-Value of 0.02 indicates that this result is significant at 5% confidence level. Thus we reject the null hypothesis.

The critical Z score values when using a 95% confidence level are -1.96 and +1.96 standard deviations. The p-value associated with a 95% confidence level is 0.05.

Customer relationship management has a z value of 3.334 which is higher than the confidence level of 1.96, the p value is 0.000 at 0.05 confidence level and therefore its significant and we reject the null hypothesis.

Product design has a z value of 4.498 which is higher than the confidence level of 1.96, the p value is 0.000 at 0.05 confidence level and therefore its significant and we reject the null hypothesis.

Flexibility has a z value of 4.053 which is higher than the confidence level of 1.96, the p value is 0.000 at 0.05 confidence level and therefore its significant and we reject the null hypothesis.

Inventory control has a z value of 3.876 which is higher than the confidence level of 1.96, the p value is 0.000 at 0.05 confidence level and therefore its significant and we reject the null hypothesis.

Postponement has a z value of 2.060 which is higher than the confidence level of 1.96, the p value is 0.002 at 0.05 confidence level and therefore its significant and we reject the null hypothesis.

Table 4.8 below shows the model summary and its analysed as follows.

Table 4.8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Dimension	.724[a]	0.645	0.523	0.00302

Predictors: (Constant), Customer relationship management, product design, Flexibility, Inventory control and Postponement.

Source: Reseacher (2017)

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Analysis in table 4.8 shows that the coefficient of determination (the percentage variation in the dependent variable being explained by the variation in the independent variables) R^2 is 64.5%) this is a fairly good fit leaving only 27.6% unexplained variation. This residual variance is explained by other variables not in the model and chance variation.

Table 4.9 below shows the analysis of variance (ANOVA).

Table 4.9: ANOVA

Model	Sum of Squares	Df	Mean Square	F	(p-value)
1 Regression	5.321	5	1.494	**16.377**	.000ᵃ
Residual	3.453	88	.091		
Total	8.774	92			

a. Predictors: (Constant), Customer relationship management, product design, Flexibility, Inventory control and Postponement.
b. Dependent Variable: Operational performance

ANOVA findings (P- value of 0.00) in table 4.9 show that there is correlation between the predictor's variables (Customer relationship management, product design, Flexibility, Inventory control and Postponement) and response variable (operational performance. The numerator df= 5, denominator df=88 α=5% the f- ratio becomes 16.377. The P value is 0.000 which is less than 0.005 significance level. The obtained f-ratio is 16.377 at (5, 88) degrees of freedom. The critical value of F is 2.32. The F ratio obtained is higher than the F critical value and therefore the overall model is significant because the p value is 0.000 which is less than the 5% significance level.

The findings are in line with those of Collins, Eldranta & Holmenin, (2009), who pointed out that customer relationship management activities execution can promote the customer satisfaction and customer loyalty to reach the purpose of

promote the enterprises' operational performance. This also concurred with Nuri, Kim & Bryan (2010) who studied the formulation of supply chain with a simultaneous design of product design optimization. The study found out that concurrent optimization provided higher profits and better visibility. It was also in line with studies done by Colicchia, Dallari & Melacini, 2010 in the machinery and equipment who concluded that in uncertain environments, increased flexibility results in improved performance, but in more predictable environments, the high cost of flexibility accounts for economic losses, which result in lower financial performance.

The results are also confirmed by Pujawan, (2004), in whose study less flexible organizations performed better in more predictable environments, and under high levels of uncertainty, greater flexibility results in better performance. The study also concured with Pohlen & Goldsby (2003), who indicated that supply chain management is the management of the interface relationships among key stakeholders and enterprise functions that occur in the maximization of value creation which is driven by customer needs satisfaction and facilitated by efficient logistics management. The findings on postponement are in line with study Waller, Dabholker & Gentry (2000) who indicated that companies would be advised to hold part of their production as undifferentiated product at one or both intermediate stages, as this practice would improve profitability when the company faces uncertain channel demands.

4.5 Challenges faced in Implementing Supply Chain Design Decisions

The study sought to find out the challenges in implementing supply chain design decisions as presented in table 4.10 below.

Table 4.10: Challenges faced in implementing Supply Chain Design Decisions

Challenges faced in implementing Supply Chain Design Decisions	Mean	Std. Deviation
Lack of proper coordination within the supply chains	4.4286	.8084
Poor integration of decisions along the supply chains	4.3143	.9947
Lack of information sharing	3.8860	.9941
Lack of commitment to implement of supply chain design decisions in the firm	4.2000	.8832
Cultural dynamism therefore there is rigidity by managers in their way of doing things	3.8000	.9041
Poor leadership in the management level which hinder supply chain design decisions implementation	3.7714	.9420
Environmental uncertainties	4.2100	.4428
Lack of technology competence	3.7429	.6171
Inadequate resources for implementation of supply chain design decisions	3.7004	.9727
Competitive factors such as the number of player is in the industry, number of competing products and supply chains used by competitors	4.0857	1.3144

Table 4.10 shows that some of the challenges faced include Lack of proper coordination within the supply chains rated with a mean of 4.4286, Poor integration of decisions along the supply chains rated with a mean of 4.3143, there are environmental uncertainties rated with a mean of 4.2100 and Competitive factors such as the number of player is in the industry, number of competing products and supply chains used by competitors rated with a mean of 4.0857, Lack of commitment to implement of supply chain design decisions in the firm was rated with a mean of 4.2000. The findings also show that respondents agreed that cultural dynamism therefore there is rigidity by managers in their way of doing things with a mean of

3.8000, Lack of information sharing was agreed with a mean of 3.8860. Poor leadership in the management level which hinder supply chain design decisions implementation was rated with a mean of 3.7429. Inadequate resources for implementation of supply chain design decisions was rated 3.7004. The findings concur with (Fawcett et al, 2007) who observed that strategic supply chains may encounter performance barriers or the inability to meet customer demand from such things as quality and production problems, cultural difference, communication, information sharing, technological competence, employee apprehension to yield up control and poor collaborative planning.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings of the study on supply chain design decisions and operational performance of large manufacturing firms in Kenya. It also presents the conclusions that were made from the study; the recommendations as well as the suggestions on areas where further research may be required in order to provide more knowledge that can bridge the research gaps that may have been left by this study.

5.2 Summary of Findings

The study established that there exists a positive influence by the supply chain design decisions on the operational performance of the large manufacturing firms in Kenya. Customer relationship management has enhanced improved responsiveness, it has also led to increase in customer satisfaction, improved operational flexibility and has led an increase in the level of dependability. There is also a long-term relationship between the firm and the customers. The study found that firm focuses on Customer Relationship Management (CRM) to a very large extent and the firm frequently determines future customer expectations. The firms frequently measures customer satisfaction and ensures customer frequent feedback to enhance responsiveness.

The study also established that product design has increased the level of customer satisfaction, increased the level of responsiveness and has led to reduction of the supply chain cost. It also found that flexibility decisions has led to an increase in customer satisfaction and increase in the level of dependability. Flexibility has also

led to an increase in responsiveness and has enhanced improvement of operational flexibility.

In addition, the study found that inventory control has led to reduction in the supply chain cost. To a large extent the study found that inventory control has led to increased customer satisfaction, improvement in responsiveness and increase in the level of dependability. The study found that postponement has led to increase in customer satisfaction, an increase in responsiveness and improvement of operational flexibility.

5.3 Conclusion

The study concludes that supply chain design decisions has an effect on operational performance of large manufacturing firms in Kenya. The factors tested includes; Customer relationship management, product design, Flexibility, Inventory control and Postponement. All the variables were found to have a positive influence on performance of large manufacturing firms in Kenya. Customer relationship was found to have the highest effect followed by inventory control, then flexibility, product design and finally postponement.

5.4 Recommendations from the Study

Supply chain management plays a critical role in the operations of many organizations. This is because it helps in improving its performance by coordinating resource flows among members in the upstream and downstream supply chain to create value. This study recommends that manufacturing firms should strengthen their supply chain management by putting greater effort to the implementation of some key best practices. This should be done by keeping all practices updated. Monitoring and further improvements for specific supply chain design decisions that showed a moderate extent of application should be done to ensure full adoption and appreciation of these practices.

For effective supply systems to take place; the barriers to supply systems must be removed. Ownership of efforts by top management will enhance better performance of supply systems strategy. Feedback is an essential element in effective supply systems; hence a comprehensive feedback system of supply systems should be adopted. There is need for monitoring and evaluation of supply systems policy for better results and closure of supply systems gap.

5.5 Limitations of the Study

The study involved a large sample size and it was extremely tedious and time consuming. The study also faced financial limitations. The duration for the study was limited hence exhaustive and comprehensive research could not be carried out. The study, however, minimized these by conducting in-depth analysis that significantly covers the shortcomings of the study. Respondents such as managers are usually very busy hence the tendency not to give in-depth attention to the unstructured parts of the questionnaire. Not all the respondents managed to respond to the questionnaire.

5.6 Suggestions for Further Research

This study represents a research carried out in order to enrich the literature of supply chain design decisions and operational performance a topic that has been neglected by researchers. Moreover, it contributes to the theoretical knowledge of strategy and its impact on project outcomes. More comparative studies should also be done with other countries both the developed and those developing and give the correlation and the differences in the supply chain design decisions. Future studies can be conducted using different sectors such as retail industry to achieve possible generalization of the results and to ascertain the influence of the supply chain design decisions and operational performance. Also, future studies may consider variables that may mediate the relationship between supply chain decisions and organizational effectiveness.

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APPENDICES

Appendix I: Research Questionnaire

This questionnaire has been designed for the sole purpose of collecting data on effect of supply chain design on operational performance. The data collected will be treated with a high degree of confidentiality and it's meant for academic purpose only.

Kindly fill this questionnaire by putting an "X" in the applicable cell.

SECTION A: General Information

1. Name of the firm (optional):...

2. What is your position in this firm?

      a)Supply Chain Manager ☐

      b) Assistant Supply Chain Manager ☐

      c) Supply Chain Officer ☐

d) Other (Specify) ....

3. Respondent's gender: Male ☐   Female ☐

4. Respondent's age bracket:

Below 30 Years ☐

31-40 years ☐

41-50 years ☐

51-60 years ☐

Above 60 years ☐

5. How long have you served in this firm?

Less than 5 years ☐

5- 10 years ☐

10-15 years ☐

Over 15 years ☐

6. What is your education Level?

☐ Certificate

☐ Diploma

☐ Degree

☐ Post graduate

SECTION B: Extent to which Supply chain design decisions are implemented

To what extent has your organization implemented the following supply chain design decisions to improve operational performance?

Please indicate using the following scale; 1=very large extent, 2= Large extent, 3= Moderate extent, 4= to small extent and 5= very small extent.

NO	Customer Relationship Management	1	2	3	4	5
1	The firm frequently measures customer satisfaction					
2	The firm focuses on Customer Relationship Management (CRM)					
3	The firm ensures customer frequent feedback to ensure responsiveness.					
4	The firm frequently determines future customer expectations.					
	Product Design					
1	The firm has considered designing their product based on the customer demand					
2	The firm ensures production of quality products to meet customer needs					
3	The firm has established product development teams to determine product components that are likely to be changed throughout the product life cycle.					
4	Sustainability of products should be considered in order to change the product design using parts from various suppliers with minimal cost.					

	Flexibility					
1	The firm focuses on producing large number of customized products and deliver them to the market					
2	The firm has considered production flexibility (ability to produce different volume at an acceptable cost and time)					
3	The firm focuses on delivery ability of the supply chain to alter delivery dates					
4	The firm ensures they manage production resources and uncertainty to meet customer needs (manufacturing flexibility)					
5	The firm has focused on altering supply of product according to customers' demand					
	Inventory Control					
1	The firm manages its inventory in the warehouse					
2	The firm embraces the system of which the suppliers monitors the inventory by encouraging storage of consignment goods.					
	The firm uses VMI strategy to control and manage its stock					
3	The firm has shifted from traditional supply chains where inventory decisions are made by downstream nodes to upstream inventory decisions and control.					
	Postponement					
1	The firm delays the final product assembly activities until customer orders have been received					
2	Our products are designed for modular assembly					
3	The firm delays final assembly activities until last possible position in supply chain					

SECTION C: Relationship between Supply Chain Design Decisions and Operational Performance.

To determine the relationship between supply design decisions and operation performance of the firm.

Kindly tick the number which best indicate whether various supply chain design practices adopted by your firm impact the various aspects of operational performance. (Use scale: 1=Very large extent, 2=Large extent, 3= Moderate extent, 4=Small extent and 5= Very small extent).

No	Relationship between SCD decisions and operational performance	1	2	3	4	5
	Customer Relationship Management					
1	Customer relationship management has led to increase in customer satisfaction.					
2	Customer relationship management has enhanced improved responsiveness.					
3	Customer relationship management has led to improved operational flexibility.					
4	Customer relationship management has led an increase in the level of dependability.					
	Design for the product					
1	Product design has increased the level of customer satisfaction.					
2	Product design has increased the level of responsiveness.					
3	Product design has led to reduction of the supply chain cost.					
	Flexibility					
1	Flexibility has enhanced improvement of operational flexibility.					
2	Flexibility has led to an increase in responsiveness.					
3	Flexibility has led to an increase in customer satisfaction.					
4	Flexibility decisions has led to an increase in the level of dependability.					
	Inventory Control					
1	Inventory control has led to increased customer satisfaction					
2	Inventory control has led to reduction in the supply chain cost					
3	Inventory control has led to increase in the level of dependability					

4	Inventory control has led to improvement in responsiveness					
	Postponement					
1	Postponement has led to increase in customer satisfaction.					
2	Postponement has led to an increase in responsiveness.					
3	Postponement has led to improvement of operational flexibility.					

SECTION D: Challenges faced in implementing Supply Chain Design Decisions

Please indicate the challenges faced by the firm in implementation of supply chain design. (Use the following scale: 1= Strongly agree, 2= Agree, 3= Neither agree nor disagree, 4= Disagree and 5= Strongly disagree.

No		1	2	3	4	5
1	Lack of proper coordination within the supply chains					
2	Poor integration of decisions along the supply chains					
3	Lack of information sharing					
4	Lack of commitment to implement of supply chain design decisions in the firm					
5	Cultural dynamism therefore there is rigidity by managers in their way of doing things					
6	Poor leadership in the management level which hinder supply chain design decisions implementation					
7	Environmental uncertainties					
8	Lack of technology competence					
9	Inadequate resources for implementation of supply chain design decisions					
10	Competitive factors such as the number of player is in the industry, number of competing products and supply chains used by competitors					

Other challenges (Please indicate)

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Appendix II: Large Manufacturing Firms in Kenya

Energy Sector	
Kenwestfal Works Ltd	A.I Records (Kenya) Ltd
Kenya Power & Lighting Co. Ltd	Modulec Engineering Systems Ltd
Assa Abloy East Africa Ltd	Amedo Centre Kenya Ltd
Nationwide Electrical Industries	Kenya Scale Co. Ltd
Aucma Digital Technology Kenya Ltd	Kenya Electricity Generating Company Ltd
Kenya Shell Ltd	Avery (East Africa) Ltd
Optimum Lubricants Ltd	Libya Oil Kenya Limited
Baumann Engineering Limited	Power Technics Ltd
Pentagon Agencies Reliable Electricals Engineers Ltd	Centurion Systems Limited
Manufacturers & Suppliers (K) Ltd	Digitech East Africa Limited
Sanyo Armo (Kenya) Ltd	Eveready East Africa Limited
Marshall Fowler (Engineers) Ltd	Specialised Power Systems
Frigorex East Africa Ltd	Mecer East Africa Ltd
Metlcx Industries Ltd	Holman Brothers (E.A.) Ltd
IberaAfrica Power (EA) Ltd	Synergy-Pro Ltd
International Energy Technik Ltd	Tea Vac Machinery Limited
East African Cables Ltd	Kenwest Cables Ltd
Chemical Sector	
Anffi Kenya Ltd	Match Masters Ltd
Imaging Solutions (K) Ltd	Maroo Polymers Ltd
Basco Product (K) Ltd	Bayer East Africa Ltd
United Chemical Industries Ltd	Interconsumer Products Ltd
Continental Products Ltd	Odex Chemicals Ltd
Osho Chemicals Industries Ltd	Oasis Ltd
Procter & Gamble East Africa Ltd	Beiersdorf East Africa Ltd
Cooper K- Brands Ltd	PolyChem East Africa Ltd
Sadolin Paints (E.A.) Ltd	Blue Ring Products Ltd
Sara Lee Kenya Limited	PZ Cussons Ltd

Rayal Trading Co. Ltd	BOC Kenya Limited
Saroc Ltd Reckitt Benckiser (E.A) Ltd	Carbacid (C02) Limited
Buyline Industries Limited	Revolution Stores Co. Ltd
Crown Berger Kenya Ltd	Super Foam Ltd
Soilex Chemical Ltd	Chemicals & Solvents E.A. Ltd
Crown Gases Ltd	Strategic Industries Limited
Chemicals and Solvents E.A. Ltd	Coates Brothers (E.A.) Limited
Decase Chemical (Ltd) Supa Brite Ltd	Deluxe Inks Ltd
Unilever Kenya Ltd	Coil Products (K) Limited
Murphy Chemical E.A Ltd	Desbro Kenya Limited
East Africa Heavy Chemicals (1999) Ltd	Syngenta East Africa Ltd
Colgate Palmolive (E.A) Ltd	Elex Products Ltd Synresins Ltd
Kel Chemicals Limited	European Perfumes & Cosmetics Ltd
Tri-Clover Industries (K) Ltd	Ken Nat Ink & Chemical Ltd
Kemia International Ltd	Galaxy Paints & Coating Co. Ltd
Twiga Chemical Industries Limited	Vitafoam Products Limited
Grand Paints Ltd	Magadi Soda Company Ltd
Henkel Kenya Ltd	
Food and Beverages Sector	
Aquamist Ltd Premier Food Industries Limited	Agriner Agricultural Development Limited
Brookside Dairy Ltd	Belfast Millers Ltd
Proctor & Allan (E.A.) Ltd	Bidco Oil Refineries Ltd
Candy Kenya Ltd	Bio Foods Products Limited
Premier Flour Mills Ltd	Promasidor (Kenya) Ltd
Capwell Industries Ltd	Trufoods Ltd
British American Tobacco Kenya Ltd	Carlton Products (EA) Ltd
Breakfast Cereal Company(K) Ltd	UDV Kenya Ltd
Chirag Kenya Limited	Unga Group Ltd

Broadway Bakery Ltd	E & A Industries Ltd
Usafi Services Ltd	C. Czarnikow Sugar (EA) Ltd
C. Czarnikow Sugar (EA) Ltd	Kakuzi Ltd
Uzuri foods Ltd	Excel Chemical Ltd
Cadbury Kenya Ltd	Centrofood Industries Ltd
ValuePak Foods Ltd	Erdemann Co. (K) Ltd
Coca cola East Africa Ltd	W.E. Tilley (Muthaiga) Ltd
Kenya Wine Agency Limited	Highlands Canner Ltd
Confec Industries (E.A) Ltd	Koba Waters Ltd
Kevian Kenya Ltd	Corn Products Kenya Ltd
Super Bakery Ltd	Cut Tobacco (K) Ltd
Lari Dairies Alliance Ltd	Sunny Processor Ltd
Crown Foods Ltd	Kwality Candies & Sweets Ltd
Spin Knit Dairy Ltd	London Distillers (K) Ltd
Highlands Mineral Water Co. Ltd	Deepa Industries Ltd
Mafuko Industries Ltd	Home oil Manji Food Industries Ltd
Del Monte Kenya Ltd	East African Breweries Ltd
Insta Products (EPZ) Ltd	Melvin Marsh International
Jambo Biscuits (K) Ltd	East African Sea Food Ltd
Kenblest Limited Nairobi Bottlers Ltd	Glacier Products Ltd
Giloil Company Limited	Mount Kenya Bottlers Ltd
Kenafric Industries Limited	Frigoken Ltd
Miritini Kenya Ltd	Karirana Estate Ltd
Mini Bakeries (Nbi) Ltd	Farmers Choice Ltd Jetlak Foods Ltd
Kenya Breweries Ltd	Global Allied Industries Ltd
Nairobi Flour Mills Ltd	Kenya Nut Company Ltd

NAS Airport Services Ltd	Global Beverages Ltd
Kenya Sweets Ltd	Rafiki Millers Ltd
Global Fresh Ltd	Nestle Kenya Ltd
Razco Ltd	Alpine Coolers Ltd
Wrigley Company (E.A.) Ltd	Pembe Flour Mills Ltd
Alpha Fine Foods Ltd	Spice World Ltd
Pearl Industries Ltd	Alliance One Tobacco Kenya Ltd
Softa Bottling Co. Ltd	Patco Industries Limited
Al-Mahra Industries Ltd	Smash Industries Ltd
Re-Suns Spices Limited	Gonas Best Ltd
Hail & Cotton Distillers Ltd	Palmhouse Dairies Ltd
Smash Industries Ltd	
Plastics and Rubber	
Betatrad (K) Ltd	Prestige Packaging Ltd
Haco Industries Kenya Ltd	Blowplast Ltd
Prosel Ltd	Hi-Plast Ltd
Bobmil Industries Ltd	Qplast Industries
Jamlam Industries Ltd	Complast Industries Limited
Kamba Manufacturing (1986) Ltd	Sumaria Industries Ltd
Kenpoly Manufacturers Ltd	Super Manufacturers Ltd
Keci Rubber Industries	Kentainers Ltd
Techpak Industries Ltd	Nairobi Plastics Industries
King Plastic Industries Ltd	Treadsetters Tyres Ltd
Kingway Tyres & Automart Ltd	Nav Plastics Limited
Treadsetters Tyres Ltd	Uni-Plastcis Ltd Ombi Rubber
L.G. Harris & Co. Ltd	Packaging Masters Limited
Laneeb Plastics Industries Ltd	ACME Containers Ltd
Plastic Electricons	Metro Plastics Kenya Limited

Afro Plastics (K) Ltd	Raffia Bags (K) Ltd
Ombi Rubber Rollers Ltd	Rubber Products Ltd
Dune Packaging Ltd	Packaging Industries Ltd
Plastics & Rubber Industries Ltd	Safepak Limited
Elgitread (Kenya) Ltd	Sameer Africa Ltd
Polyblend Limited	Sanpac Africa Ltd
Polyflex Industries Ltd	Eslon Plastics of Kenya Ltd
Silpack Industries Limited	Polythene Industries Ltd
Five Star Industries Ltd	Solvochem East Africa Ltd
Premier Industries Ltd	General Plastics Limited
Metal and Allied	
Alloy Street Castings Ltd	Nails & Steel Products Ltd
Nampak Kenya Ltd	Apex Street Ltd
Rolling Mill Division	Orbit Engineering Ltd
Napro Industries Limited	Rolmil Kenya Ltd
Specialized Engineer Co. (EA) Ltd	ASL Ltd
Sandvik Kenya Ltd	ASP Company Ltd
East Africa Foundry Works (K) Ltd	Steel Structures Limited
Steelmakers Ltd	Sheffield Steel Systems Ltd
Tononoka Steel Ltd	City Engineering Works Ltd
Steelwool (Africa) Ltd	Elite Tools Ltd
Booth Extrusions Limited	General Aluminum Fabricators Ltd
Crystal Industries Ltd	Welding Alloys Ltd
Wire Products Limited	Gopitech (Kenya) Ltd
Kens Metal Industries Ltd	Metal Crown Limited

Warren Enterprises Ltd	East Africa Spectre Limited
Insteel Limited	Viking Industries Ltd
Heavy Engineering Ltd	Devki Steel Mills Ltd

Leather Products	
Bata Shoe Co. (K) Ltd	East Africa Tanners (K) Ltd
CP Shoes Leather Industries of Kenya Limited	C & P Shoe Industries Ltd
Alpharama Ltd	New Market Leather Factory Ltd

Pharmaceutical	
Alpha Medical Manufacturers Ltd	Madivet Products Ltd
Beta Healthcare International Limited	KAM Industries Ltd
Novelty Manufacturing Ltd	KAM Pharmacy Limited
Biodeal Laboratories Ltd	Oss. Chemie (K) Pharmaceutical Manufacturing Co.
Bulks Medical Ltd	Dawa Limited
Universal Corporation Limited	Laboratory & Allied Limited
Gesto Pharmaceutical Ltd	Elys Chemical Industries
Cosmos Limited	Pharm Access Africa Ltd
Glaxo Smith Kline Kenya Ltd	Manhar Brothers (K) Ltd

Paper Sector	
Ajit Clothing Factory Ltd	Paper House of Kenya Ltd
General Printers Limited	Associated Papers & Stationery Ltd
Paperbags Limited	Paperbags Limited
Graphics & Allied Ltd	Autolitho Ltd
Primex Printers Ltd	Guaca Stationers Ltd
Guaca Stationers Ltd	Print Exchange Ltd
Bag and Envelope Converters Ltd	Icons Printers Ltd
Printpak Multi Packaging Ltd	Bags & Balers Manufacturers (K) Ltd
Brand Printers Printwell Industries Ltd	Interlabels Africa Ltd

Business Forms & Systems Ltd	Jomo Kenyatta Foundation
Prudential Printers Ltd	Karatasi Industries Ltd
Carton Manufacturers Ltd	Punchlines Ltd
Kenafric Diaries Manufacturers Ltd	Cempack Ltd
Chandaria Industries Limited	Kitabu Industries Ltd
Creative Print House Kul Graphics Ltd	Colour Labels Ltd
Label Converters	D.L. Patel Press (Kenya) Limited
Colour Packaging Ltd	Dodhia Packaging Limited
Modern Lithographic (K) Ltd	Colour Print Ltd
Kenya Stationers Ltd	East Africa Packaging Industries Ltd
Elite Offset Ltd	Ramco Printing Works Ltd
Ellams Products Ltd	Kim-Fay East Africa Ltd
Paper Converters (Kenya) Ltd	Regal Press Kenya Ltd
English Press Limited	

Wood and Furniture	
Kenya Wood Ltd	Tetra Pak Ltd
Shamco Industries Ltd	Slumberland Kenya Limited
Newline Ltd	Taws Limited
Timsales Ltd	Hwan Sung Industries (K) Ltd
Shah Timber Mart Ltd	Statpack Industries Ltd
Economic Flousing Group Ltd	Rosewood Office Systems Ltd
Furniture International Limited	United Bags Manufacturers Ltd
Uchumi Quick Suppliers Ltd Twiga Stationers & Printers Woodtex Kenya	Fine Wood Works Ltd

Textile Sector	
Africa Apparels EPZ Ltd	Fulch and Manek & Bros Ltd
Kenya Trading EPZ Ltd	Kikoy Co. Ltd

Spinners & Spinners Ltd	Storm Apparel Manufacturers Co. Ltd
Image Apparels Ltd	Le-Stud Limited
Straightline Enterprises Ltd	Alltex EPZ Ltd
Sunflag Textile & Knitwear Mills Ltd	Metro Impex Ltd
Alpha Knits Limited	Midco Textiles (EA) Ltd
Tarpo Industries Limited	Apex Appaels (EPZ) Ltd
Mirage Fashionwear EPZ Ltd	Teita Estate Ltd
Baraka Apparels (EPZ) Ltd	MRC Nairobi (EPZ) Ltd
Thika Cloth Mills Ltd	Bhupco Textile Mills Limited
United Aryan (EPZ) Ltd	Ngecha Industries Ltd
Silver Star Manufacturers Ltd	J.A.R Kenya (EPZ) Ltd
YU-UN Kenya EPZ Company Ltd	Rolex Garments EPZ Ltd
Riziki Manufacturers Ltd	Yoohan Kenya EPZ Company Ltd
Brother Shirts Factory Ltd	Vaja Manufacturers Limited
Protex Kenya (EPZ) Ltd	Upan Wasana (EPZ) Ltd
Premier Knitwear Ltd	Blue Plus Limited
Motor Vehicle Assembly and Accessories	
Toyota East Africa Ltd	General Motor East Africa Limited
Megh Cushion industries Ltd	Auto Ancillaries Ltd
Impala Glass Industries Ltd	Varsani Brakelining Ltd
Mutsimoto Motor Company Ltd	Bhachu Industries Ltd
Kenya Grange Vehicle Industries Ltd	Pipe Manufacturers Ltd
Unifilters Kenya Ltd	Kenya Vehicle Manufacturers Limited
Labh Singh Harnam Singh Ltd	Mann Manufacturing Co. Ltd
Building sector	
Central Glass Industries Ltd	Kenbro Industries Ltd
Manson Hart Kenya Ltd	Bamburi Cement
Karsan Murji & Company Limited	Kenya Builders & Concrete Ltd

Source: Kenya Association of Manufacturers (2017)

Appendix III: Extent to which Supply chain design decisions are implemented in Large Manufacturing firms in Kenya.

Customer Relationship Management

The firm frequently measures customer satisfaction

The firm focuses on customer relationship management (CRM)

The firm ensures customer frequent feedback to ensure responsiveness

The firm frequently determines future customer expectations

Product Design

The firm has considered designing their product based on the customer demand

The firm ensures production of quality products to meet customer needs

The firm has established product development teams to determine product components that are likely to be changed throughout the product life cycle.

Sustainability of products should be considered in order to change the product design using parts from various suppliers with minimal cost.

Flexibility

The firm focuses on producing large number of customized products and delivers them to the market

The firm has considered production flexibility (ability to produce different volume at an acceptable cost and time)

The firm focuses on delivery ability of the supply chain to alter delivery dates

The firm ensures they manage production resources and uncertainty to meet customer needs (manufacturing flexibility)

The firm has focused on altering supply of product according to customer's demand

Inventory Control

The firm manages its inventory in the warehouse

The firm embraces the system of which the supplier monitors the inventory by encouraging storage of consignment goods.

The firm uses VMI strategy to control and manage its stock

The firm has shifted from traditional supply chains where inventory decisions are made by downstream nodes to upstream inventory decisions and control.

Postponement

The firm delays the final product assembly activities until customer orders have been received

Our products are designed for modular assembly

The firm delays final assembly activities until last possible position in supply chain.

Relationship between Supply Chain Design Decisions and Operational Performance

Customer Relationship Management

Customer relationship management has enhanced improved responsiveness.

Customer relationship management has led to increase in customer satisfaction.

Customer relationship management has led to improved operational flexibility.

Customer relationship management has led an increase in the level of dependability.

Design for the product

Product design has increased the level of customer satisfaction.

Product design has increased the level of responsiveness.

Product design has led to reduction of the supply chain cost.

Flexibility

Flexibility has enhanced improvement of operational flexibility.

Flexibility has led to an increase in responsiveness.

Flexibility has led to an increase in customer satisfaction.

Flexibility decisions have led to an increase in the level of dependability.

Inventory Control

Inventory control has led to increased customer satisfaction

Inventory control has led to reduction in the supply chain cost

Inventory control has led to increase in the level of dependability

Inventory control has led to improvement in responsiveness

Postponement

Postponement has led to increase in customer satisfaction.

Postponement has led to an increase in responsiveness.

Postponement has led to improvement of operational flexibility.