INFLUENCE OF SUPPLY CHAIN OPTIMIZATION ON THE PERFORMANCE OF MANUFACTURING FIRMS IN KENYA

NANCY WAITHIRA MWANGI

DOCTOR OF PHILOSOPHY

(Supply Chain Management)

JOMO KENYATTA UNIVERSITY OF

AGRICULTURE AND TECHNOLOGY

2019

Influence of Supply Chain Optimization on the Performance of Manufacturing Firms in Kenya

Nancy Waithira Mwangi

A Thesis Submitted in Partial Fulfilment for the Degree of Doctor of Philosophy in Supply Chain Management in the Jomo Kenyatta University of Agriculture and Technology

2019

DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

Signature…….……Date……

Nancy Waithira Mwangi

This thesis has been submitted for examination with our approval as the University supervisors

Signature……. Date……

Prof. Willy Mwangi Muturi, PhD

JKUAT, Kenya

Signature……. Date……

Dr. Noor Ismail Shale, PhD

JKUAT, Kenya

DEDICATION

I would like to dedicate this work to my dear husband Joseph, who has supported me tirelessly to see that I achieve this. You have been my role model and my mentor

ACKOWLEDGEMENTS

I would wish to thank the Almighty God who has seen me through this long journey of research, His Grace has been sufficient for me. My sincere appreciation goes to my supervisors Prof. Willy M. Muturi, Ph.D and Dr. Noor Ismail Shale,Ph.D who have supported me to ensure that I achieve my academic pursuit. Your professional guidance went along way to making this document what it is now. In you I have found academic mentorship a valuable gift that I will always treasure.

I acknowledge my dear husband Dr. Joseph M.Gichure, Ph.D for the support and encouragement he has given me throughout my studies and my children, Sarah and Victor for the understanding they have given me when I was not available for them when they needed me. I appreciate prayers and other support from friends and family members. I appreciate my research assistants and all the respondents who participated in this research study without whom the study would be incomplete. I also acknowledge JKUAT for giving me the opportunity to pursue this degree. Many other people have walked with me through this academic journey that includes my Ph.D lecturers and classmates; I may not mention all of you but I just wish to say a thank you for your assistance.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

DEFINITION OF TERMS

Cost Optimization: is a business-focused, continuous discipline to drive spending and cost reduction, while maximizing business value (Stubbs, 2011).

Inventory Control: Refers to the planning for optimum quantities of materials at all stages in the production cycle and evolving techniques which would ensure the availability of planned inventories (Bartmann & Bach, 2012).

Inventory Management: is the supervision of non-capitalized assets (inventory) and stock items. A component of supply chain management, inventory management supervises the flow of goods from manufacturers to warehouses and from these facilities to point of sale (Iser, Bedingfield & Wells, 2015).

Return On Asset: is a measurement used to show the ability of the company to utilize assets in an efficient way to generate profits (Mohamad, Saleh & Fares, 2011).

Return on Equity: is the amount of net income returned as a percentage of shareholders' equity (Vintila & Gherghina, 2012).

Staff Competence: Refers to a combination of observable and measurable knowledge, skills, abilities and personal attributes that contribute to enhanced employee performance and ultimately result in organizational success (Osei & Ackah, 2015).

Supplier Management: Refers to comprehensive approach to managing an enterprise's interactions with the organizations that supply the goods and services it uses (Kosgei & Gitau, 2016).

Supply Chain Automation: Is the use of largely automatic equipment in a system of manufacturing or other production process (Forbes & Ahmed, 2010).

Supply-chain optimization: is the application of processes and tools to ensure the optimal operation of a manufacturing and distribution supply chain (Bucki & Suchanek, 2012).

LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variances
BAT	British American Tobacco
CRM	Customer Relationship Management
EAC	East Africa Community
GDP	Gross Domestic Product
GPS	Global Positioning Systems
HPM	High Performance Manufacturing
ICAP	Institute of Chartered Accountants of Pakistan
IT	Information Technology
KAM	Kenya Association of Manufacturers
KMO	Kaiser-Meyer-Olkin
KNBS	Kenya National Bureau of Statistics
KPI	Key Performance Indicators
KPMG	Klynveld Peat Marwick Goerdeler
KS	Kolmogorov-Smirnov Test
MMR	Moderated Multiple Regression
PSM	Purchasing and Supply Management
ROA	Return on Asset

ROE	Return on Equity
SCM	Supply chain management
SCOR	Supply Chain Operations Reference
SPSS	Statistical Package for Social Sciences
SRM	Supplier Relationship Management
TFP	Total Factor Productivity
US	United States
VIF	Variance Inflation Factor

ABSTRACT

The purpose of the study was to assess the influence of supply chain optimization on the performance of manufacturing firms in Kenya. The specific objectives of the study were to establish the influence of inventory control, supplier management, procurement cost optimization, supply chain automation on performance of manufacturing firms in Kenya. The study further explored the moderating effect of staff competence on the relationship between supply chain optimization and performance of manufacturing firms in Kenya. The study focused on the purchasing portfolio theory, transaction cost analysis theory, theory of constraints, competency theory and supply chain operations reference model. The study used cross sectional survey research design. Cross sectional design was justified on grounds that data of different manufacturing firms will be collected at a defined period. The study's target population included supply chain managers in charge of procurement department in manufacturing firms in Nairobi County. The 499 supply chain managers in manufacturing firms were the population for this study. The sample of this study consisted of 222 supply chain managers in manufacturing firms in the Nairobi that were stratified and randomly selected from a list of 499 supply chain managers in manufacturing firms operating in Nairobi in Kenya. This study relied on both primary and secondary data sources. Secondary data was collected for performance of the selected manufacturing firms for the period of between 2012 and 2016. This study utilized a questionnaire on the other hand to collect primary data. Quantitative techniques were used in analyzing the data. A pilot study was conducted on 22 supply chain managers which constituted 10 per cent of the sampled 222 supply chain managers in manufacturing firms. The supply chain managers used in pilot testing were not used in data collection for the study. The aim of the pilot test was to test the reliability and validity of the questionnaire. The study used both descriptive and inferential statistics. Descriptive analyses used included: mean, standard deviation as an additional measure of variance and hence risk, frequencies and percentages, while the inferential statistics used were correlation analysis and regression analysis. The findings revealed that supply chain optimization used in this study were significant predictors of performance of manufacturing firms in Kenya. This revealed that there is a significant positive relationship between inventory controls, supplier management, procurement cost optimization, supply chain automation and performance of manufacturing firms in Kenya. The study also established that staff competence significantly moderated the relationship between supply chain optimization and performance of manufacturing firms in Kenya. The study concludes that supply chain optimization plays a significant role in the overall performance of the manufacturing firms. The study recommends that manufacturing firms should invest in supply chain optimization to enhance their performance.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

As competition in the 1990s intensified and markets became global, so did the challenges associated with getting a product and service to the right place at the right time at the lowest cost (Li, Ragu-Nathan & Rao, 2006). Organizations began to realize that it is not enough to improve efficiencies within an organization, but their whole supply chain has to be made competitive. The understanding and practicing of supply chain management has become an essential prerequisite for staying competitive in the global race and for enhancing profitably (Li, Ragu-Nathan & Rao, 2006).

SCM is the external logistics part of a company including customers and suppliers. Supply chain management relates the management of materials and information flows through logistic chain (Ballou, 2007). The most of the definitions of SCM focus on the external environment. However, in some management areas (especially in the modernization of business and operational management) studies focus on the internal part. Without taking into account the global market supply chain realities, it is no longer seems possible to achieve success for the companies (Rushton, Croucher & Baker, 2014). It is not enough for the firms to capture the entire success, by only integrating; the design, procurement, manufacturing and distribution processes within the new methods and also the management, in accordance with the implementation of advanced technology.

Supply chain optimization connects the entire manufacturing or distribution value chain, from R&D and materials sourcing through production and delivery. Rather than focusing on individual suppliers, it gain a holistic view to enable the firm to look at the entire system and find ways to improve delivery speed, while reducing costs and risks. The implementation of the supply chain networks to cover this form of management is one the main factors of the success (Rushton, Croucher & Baker, 2014). In various research activities, SCM implementations were described as;

supplier partnership, customer relationship, customer service management, foreign procurement, purchasing, information sharing, information technologies sharing among others. Li *et al.* (2006) has set-up their works on five activities; strategic supplier partnership, customer relationship, level of information sharing, information sharing quality and delay.

Suppliers' performance has a significant impact on the product quality, production costs, delivery time, technology, innovation and the development of the firm and also strongly affects the competitiveness and profitability of the organization. Resource utilization quality can be only improved by the strategic partnerships of the main suppliers. The development of management capacity depends on the long-term cooperation, to ensure excellent product quality, availability and selection of the supplier (Ince, Imamoglu, Keskin, Akgun & Efe, 2013). Strategic partnerships do not have special form; they can be changed according to the aims of the partners. Selection and development of supplier's activities, improved communication between the institutions will promote mutual trust, making the sharing of information and provide long-term partnerships, establish a balanced partnership and also provide an understanding of the strategic orientations for the partners' expectations (Mzoughi, Bahri & Ghachem, 2008).

A fundamental element of operations strategy is the definition of the firm's competitive priorities. These may include the basic priorities cost, quality, delivery, and flexibility (Boyer & Lewis, 2002), as well as additional ones such as innovation (Kroes & Ghosh, 2010). A firm has to make trade-offs between these priorities while allocating its limited resources, at least with respect to the relative rates of improvement of the different priorities. In their study of 110 manufacturing plants, Boyer and Lewis (2002) found that trade-offs between cost and flexibility, delivery and flexibility, and delivery and quality exist. This trade-off is also reflected in the distinction between lean vs. agile manufacturing and supply chain strategies as well as the efficiency–responsiveness dichotomy in supply chain priorities, where efficient supply chains aim for the cost-efficient fulfillment of predictable demand, and responsive supply chains for the quick response to unpredictable demand (Wagner, Grosse-Ruyken & Erhun, 2012).

Extending the concept of fit to the supply chain strategy context, we conceptualize supply chain fit based on the framework of Abdulaziz (2014) who formalizes fit by characterizing products as being either certain/predictable or uncertain/unpredictable and supply chains as being either efficient or responsive. Supply chain fit is defined as the perfect strategic consistency between a product's supply and demand characteristics such as demand predictability, life-cycle length, product variety, service, lead-times, and specific market requirements and supply chain design characteristics such as inventory strategy, product design strategy, and supplier selection aspects. For certain/predictable uncertain/unpredictable products the perfect strategic consistency is achieved with an efficient responsive supply chain (Wagner, Grosse-Ruyken & Erhun, 2012).

SCM is management of material and information flow in a supply chain to provide the highest degree of customer satisfaction at the lowest possible cost. Li *et al.* (2006) defined SCM practices as the set of activities undertaken by an organization to promote effective management of its supply chain. From literature review and consolidation, they were able to identify six dimensions of SCM practices: strategic supplier partnership, customer relationship, information sharing, information quality, internal lean practices and postponement (Sundram, Ibrahim & Govindaraju, 2011).

Corporate SCM practices relate to supply chain integration, information technology and sharing, just-in-time, supplier relationship, customer relationship, and geographical proximity. Functional SCM practices relate to issues regarding supply and materials management, internal operations (divided by new product development, just-in-time, and quality) and customers and distribution (Christopher, 2016). SCM requires commitment of supply chain partners to work closely to coordinate order generation, order taking and order fulfillment thus, creating an "extended enterprise" spreading far beyond the producer's location. Supply chains encompass the companies and the business activities needed to design, make, deliver and use a product or service (Christopher, 2016). Various theories that guide on effective supply chain management and its benefits in clued the systems theory, resource based theory and the principle agent theory. Supply chain management is also the integration of key business processes from initial raw material extraction to

the final or end customer, including intermediate processing, transportation and storage activities and final sale to the end customer. Organizations/ Firms with large system inventories, many suppliers, complex product assemblies, and highly valued customers with large purchasing budgets have the most to gain from the practice of supply chain management (Christopher, 2016).

With any supply chain, there is always room for improvement. Whether it be bottleneck elimination, cost management, or a new system integration, project managers are attempting to locate various ways in which they can optimize their supply chain. Supply chain optimization methods will permit your manufacturing operation to come closer to overall production and factory efficiency, leading to reductions within time and cost (Giuliano & O'Brien, 2007). Furthermore, here are ways that firms are able to optimize supply chain. Inventory Control, being fully aware of your inventory not only reduces cost, but it will enhance delivery time as well. Inventory accuracy is a must for any manufacturing operation that wants to expand their consumer base and target market. Delivery times are important to all consumers, and if the materials or product do not show up on time, then the entire supply chain can fall out of whack, leading to lost time and revenue (Grönroos, 2004). Supplier Inventory Management, establishing a favorable relationship with the supplier will enable open communication. Through open communication, can share information about customer demand and inventory, which may optimize demand planning. As both firm and the supplier have the same goals (delivery time accuracy), being open and sharing information with your supplier will permit a steady flow within your supply chain. System Integration, modern Manufacturers can not reach full potential without integrating an accurate and efficient system. Whether it is an enterprise resource planning system (ERP) or installing advanced planning and scheduling software (APS), gradually witness the improvements in production through systemic accountability and optimization.

1.1.1 Global Perspective on Supply Chain Optimization

Supply chain optimization is one of the key components for the effective management of a company with a complex manufacturing process and distribution network (Ballou, 2007). Companies with a global presence in particular are motivated to optimize their distribution plans in order to keep their operating costs low and competitive. Changing conditions in the global market and volatile energy prices increase the need for an automatic decision and optimization tool. In recent years, many techniques and applications have been proposed to address the problem of supply chain optimization (Christopher, 2016). However, such techniques are often too problem specific or too knowledge-intensive to be implemented as in-expensive, and easy-to-use computer system. The effort required to implement an optimization system for a new instance of the problem appears to be quite significant. The development process necessitates the involvement of expert personnel and the level of automation is low (Christopher, 2016).

The supply chains of large corporations involve hundreds of facilities (retailers, distributors, plants and suppliers) that are globally distributed and involve thousands of parts and products (Kembel, Jones, Kline, Northcutt, Stenson, Womack & Green 2012). The goals of corporate supply chains are to provide customers with the products they want in a timely way and as efficiently and profitably as possible. Fueled in part by the information revolution and the rise of e-commerce, the development of models of supply chains and their optimization has emerged as an important way of coping with this complexity (Hugos, 2011). Indeed, this is one of the most active application areas of operations research and management science today. This reflects the realization that the success of a company generally depends on the efficiency with which it can design, manufacture and distribute its products in an increasingly competitive global economy (Monczka, Handfield, Giunipero & Patterson, 2015).

Typically firms carry inventories at various locations in a supply chain to buffer the operations at different facilities and in different periods. Inventories are the links between facilities and time periods (Dzupire & Nkansah-Gyekye, 2014). Inventories

of raw materials, work-in-process, and finished goods are ubiquitous in firms engaged in production or distribution (by sale or circulation) of one or more products. Cost optimization is where the costs are linear, so there are unit costs and of production and storage in period (Váncza, Monostori, Lutters, Kumara, Tseng, Valckenaers & Van Brussel, 2011). It is optimal to hold inventory in a period if the unit production cost in that period is less than that in the following period and the unit storage cost is small enough. According to (Dzupire & Nkansah-Gyekye, 2014). supply chain optimization has several advantages. First, it unifies the treatment of many supply-chain models. Second, it extends the applicability of the methods to broad classes of problems outside of supply-chain management. Third, it facilitates use of the special structure of the associated graphs to characterize optimal flows and develop efficient methods of computing those flows.

A supply chain is the network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product, from the delivery of source materials from the supplier to the manufacturer, through to its eventual delivery to the end user (Carr & Pearson, 2002). Supply chain management is the streamlining of a business' supply-side activities to maximize customer value and to gain a competitive advantage in the marketplace. Supply chain management (SCM) represents an effort by suppliers to develop and implement supply chains that are as efficient and economical as possible. Supply chains cover everything from production, to product development, to the information systems needed to direct these undertakings (Wisner, Tan & Leong, 2014).

1.1.2 Regional Perspective on Supply Chain Optimization

Manufacturers in the region lose over $330 million annually and the government loses $67 million in potential tax revenue due to unforeseen uncertainties (Kihara, 2017).. By managing the supply chain, companies are able to cut excess fat and provide products faster. This is done by keeping tighter control of internal inventories, internal production, distribution, sales and the inventories of the company's product purchasers. SCM is based on the idea that nearly every product that comes to market results from the efforts of various organizations called the

supply chain. Although these supply chains have existed for ages, until recently most companies have paid only scant attention to them (Wisner, Tan & Leong, 2014).

Supply chain management (SCM) is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer (Zhu, Sarkis, Cordeiro & Lai, 2013). Council of Supply Chain Management Professionals (2010) defined supply chain as material and informational interchanges in the logistical process, stretching from acquisition of raw materials to delivery of finished products to the end user. All vendors, service providers, and customers are links in the supply chain (Ayers, 2006).

Tang (2006) defined supply chain as the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer. Coyle, Langley, Novak and Gibson (2013) define supply chain as a series of integrated enterprises that must share information and coordinate physical execution to ensure a smooth, integrated flow of goods, services, information, and cash through the pipeline. The three main flows of the supply chain are the information flow, the finance flow and the product flow. SCM involves coordinating and integrating these flows both within and among companies.

Supply chain management, then, is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage. It represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective & efficient ways possible. Supply chain activities cover everything from product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities (Monczka, Handfield, Giunipero & Patterson, 2015).

1.1.3 Local Perspective on Supply Chain Optimization

In Kenya today, companies face an increasingly challenging marketplace with a growing field of competitors, higher customer expectations, and complex supplier

relationships. Increased competition means that companies face a dual challenge of cutting costs while being more responsive to the markets. The need to cut cost is driving companies to outsource business operations, minimize inventories, divert underutilized capital equipment and facilities and in general run as close to the edge as possible (Ambira & Kemoni, 2011).

A study by Ambiria and Kemoni (2011) showed that BAT supply chain reconfiguration program has lasted six years at this point in time and it has been a major undertaking. This is not uncommon given the size and scale of modern supply chains and the breadth and depth of business alignment needed for successful change. It should be noted that specific keys to success are in the change management itself. There is real importance and art to getting business alignment and change management right. BAT has changed direction of its efforts while underway and it has learned many lessons as it went along. Because of the stakes, the amount of effort and time required in major supply chain reconfiguration programs, the lessons shared here are so valuable and unique. In particular, they can help other companies improve effectiveness or accelerate the pace of change in their supply chain reconfiguration programs (Odhiambo & Kamau, 2003).

East Africa Breweries apply the concept of supply chain from the farmers instead of pass through the brokers that could result into higher income for small scale farmers, whose motivation for commercial farming is always dimmed by lack of market or rock bottom prices for produce especially when there is oversupply (Nderitu & Ngugi, 2014). The Vision 2030 is Kenya's current blue-print for the future of economic growth. The long-term goals of this vision are to create a prosperous and globally competitive nation with a high quality of life by the year 2030. To do this, it aims to transform Kenyan industry all the while creating a clean and secure environment. The Economic Pillar is seeking to achieve growth in the Gross Domestic Product of 10 percent by 2012 (Low, 2012). The economic areas that the Vision 2030 is targeting include tourism, agriculture, wholesale/retail trade, manufacturing, IT enabled services, and Financial Services. This can only become a reality if the supply chain performance in these sectors is perfected and generally improved through management of risks of disruptions (Income, 2010).

According to Musau (2015), the performance in procurement in Kenya is heavily influenced by the implementation of inventory optimization, especially where e-procurement systems are used. The evaluation of procurement performance takes into consideration of both the strategic and operational dimensions of the procurement function. From the operational dimension, procurement performance relates to the costs of purchasing, product and/or service quality, delivery and flexibility in procurement (Nair, Jayaram & Das, 2015).

Poor procurement performance on its part contributes to rising inefficiency as well as costs and competitiveness of the procurement function. According to Barsemoi, Mwangagi and Asienyo (2014), poor procurement performance contributes to decrease in profitability in the private sector hence is a major hindrance to the realization of organizational growth as it leads to delays in low quality goods and services, increase in defects and delays in delivery. In both public and private sectors, poor procurement performance results from inability to embrace e-procurement, use traditional procurement procedures and poor coordination of procurement activities between the requisitioning departments and the procurement department (Chemjor, 2015).

The realization of supplier evaluation objectives in earnest leads to procurement performance. The use of evaluation criteria such as the quality criterion is a helpful tool in supplier development (Odhiambo, 2015). This is because supplier evaluation motivates suppliers to continuously improve their operations by raising efficiency and being more innovative (Sundtoft & Ellegaard, 2011). The use of realistic evaluation criteria helps both parties to realize causes of weak performance on the part of suppliers and this enables them to take remedial measures.

1.1.4 Manufacturing Firms in Kenya

In Kenya, the industrial sector is the fourth biggest sector after agriculture, transport and communication. Although Kenya is the most industrially developed country in East Africa, the manufacturing sector in Kenya constitutes 10 per cent of the industrial sector contribution to GDP. Kenya Vision 2030 identifies the

manufacturing sector as one of the key drivers for realizing a sustained annual GDP growth of 10 per cent (Vernon, 2017).

The manufacturing sector has high, yet untapped potential to contribute to employment and GDP growth. Industrial activity, concentrated around the three largest urban centres of Nairobi, Mombasa, and Kisumu is dominated by food-processing (Oyuke, 2012). After a long period of virtual stagnation, the Kenyan economy went through a strong phase over the period 2003-2007, as the rate of economic growth accelerated up to 7 per cent. During the same period Total Factor Productivity (TFP) in manufacturing increased by as much as 20% (Orege, 2016). The growth in manufacturing industry declined from 3.3 per cent in 2011 as compared to 4.4 per cent in the year 2010 mainly due to a challenging operating environment (KNBS, 2012). As an important sector in the overall economic growth, manufacturing sector requires in depth analysis at industry as well as firm level.

According to KPMG (2014) real growth in the manufacturing sector averaged 4.1% p.a. during 2006-2013, which is lower than the average annual growth in overall real GDP of 4.6%. As a result, the manufacturing sector's share in output has declined in recent years. According to the US Department of State, this exposes a gap in the country's ability to achieve a fully industrialized economy by 2030. It argues that there is still a lot of room for expansion in Kenya's manufacturing sector, but for this to happen, reforms to the business environment need to be made to factor in the influence of contingencies in the manufacturing sector in Kenya (KPMG, 2014).

The manufacturing sector has a great potential on promoting economic growth and competiveness in the country like Kenya. It is the third leading sector contributing to GDP in Kenya. The sector has experienced the fluctuations over the years under different financial conditions mostly contingent in nature. According to the World Bank (2014), sluggish growth in the manufacturing sector is pulling down economic growth in Kenya and is also losing grip on the East Africa Community market where it was dominant, due to inefficiencies and the unpredictable operating environment.

The share of manufactured goods imported by EAC from Kenya declined from 9 per cent in 2009 to 7 per cent in 2013 (World Bank, 2014). Kenya was the largest exporter of various manufactured goods to the EAC. Its market share has declined for a range of products, including chemicals, paper and plastics (Vernon, 2017). The report spelt out the main influence being uncertainties in the operating environment and lack of preparedness by these manufacturing firms to adjust and cope with the dynamic environment (Vernon, 2017). Statistics from World Bank show that Kenyan manufacturers have registered stagnation and declining profits for the last five years due to unpredictable operating environment (Orege, 2016). Further statistics from Kenya Association of Manufacturers have shown that firms announced plans to shut down their plants and shift operations to Egypt as a result of reduced profits (KAM, 2014). Cadbury Kenya announced that it will close down its manufacturing plant in Nairobi by the end of October 2014 (Vernon, 2017). In the full-year to September 2013 results, Eveready's net profit fell 58.7 per cent to $493,237, from $784,783 the previous year. Its production capacity dropped to 50 million units annually, down from a previous high of 180 million per year mainly caused by contingencies (Vernon, 2017). Tata Chemicals Magadi scaled down its operations by closing down its main factory (Tunga, 2013).

It is estimated that manufacturing companies have lost 70 per cent of their market share in East Africa (Vernon, 2017). due to contingencies. Reckitt & Benkiser, Procter & Gamble, Bridgestone, Colgate Palmolive, Johnson & Johnson and Unilever have all relocated or restructured their operations, opting to serve the local market through importing from low-cost manufacturing areas such as Egypt therefore resulting in job losses (Nyabiage & Kapchanga, 2014) as a result of turbulent operating environment and high operating costs. Magadi Soda (Tata chemicals) had more than 200 workers laid off due to performance challenges, Eveready laid off 100 workers while the multinational confectionary company Cadbury Kenya fired about 300 of their team due to its declining profits (Timase, 2014).

1.2 Statement of the Problem

Many manufacturing firms have failed to manage their ever increasing supply chain costs leading to poor performance. According to Salazar (2012) the cost of materials as a percentage of sales has been estimated at approximately 53% for all types of manufacturing. These costs range from a low of 27% for tobacco products to a high of 83% for petroleum and coal products but most industries are in the 45 – 60% range. This amount of money spent represents a significant opportunity for companies to realize cost savings through supply chain optimization (Li, Rao, Ragu-Nathan & Ragu-Nathan, 2015). The performance of the manufacturing sector in Kenya has been affected by use of obsolete supply chain management practices (Vernon, 2017). Statistics from World Bank show that Kenyan manufacturing of firms have registered stagnation and declining profits for the last five years due to a turbulent operating environment (Orege, 2016). It is estimated that large manufacturing companies have lost 70 per cent of their market share in East Africa largely attributed to contingencies arising from among others improper management of supply chain (Vernon, 2017).

Many manufacturing firms have relocated or restructured their operations, opting to serve the local market through importing from low-cost manufacturing areas such as Egypt therefore resulting in job losses (Nyabiage & Kapchanga, 2014) citing turbulent operating environment and high operating costs. Supply chain management practices contribute 50% to the profitability and performance of any organization (Zhu, Sarkis, Cordeiro & Lai, 2013). KPMG (2014) report also noted that real growth in the manufacturing sector averaged 4.1% p.a. during 2006-2013, which is lower than the average annual growth in overall real GDP of 4.6%. As a result, the manufacturing sector's share in output has declined in recent years. According to the World Bank (2014), sluggish growth in the manufacturing sector is pulling down economic growth in Kenya and is also losing grip on the East Africa Community market where it was dominant, due to inefficiencies and the unpredictable operating environment. The share of manufactured goods imported by EAC from Kenya declined from 9 per cent in 2009 to 7 per cent in 2013 (Orege, 2016).

Efficient human resource plays a significant role in an organization's performance as compared with it financial and technology resources. This is true due to the fact that a resourceful and capable workforce is critical to achieving the overall goals and strategies of a firm (Osei & Ackah, 2015). In order to develop competent workforce managers, need to engage employees in the decision making process and this will provide continuous learning environment where needed skill be obtained. When employees have clear idea in-terms of job expectation and the strategic goals of the firm, task and jobs are designed in line with these set targets (Prasanna & Swarnalatha, 2018).

Studies that have been done in this areas include Kimani (2013) who pointed out that manufacturing companies have faced challenges of dealing with scope global market place and its supply chain while retaining speed and flexibility, elimination of wasted time, effort and materials from all point in the supply chain and meet the needs of customer without holding more inventories. Oketch (2014) study focused on supply chain performance and performance of manufacturing pharmaceutical firms in Kenya. The author noted that monitoring the supply chain performance measurement could help give a firm competitive edge over the others.

Awino (2011) on the other hand focused on investigation of selected strategy variables on performance of large private manufacturing firms in Kenya. Haron and Arul (2012) study was based on the efficiency performance of manufacturing companies in Kenya. Mwangangi (2016) on the other hand focused on influence of logistics management on performance of manufacturing firms in Kenya. Gichuru, Iravo and Arani (2015) study focused on collaborative supply chain practices on performance of food and beverages companies.

The above studies (Awino, 2011; Haron, & Arul, 2012; Mwangangi, 2016; Gichuru, Iravo & Arani, 2015) demonstrate that research has been conducted on the performance of manufacturing firms in Kenya, however none of the mentioned studies and generally little attention has been given on the role supply chain optimization on the performance of manufacturing firms in Kenya. Specifically, there is a knowledge gap on the influence of inventory optimization, supplier

optimization; procurement cost optimization and supply chain automation on the performance of manufacturing firms in Kenya. Therefore, this study intended to address this knowledge gap.

1.3 Research Objectives of the Study

This section outlines the objectives which were addressed by the study. The objectives were categorized into general objective and specific objectives.

1.3.1 General Objective

The general objective of the study was to assess the influence of supply chain optimization on the performance of manufacturing firms in Kenya

1.3.2 Specific Objectives

The study was guided by the following specific objectives:

1. To establish the influence of inventory control on performance of manufacturing firms in Kenya.
2. To assess the influence of supplier management on performance of manufacturing firms in Kenya.
3. To determine the influence of procurement cost optimization on performance of manufacturing firms in Kenya.
4. To assess the influence of supply chain automation on performance of manufacturing firms in Kenya.
5. To explore the moderating effect of staff competence on the influence of supply chain optimization on performance of manufacturing firms in Kenya.

1.4 Research Hypotheses

The study sought to test the following null hypotheses:

1. **H_0**: There is no significant influence of inventory control on the performance of manufacturing firms in Kenya.

2. **H_0**: There is no significant influence of Supplier management on the performance of manufacturing firms in Kenya.
3. **H_0**: There is no significant influence of Procurement cost optimization on the performance of manufacturing firms in Kenya.
4. **H_0**: There is no significant influence of Supply chain automation on the performance of manufacturing firms in Kenya.
5. **H_0**: There is no significant moderating effect of Staff competence on the on the influence of supply chain optimization on the performance of manufacturing firms in Kenya.

1.5 Significance of the Study

The findings of this study are of importance to stakeholders and procurement managers of manufacturing companies. Stakeholders and procurement managers may be able to understand the role of supply chain optimization particularly inventory control, supplier management; procurement cost optimization and supply chain automation on the performance of manufacturing firms in Kenya. This may enable to overcome the daily challenges experienced in the line of duty.

The study will also benefit many stakeholders since it will inform the policy makers on the areas of the supply chain that require policy interventions for the purpose of providing an efficient supply chain. Kenya Institute of Supplies Management is in the process of developing a regulatory body for procurement officers, this study will provide the relevant facts and suggestions upon which to base their standards and performance benchmarks. Internal and external policy makers may be informed on the role of supply chain optimization on the performance of manufacturing firms in Kenya hence they may be more informed when making policy touching in this sector.

The study also contributed to theory building by expanding the theory adopted to explain the relationship between supply chain optimization on the performance of manufacturing firms in Kenya. These include purchasing portfolio theory, transaction cost analysis theory, theory of constraints, system theory, competency theory and supply chain operations reference model.

1.6 Scope of the Study

The study was restricted on the influence of supply chain optimization on the performance of manufacturing firms in Kenya. The study specifically focused on establishing the influence of inventory control, supplier management; procurement cost optimization and supply chain automation on the performance of manufacturing firms in Kenya. The study covered the manufacturing in Kenya. The study focused on this period 2012 to 2016, because majority of firms performed so dismally causing public outcry for instance the Mumias Sugar, among others. In addition, five years' period was adequate to measure any significant change. The population of this study was derived from the supply chain managers or their equivalence in charge of procurement departments in manufacturing firms in Kenya.

1.7 Limitation of the Study

The major limitation encountered was obtaining information from the supply chain managers as most of them were not willing to disclose some information which they thought to be confidential. The researcher overcame this limitation by using the introduction letter from the University to assure them that the information provided will be used for academic purpose only. The data of the study were collected on an urban county; thus it may be difficult to replicate it in rural areas of the country. It is important that further research be conducted in rural areas within Kenya to confirm the findings of this study. Some respondents took a lot of time to respond and some lost their copies of the questionnaires thus extending the period of data collection for more than the intended time. Another limitation is that the manufacturing firms are too many; to overcome this study only targeted manufacturing firms in Nairobi County. The sample of the study was drawn from all manufacturing firms in Kenya; therefore, the conclusions inferred can only be generalized to the population of manufacturing firms in Kenya and must exclude other categories of firms like service and hospitality industry.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews relevant literature on supply chain optimization and firm performance. The chapter further develops theoretical review, conceptual framework, empirical review that was used by the study in regard to each variable in the study.

2.2 Theoretical Literature Review

A theory is a statement that is supported by evidence and meant to explain a certain phenomenon. Theories provide a general explanation to an occurrence and that a researcher should be conversant with theories that are applicable to his area of study (Ngumi, 2013). It guides research to determine what things to measure, and what statistical relationships to look for (Defee, Randal, Thomas & Williams, 2010). Thus the theoretical literature helps the researcher to see clearly the variables of the study, provides a general framework for data analysis and helps in selection of applicable research design (Ngumi, 2013). The current study focused on the purchasing portfolio theory, transaction cost analysis theory, theory of constraints, system theory, competency theory and supply chain operations reference model.

2.2.1 Purchasing Portfolio Theory

Portfolio approach on purchasing has been a relevant subject through last decades; it is well known that there is no one “perfect” purchasing strategy that could fit all kinds of purchased good or services (Lysons & Farrington, 2006). Thus segmentation is necessary in order to differentiate purchases and to adapt different strategies. Purchasing portfolio theory refers to approaches that are applied for the efficient portfolio management in order to generate the highest possible returns at lowest possible risks (Gelderman & Semeijn, 2006). Portfolio approach was introduced by Kraljic (1983) to determine a set of differentiated purchasing strategies. The general idea is to minimize supply risk and make the most of buying power (Kraljic, 1983). This explains the choice of dimensions: accounting for risk on the one hand, and

using buying power on the other hand. Kraljic's approach includes the construction of a portfolio matrix that classifies products on the basis of two dimensions: profit impact and supply risk ('low' and 'high') (Caniëls & Gelderman, 2007). The result is a 2x2 matrix and a classification in four categories: bottleneck, noncritical, leverage and strategic items. Each of the four categories requires a distinctive approach, in proportion to the strategic implications (Gelderman, 2003).

Non-critical items require efficient processing, product standardization, order volume and inventory optimization. Leverage items allow the buying company to exploit its full purchasing power, for instance by tough negotiating, target pricing and product substitution (Arabzad, Razmi & Ghorbani, 2011). Bottleneck items on the other hand cause a lot of problems and risks. Volume insurance, vendor control, security of inventories and backup plans are recommended. A further analysis of the strategic items is recommended (Gelderman & Laeven, 2005). By plotting the buying strengths against the strengths of the supply market, athree basic power positions are identified and associated with three different supplier strategies: balance, exploit, and diversify (Gelderman & Laeven, 2005).

A general conclusion is that portfolio approaches is very helpful in positioning commodities in different segments and in developing purchasing strategies. Furthermore, the Kraljic matrix is useful for discussing, visualizing, and illustrating the possibilities of differentiated purchasing-and supplier strategies. It can also be useful for coordinating purchasing and supplier strategies among different fairly autonomous business units (Fenson, Edin & Holmer, 2008). Gelderman and Van Weele (2003) illustrate in their case study a clear tendency that buyers want to avoid supply risk and thereby position more in the center of the matrix. Regarding strategic movements in the matrix and the movements to and from the strategic quadrant, three distinctive situations were found: holding the position and maintain strategic partnership, holding the position and accept a locked in partnership and moving to another position and terminate the partnership and thereby find a new supplier. In a move to the strategic quadrant it is about developing a partnership. Most likely it concerns a commodity positioned in the leverage quadrant. Furthermore, three distinctive measurement methods were found: the consensus method (strategic

discussions), one-by-one method (one key variable per dimension) and the weighted factor (a number of factors for each dimension) (Fenson, Edin & Holmer, 2008). The consensus method has some attractive features and is based on reasoning and discussions. The last remark is that experienced portfolio users always include additional information with reference to the overall business strategy, the situation in the supply market and the capacities and intension of the individual suppliers (Bhushan & Rai, 2007).

Canïels and Gelderman (2005) empirically looked at the relative power and total interdependence for a number of portfolio based purchasing strategies. The result of the study, among Dutch purchasing professionals, is that there appear to be a significant difference in the power positions between the purchasing strategies within each quadrant, and that it might be associated with differences in power and dependence positions (Caniels & Gelderman, 2005). The choice of a specific purchasing strategy within each quadrant is yet unclear but can be associated with differences in power and dependence between the buyer and the supplier. New findings concerned the fact that positions in the bottleneck and the strategic quadrants were associated while the other two quadrants had a more balanced power structure. This means that when a strategic relationship was maintained in the strategic quadrant, there was supplier dominance (Seppälä, 2014). Often the suppliers' sideof the buyer-seller relationship is considered as a disregarded element in Kraljic's model.

The Kraljic approach does not explicitly take into account the possible strategies and reactions of suppliers (Kamann, 2000). In a critical review of the Kraljic-approach Dubois and Pedersen (2002) argued that purchasing portfolio models using ‘given products’ as a point of departure, in addition to a dyadic perspective, may be counterproductive where purchasing efficiency is concerned. Nellore and Söderquist (2000) confirmed that it is imperative for any portfolio use to indicate the characteristics of the supplier with regard to the specification generation, the required relationship and the required type of specification for a given component. The design of a product entails issues that are not explicitly considered in portfolio models. Obviously, whether the product is developed by the supplier, the customer or

developed jointly impacts on the relationships between parties (Araujo et al., 1999). Mismatches between buyer and seller are likely to occur if one does not take into account how a supplier (i.e. a marketing or sales manager) assesses the situation. And vice versa, of course. A partnership is only possible if that is the strategic intent of both parties. Unquestionably, organizations must match their intentions and strategies. Gelderman and Van Weele (2000) pointed at the natural conflict of interests in buyer/supplier relationships. Both are likely to prefer a dominant power position due to the attached benefits. As a result, positions in the Kraljic matrices will always be amendable to the dynamics of buyer/seller relationships.

2.2.2 Transaction Cost Theory

The theory was developed by Coase (1937). It refers to the cost of providing for some good or service through the market rather than having it provided from within the firm. According to Coase (1937) article on the “The Problem of Social Cost", transaction costs include search and information costs, bargaining and decision costs and policing and enforcement costs (Williamson, 1979). It observes that market prices govern the relationships between firms but within firm decisions are made on a basis different from maximizing profit subject market prices. Within the firm decisions are made on through entrepreneurial coordination (Allen, 1999).

In order to explain how Transaction cost applies to the critical decision points of purchasing, a further explanation of the activities of the purchasing function is given (Baily, 2005). The main activities of Transaction cost economics are centred within 5 processes, namely category strategy, supplier strategy, quotation supplier selection and negotiation, operative procurement and supplier evaluation. Within the first process the category strategy, the buyer puts equal products into one pool (Schiele 2006) and can then determine a strategy for this pooled group.

For a supplier strategy, one might identify the purchasing volume, and level of dependency on the supplier to create a supplier strategy (Johnston, *et al.* 2004). For supplier selection and negotiation, one can choose between competitive bidding and negotiation (Papazoglou & Heuvel, 2007). Coming to the operative procurement step, this step assists the supplier to act according to what has been negotiated

beforehand. When the supplier is providing the buyer with the component, one can measure performance of the supplier, which can be indicated through quality, costs and service (Papazoglou & Heuvel, 2007).

The company should make a component if transaction costs cannot be kept low, use a hybrid governance approach if asset specificity is high but transaction costs can be kept low through the safeguards provided in the contract, and use the market if the component which has to be supplied has low asset specificity (Williamson, 2008). Coming to the sourcing strategy, whether to use multiple suppliers or a single supplier, one might use the same approach of the human agent as being opportunistic and limitedly rational, as in the make or buy decision (Ellram, Tate & Billington, 2008).

Single sourcing is used when the supplier offers special technology, which can lead to a competitive advantage of the company; however, the relationship has to be safeguarded to ensure a cooperative relationship (Walter, Müller, Helfert & Ritter, 2003). Multiple sourcing can be applied when the component is placed within an unassisted, highly competitive market, mostly not providing any special technology that leads to a competitive advantage (Schwabe, 2013). When creating a supplier portfolio the company pools suppliers with the same activities into one pool, however since there is a difference between special technology suppliers, and suppliers providing low asset specificity, one might differentiate between parts that provide a competitive advantage and parts that do not and therefore pool only suppliers with high asset specificity for components delivering a competitive advantage and pool only suppliers with low asset specificity for suppliers providing components that do not lead to a competitive advantage (Lalkaka, 2006).

limitation of the Coase-Williamson approach is that comparative statics detract attention from the mechanisms that lead to different possible outcomes. If governance forms tend to minimise transaction costs, it is not clear how this occurs. Are managers to some extent aware of these costs and consciously reduce them? Or are costs reduced through some process of competitive evolutionary selection of

the costlier over the less costly firms? With his emphasis on information problems and bounded rationality, Williamson does not suggest that managers have sufficient information. Instead (Williamson, 1975) hints at anevolutionary process of selection, but never develops this argument. If he did, he would have to address the well-established theoretical limitations to an (near) optimal evolutionary process of selection, including frequency effects and other context-dependent outcomes (Winter, 1964; Hodgson, 1996). Also in evolution, context matters.

2.2.3 Theory of Constraints

The theory of constraints (TOC) is an overall management philosophy introduced by Eliyahu M. Goldratt in his 1984 book titled The Goal, that is geared to help organizations continually achieve their goals. The theory of constraints (TOC) is a management paradigm that views any manageable system as being limited in achieving more of its goals by a very small number of constraints. There is always at least one constraint, and TOC uses a focusing process to identify the constraint and restructure the rest of the organization around it. TOC adopts the common idiom "a chain is no stronger than its weakest link". This means that processes, organizations, etc., are vulnerable because the weakest person or part can always damage or break them or at least adversely affect the outcome. The theory of constraints is a management philosophy that seeks to increase manufacturing throughput efficiency or system performance measured by sales through the identification of those processes that are constraining the manufacturing system (Goldratt & Goldratt, 2004). Theory of constraints is based on the principle that a chain is only as strong as the weakest link or constraint and to elevate and manage the constraint as necessary (Kairu, 2015). The difficulties in the theory of constraints are: very long lead times, large number of unfulfilled orders or they are executed with much extra effort (overtimes), high level of unnecessary inventories or lack of relevant inventories, wrong materials order, large number of emergency orders and expedition levels, high levels of devolution, lack of key customers engagement, frequent changes or absence of control related to priority orders, which implies on schedule conflicts of the resources (Ceniga & Šukalová, 2014). The theory is founded on the belief that an organization that maximizes the output of every machine will not perform as well as

one that ensures optimization of the flow of materials and value created through its operational performance (Sproull, 2012).

Theory of constraints emphasizes focus on effectively managing the capacity and capability of these constraints if they are to improve the operational performance of their organization. This can be achieved by processing firms applying appropriate inventory control systems. Companies have struggled to invest in the technology and organizational structures needed to achieve to-date systems synchronization that enable coordinated inventory flows (Fawcett, Ogden, Magnan, & Cooper, 2006).

The Theory of Constraints methodology proposes that operational performance is dependent on the application of inventory control systems in processing firm (Cox & Schleier, 2010). Theory of constraints is a methodology whose basis is applied to production for the minimization of the inventory. In reality, it is difficult for a firm to forecast with precision the consumption of its specific product at a specific region with sometime prior to production and supply of the same product (Noreen, Smith & Mackey, 1995).

Under Theory of Constraints, performance measurements are based on the principles of throughput, inventory dollar days and operating expenses (Umble, Umble, & Murakami, 2006). Theory of Constraints measurements are based on a simple relationship that highlights the influence of inventory control system on progress toward the operational performance. The proof of effectiveness for any inventory control system is the degree to which it improves operational performance of business firms. For processing firms to ensure that the bottlenecks on their operations run smoothly they have to embrace the use of inventory control systems that can facilitate operational efficiency (Umble, Umble, & Murakami, 2006). This may result in the acquisition of additional capacity or new technology of inventory control systems that lift or break the constraints. Improving the performance of the constraint leads to improvement in the operational performance of the entire system. The processing firms depend on inventory as a resource in their operations. The theory of constraints contributes a lot to the building of literature in this study (Bayraktar *et a.,* 2009).

Boyd and Gupta (2004) in their studies introduced a theoretical model for Theory of Constraints on Manufacturing Resource Planning and Just-In-Time in manufacturing firms; they suggest that a positive relationship between each of the three Constraints principles and ideas can be used to improve operational performance of processing firm in Kenya. Gupta and Boyd (2008) in their research on 'theory of constraints can serve as a general theory in operations' revealed that theory of constraints provides approaches to operations that avoid pitfalls of local optimization by reaching a cross functional boundary in organizations. They also noted that while the theory appears to meet the criteria of a good theory, it has not been empirically tested for the most part. Criticism that has been leveled against theory of constraints includes its sub optimality. Trietsch (2005), argues that the theory is inferior to competing approach.

2.2.4 Competency Theory

According to Ryan, Emmerling and Spencer (2009) the global move to Competence Based Training has introduced a number of new concepts and chief among these concepts is the concept of competence. The concept has created confusions and a host of conceptual misunderstandings at global. The learners identify and select the required concepts, from the relevant domain knowledge, which is facilitated by the teacher. The learners are then guided to identify and draw the relationship of the concepts from the problem to required knowledge, from the required knowledge to performance criteria using skills as the interplay elements or links, and, finally, from performance criteria to the problem.

Maximum performance is believed to occur when the person's capability or competency is consistent with the needs of the job demands (roles and responsibilities) and the organizational environment, systems and structures (Ryan *et al.,* 2009). Competencies are framed as abilities related to motive and personality constructs that influence the frequency and intrinsic affective value associated with the execution of specific behaviour and cognitive-affective processes. In this way, competencies not only imply what an individual is capable of doing but what they want to do. Thus for effective prediction of work performance, both of these factors have to be taken into account. This implies that competencies differ significantly

from abilities, because motives form a critical element of the theoretical framework. In other words, abilities inform you about what a person can do, while competencies provide insight into what a person can and will do (Ryan, Emmerling & Spencer, 2009). The theory is relevant to the study as it can be linked to Staff competency which is a moderating variable of the study. The theory indicates that better performance can be achieved if employee's competency is consistent with the job's needs. In other words, better procurement performance is expected if the employee's handling procurement activities are competent.

Despite its significance the competency approach is plagued with long-standing controversies. The main criticism is on its over-simplification of the complex nature of managerial roles. Its view and quest for the 'ideal' model of effective management behaviours suggest that managerial jobs are universal and standardized. Such thinking reflects the theory of scientific management which has become increasingly irrelevant in today's world. The manner in which the competency approach tries to capture all the mysteries of managerial work into sets of 'to do' and 'to have' lists has been considered an insult to managerial communities (Antonacopoulou & FitzGerald,1996). It has been argued that competencies have failed to provide enough subtleties, complexities and contextualities necessary for effective leadership in organizations but have produced conformity and unfocused leadership model (Bolden & Gosling, 2006).

Secondly, the approach is also criticized for assuming that competencies and effective performance is necessarily direct, observable and testable relationships. This criticism is targeted more towards the British MCI competence framework which is concerned with the measurement of managerial performance outputs to some predetermined standards with the purpose of accrediting the performance according to several competence levels. Such practice ignores the fact that effective managerial performance most of the time involves intangible and hard-to-measure elements. By focusing on the output, the MCI method failed to recognize that there are various ways to which managers learned and became competent (Burgoyne, 1989). In other words, adoption of the MCI framework across Britain suggests there is only one way for managers to become competent, and that is through the MCI

accreditation. Antonacopoulou and FitzGerald (1996) also noted the same stating that the system disregards the significance of the managerial learning process.

Thirdly, the lack of consensus in the competency definition has been considered problematic. For instance, Jubb and Robotham (1997), notable critics of the approach, label the competency discourse as 'confusing and confused' and declare the approach a 'myth' whose validity has not been adequately proven. As mentioned earlier, the definition difference is a result of the multi-disciplinary nature of the discipline. Competency has originated from the disciplines of psychology, management / human resource, education and political disciplines (Burgoyne, 1993; Hoffmann, 1999). Each discipline with different interests that affects its orientation towards macro/micro, theoretical/practical and technical/practical dimensions (Burgoyne, 1993). Psychologists concern with individual traits for effective performance (Rhee, 2008). Human resources pursue it as a tool for organizational strategic planning (Clardy, 2008; Rees & Doran, 2001). Whilst some educationists perceive it as a political move to vocationalize education. Given these diversions, competency definition provided by a particular author is therefore oriented towards the purpose of his / her discipline. Competency models have been said incompatible with our fast-changing world. Caldwell (2003) argues that identification of relevant competencies is 'impossible' and not 'useful' in this volatile environment. The use offunctional analysis technique, common in many competency studies, is retrospective rather than prospective.

And the lastly, the idea of the generic competency framework has been said to ignore the importance of work context in influencing managerial behaviours (McKenna, 2004). The generic models wrongly assume that managerial works are standardized and that the required competencies are similar across organizations and countries. A manager considered 'competent' in one organization, industry or in a particular country will not necessarily perform well in other contexts. The importance of context to managerial effectiveness has been repeatedly proven in the literature (Hofstede, 2001; Erondu, 2002). Even within the same organization, interpretation and application of certain competencies varies amongst managers (Antonacopoulou & FitzGerald, 1996; Hayes *et al.,* 2000).

Criticisms that have been leveled against TOC include: Claimed suboptimality of drum-buffer-rope. While TOC has been compared favorably to linear programming techniques, Trietsch (2013) from University of Auckland argues that DBR methodology is inferior to competing methodologies and unacknowledged debt. TOC borrows heavily from systems dynamics developed by Forrester in the 1950s and from statistical process control which dates back to World War II. And Noreen Smith and Mackey, in their independent report on TOC, point out that several key concepts in TOC "have been topics in management accounting textbooks for decades.

2.2.5 Supply Chain Operations Reference Model

The Supply Chain Operations Reference (SCOR) model was a grassroots initiative in SCM. The model was developed and endorsed by the Supply Chain Council as the cross-industry, standard diagnostic tool for supply chain management. The model can be applied to any and all product and information flow in the supply chain at high-levels of modeling abstraction (CSC, 2008). The model provides a unique framework that links performance metrics, processes, best practices, and people into a unified structure (Zailani, Jeyaraman, Vengadasan & Premkumar, 2012). The framework supports communication between supply chain partners and enhances the effectiveness of supply chain management, technology, and related supply chain improvement activities (Trkman & McCormack, 2009).

The SCOR model describes high-level business processes associated with all phases of satisfying customer demand (SCC, 2000). At the highest level the SCOR model is organized around four business process types (Plan, Source, Make, & Deliver). The model provides a business process framework with standard descriptions and interdependencies among processes. The aim is to meaningfully map supply chains and supply chain activities with varying complexities across multiple industry-verticals (Huan, Sheoran & Wang, 2004). The theory is relevant to the study as it provides a framework upon which the supply chain performance can be measured. This framework is a strategic tool for describing, communicating, measuring, implementing and controlling and fine-tuning complex SCM processes. The model

offers the benefits of standardization if all value chain participants implementing the SCOR model adhere to the framework.

One common criticism of SCOR is that it is too “generic” to describe the peculiarities of a given industry or company. But it is in that lack of specificity that its true genius is revealed. At the task level, one or two levels of decomposition below SCOR’s processes, most companies will describe their activities using jargon, IT system entries, and other terms unique to their products, services and customers. By masking those unique steps within higher level “black boxes,” supply chain leaders working with counterparts in other companies and organizations can more easily identify the actors, events and data needed that is, the hand-offs - to orchestrate multi-enterprise processes. If a tool like SCOR didn't exist, it would have to be invented for that purpose. Another criticism of SCOR is the vast array of metrics at each of the model’s three process levels (Theeranuphattana, & Tang, 2007). While it is true that the hundreds of individual measures can seem daunting to say the least, it’s important to understand what SCOR’s curators consider to be the fundamental attributes of any supply chain: Reliability, Responsiveness, Flexibility, Costs and Assets.

2.3 Conceptual Framework

Kothari (2017) defines an independent variable also known as the explanatory variable as the presumed cause of the changes of the dependent variable, while a dependent variable refers to the variable which the researcher wishes to explain. The goal of a conceptual framework is to categorize and describe concepts relevant to the study and map relationships among them. Such a framework would help researchers define the concept, map the research terrain or conceptual scope, systematize relations among concepts, and identify gaps in literature (Creswell & Creswell, 2017). Kothari, 2017; Kombo & Tromp, 2006)

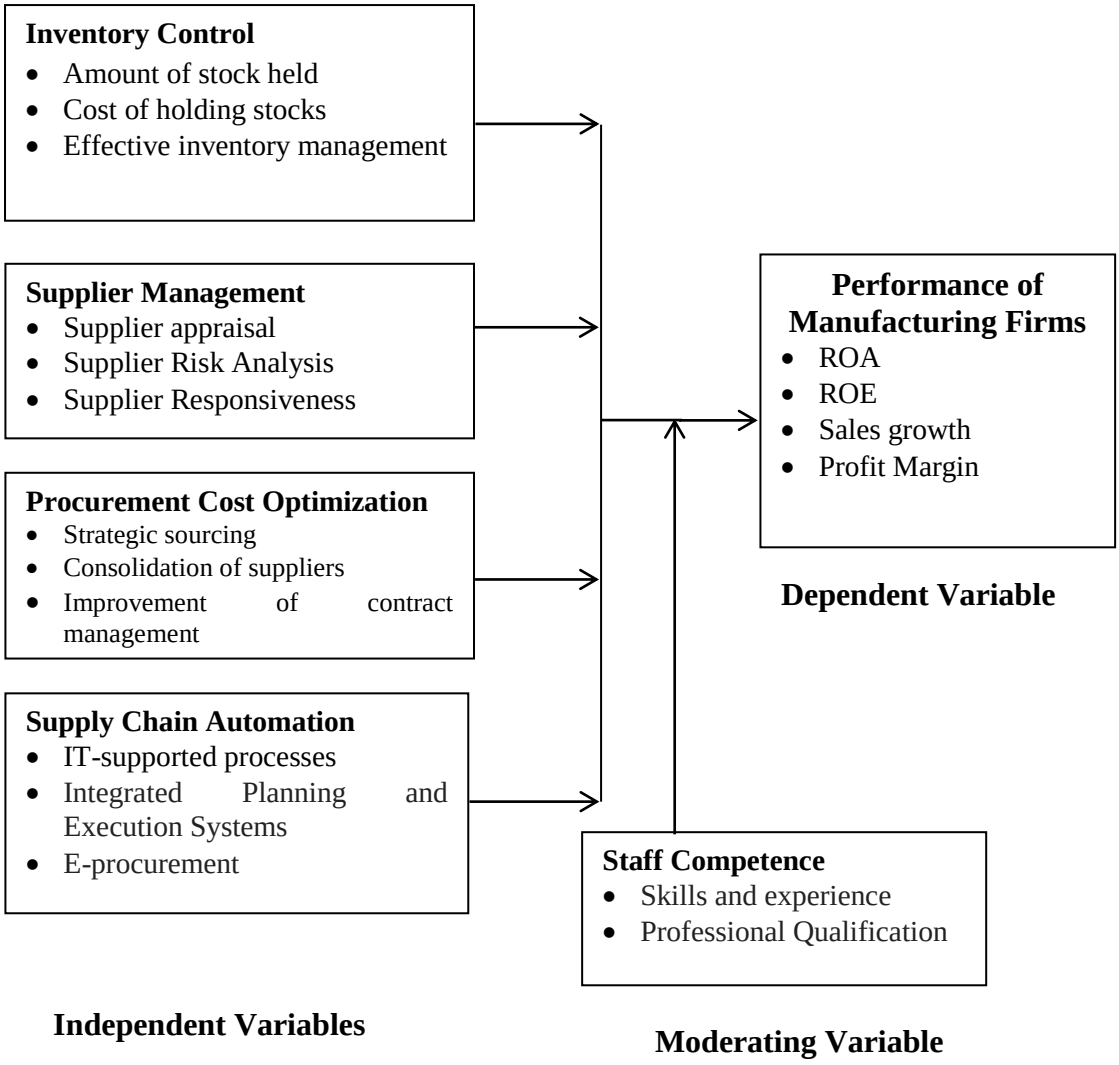

Figure 2.1: Conceptual Framework

2.3.1 Inventory Control and Performance of Manufacturing Firms

Inventory management refers to keeping or maintaining the firm's stocks at a level that a firm will only incur the least cost consistent with other management's set objectives or targets. Inventory management is about ensuring that all input materials of production available to the firm are maintained at a level where production is not interrupted as well as ensuring that operational cost is kept at a minimal level without affecting operation efficiency (Eneje, Nweze, & Udeh, 2012). Inventory management entails planning, organizing, controlling and directing. All these coordinated efforts are meant to ensure achievement of efficiency in all operations of the firm.

The importance of inventory control in business increased dramatically with the increasing interest rates of the 1970s. It was the rule of the hour to release surplus operating capital tied up in excessive inventories and to use the resulting liquidity to finance new investments (Bartmann & Bach, 2012). Inventory management and control refers to the planning for optimum quantities of materials at all stages in the production cycle and evolving techniques which would ensure the availability of planned inventories. It is a significant step but a difficult one. Too much inventory results in locking up of working capital accompanied by increased carrying costs (but reduced ordering costs) (Ward, 2012). Excess inventories, however, guarantee uninterrupted supply of materials and components, to meet production schedules and finished goods to meet customers demand. Too less of inventory releases working capital for alternative uses and reduces carrying costs and increases ordering costs. But there is the risk of stock out costs (Bartmann & Bach, 2012).

An inventory system provides the organizational structure and the operating policies for maintaining and controlling goods to be inventoried (Pfeffer & Salancik, 2003). The system is responsible for ordering and receipt of goods, timing the order placement, and keeping track of what has been ordered, how much, and from whom Inventory control techniques are employed by the inventory control organization within the framework of one of the basic inventory models, viz., fixed order quantity system or fixed order period system. Inventory control techniques represent the operational aspect of inventory management and help realize the objectives of inventory management and control (Pierskalla, 2005).

Such operations may include procurement, stocking and transportation (Akindipe, 2014). Mismanagement of Inventories may lead to significant financial problems for a firm (Muhayimana, 2015). Inventory management is of high importance in financial management decision. This is because excess or shortage of this may bring danger to the company (Mwangi, 2016). The objective of inventory management is to maintain a system that minimizes total cost, while specifically, it establishes that the amount of stock to be ordered is optimal as well as the period between orders. Excess inventory consumes a lot of space, can increase possibility of spoilage, leads

to a financial burden and loss while insufficient inventory has the potential of interrupting business operations (Mwangi, 2016).

Inventory management is vital and needed in various areas within the firm especially in a supply network so as to protect production against any disturbance of running out of production inputs or materials and goods (Ogbo & Ukpere, 2014). Management of Inventory is crucial to a firm since it plays a decisive role to enhance efficiency and improve the firm's competitiveness ability against the firm's competitors. Effective inventory management is all about holding the right amount of inventory required by the business at any point in time. Inventory management involve creation of a purchasing plan which will help to ensure that all items or materials are available when needed as well as and tracking the existing inventories and its use (Muhayimana, 2015).

Ondiek and Odera (2012) explained the concept of inventory management brings in the total systems approach to managing the entire flow of information, materials and services from raw materials suppliers through factories and warehouses to the end user/customer. The study further confirmed that a firm's success depends on how they manage their materials effectively. They indicate that it is important to monitor inventory at each stage because it ties up resources. Therefore, effective inventory management is fundamental to the survival of business, industry and economy.

2.3.2 Supplier Management and Performance of Manufacturing Firms

Supplier Management plays an important role in the reduction of costs and the optimization of performance in industrial enterprises (Samuel, 2014). Supplier Management is a comprehensive approach to managing an organization's interactions with the firms that supply the products and services it uses. SRM is understood as the sourcing policy-based design of strategic and operational procurement processes as well as the configuration of the supplier management (Onyango, Onyango, Kiruri, & Karanja, 2015).).

According to Kosgei and Gitau, (2016) supplier relationship management is defined as a comprehensive approach to managing an enterprise's interactions with the organizations that supply the goods and services it uses. The goal of Supplier Relationship Management (SRM) is to streamline and make more effective the processes between an enterprise and its suppliers just as customer relationship management CRM is intended to streamline and make more effective the processes between an enterprise and its customers. SRM includes both business practices and software and is part of the information flow component of supply chain management (SCM).

According to Klassen and Vereecke (2012), the most common supply chain management practices are supplier selection, evaluation, segmentation and development. These practices are fueled by some attributes such as trust, commitment, corporate culture, information sharing and the drive to meet obligations among the parties in the chain (Field & Meile, 2008). The chain is however faced with challenges which affect a smooth practice supply chain management. Jüttner, Christopher and Baker (2007). emphasizes that the relationship that is created in the new paradigm of supplier relationship management creates value in two ways which are; firstly, instances of collaboration have the ability to create value in working relationships which in the long run enhances the value that is derived from each partner.

Proper management of the supply chain has been known to diminish the potential risks and uncertainty that may be incurred by a firm, lead to the optimization of the inventory levels and process cycle time this performance is increased through satisfied customers and increased profit margins (Moore, 2012). In the case of manufacturing firms, the purchasing function must receive enough consideration with the consideration increasing as the cost of outsourcing and purchasing assume a greater portion of the total cost of the manufacturing process.

Taking into account as aforementioned the significance of supplier relationship management, the management of the SRM system is receiving attention (Sweeney, 2013) and until in the recent past, most of the attention has been on specific subjects

such as purchasing strategy, supplier selection, collaboration and development but studies have been meager on the relationship and networking aspect (Field & Meile, 2008). Research that has been done in the recent past has brought to view the fact that manufacturing organizations is a unit or actor in its own supplier network. More specifically, the business of the company should be viewed from the perspective of a network considering the product value they bring about has its origins in the upstream network of suppliers (Sweeney, 2013).

The understanding and practicing of supply chain management has become an essential prerequisite for staying competitive in the global race and enhancing profitably, (Gold, Seuring, & Beske, 2010). Most organizations have begun to realize that it is not only enough to improve efficiencies within an organization but rather making the supply chain management competitive among others will greatly improve their chances of survival. This is because competition is no longer between organizations, but among supply chains. Intensified competition and globalization of markets over the last decade has contributed to challenges associated with ensuring that goods and services that meet customer requirements are provided in an efficient and effective way (Ellram & Cooper, 2014).

Practicing of supply chain management with key focus on supplier relationships is an essential prerequisite for staying competitive in the global race and enhancing profitably in the market. Gold, Seuring and Beske (2010) found out that there was a great opportunity for organizations to improve its performances through proper use of SRM strategies and therefore recommended that organizations should show more commitment in SRM by having systems to monitor, appraise and evaluate performance at a strategic level.

2.3.3 Procurement Cost Optimization and Performance of Manufacturing Firms

Optimization is a systematic effort made to improve profit margins and obtain the best results under given circumstances or situations. The cost optimization is a process that should be carried out throughout the construction period to ensure that the cost of the building is kept within the estimated cost limits (Ehrlenspiel, Kiewert,

Lindemann & Hundal, 2007). Business uncertainty will continue to impact organizations, and even a well thought-out cost savings program can prove ineffective in the long run. However, when cost pressures are intense, businesses must overcome the dual challenge of continuously innovating while reducing spend to outperform the competition (McGrath, 2013).

Overcoming these obstacles requires a strategic cost optimization program to strike a balance between cost reduction initiatives and investments needed to generate process efficiencies, improve quality of service, build a stronger value chain, improve skill management and increase customer satisfaction. Further, cost optimization cannot be a one-time strategic initiative. Instead, it should be a guiding principle for managing organizations in the most efficient manner while responding promptly to fluctuations in business conditions (McGrath, 2013).

The supply chain has become a very prominent concern for all organizations as theystrive for better quality and higher customer satisfaction (Chopra & Meindle, 2016). Due to a realization by most firms that maximizing performance of one department or functions may lead to less than optimal performance for the whole firm, it has become critical for firms to manage the entire network of supply to optimize overall performance and become competitive in the long run.

Over time, the procurement function has become an integral part of every firm's competitive success (Cousins, 2007). Performance measurement is a central element in procurement management which cannot be considered in isolation. Planning and control go hand in hand. If the procurement function lacks a clear vision, when procurement outsourcing plans are ill developed and management reporting is absent, systematic performance measurement and evaluation will be difficult if not impossible.

Procurement is a functional group as well as a functional activity and performs many activities to ensure value to the organization such as supplier identification and selection, buying, negotiation and contracting, supply market research, supplier measurement and improvement, and purchasing systems development, this function can also be outsourced instead of the organization having a procurement department

of its own (Monczka, Handfield, Giunipero, & Patterson, 2015). Supply management on the other hand oversees and optimizes the process of acquiring inputs from suppliers (purchase), converting those inputs into a finished product (production), and delivering those products or outputs to customers (Caniëls & Gelderman, 2007).

Procurement could focus, opportunistically, on the short-term superiority of bargaining power and extract maximum cost reductions (Nollet & Beaulieu, 2005). Alternatively, recognizing that good supply chain management requires a long-term perspective (Rao Tummala, Phillips, & Johnson, 2006), government procurement could take a more strategic perspective, reflecting its uniqueness from the private sector (Murray, 2001), improving its strategic contribution and meaningful involvement (Johnson & Leenders, 2003) through accelerating the economic growth. Procurement is considered as a strategic player in the value chain as it usually represents one of the largest expense items in a firm's cost structure.

According to Kiplagat (2010), the procurement of goods and services represents the single largest cost item for any given enterprise since each dollar a company earns on the sale of a product; it spends about $0.50-0.60 on goods and services. Further, more capital is spent on the procurement of materials and services to support the business's operations than on all other expense items combined.

2.3.4 Supply Chain Automation and Performance of Manufacturing Firms

Leitão (2009). defines automation as a technology dealing with the application of mechatronics and computers for the production of goods and services. Automation is broadly classified into manufacturing and service automation. The main reasons why many firms automate is to curb the problems of shortage of labour, high cost of labour, need to increase productivity and to reduce the manufacturing lead-times. All this put together, it implies that automation leads to lower operational costs and improved customer service.

Digital supply chains, on the other hand, have the capability for extensive information availability, and enable superior collaboration and communication across digital platforms resulting in improved reliability, agility and effectiveness. For

instance, the U.S.-based land transportation company J.B. Hunt started using sensor based technology and Global Positioning Systems (GPS) to improve visibility of shipments and improve fill-rates (Sinha, 2010).

Currently many organizations are tackling these challenges separatelhay with ongoing initiatives to automate processes, consolidate master data, make the supply chain more responsive or set up new shared services. Though these initiatives may have their merits, there is a faster path towards superior performance by designing a Digital Operating Model, as there are strong interdependencies between the organizational design, financial governance and KPIs, processes, data, and IT applications of a company (Van Der Aalst, 2013).

Van Weele and Van Raaij (2014) argue that driven by the need for lean organizations with focused efforts and rapid growth of information technology, procurement has become a strategic issue and a key success factor of every organization. Arguably the Weele and Rozemeijer argument should apply both in the public and private sectors supported by the modern trend for the call for transparent effectiveness in both sectors; demanded by stakeholders in the public sector and shareholders in the private sector.

Markusen (2017). suggests that ineffective procurement can hamper the growth and competitiveness of the organization in the market. This is particularly compounded when the same product, or service, is bought under differing part numbers of service description. Markusen (2017) also argues that this problem is particularly acute in military, automotive, aerospace and electronics applications but is by no means restricted to those industries or indeed their suppliers. Blome and Schoenherr (2011) identifies strategic procurement management as proactive rather than reactive. His approach links competencies, relationships and asset specificity in order to procure a supply and value chain which reduces the costs of transactions and improves profitability.

Automated inventory systems usage has had little application and this has resulted in problems that come as a result of stock shortages and it is for this reason that various researches have been carried out pertaining to Inventory Management Control

Systems. Dong and Xu (2012) researched on the impact of telecommunication in inventory management and established that telecommunication and inventory control systems are directly related.

For instance, Just-in Time System helps in improving the lead-time since orders are made on time and there is just-in-time delivery and therefore this helps in improving the production scheduling and planning of most companies. Every organization holds something in stock; organizations such as manufacturers, healthcare institutions and other service providers place stock in a subsidiary position rather than a central position. Inventory is still an important element in operational effectiveness and often appears in the balance sheets as the biggest of the current assets, holding up a lot of cash. Current stock is very expensive and it is unacceptable in many organizations to hold up excess stock (Samuel & Ondiek, 2014).

Automated inventory management also requires a lot of information processing within and outside the organization and the transformation, storage and communication of information about the inventory in the stock points as well as in the intermediate processes across the supply chain is highly complex (Samuel & Ondiek, 2014). The driving forces for automated inventory management are increasing customer requirements, the need for networked organizations and the opportunity of networked inventory management. In networked firms where the inventory managers have to deal with several other organizations as far as stock management is concerned, the Networked Inventory Management Information Systems (NIMIS) come in handy (Ballou, 2007).

2.3.5 Staff Competence and Performance of Manufacturing Firms

The evolving and complex dynamic nature of the business environment in recent times has shifted the manner in which firms carry out their business activities. In this new era innovative firms turns to be more successful than non-innovative one. Despite advancement in technological, innovation over the past decades have improved work and job performance and satisfaction respectively. The critical significances of the employee cannot be underestimated since human resource forms

the bases effective execution of this new systems and technologies (Osei & Ackah, 2015).

Efficient human resource plays a significant role in an organization's performance as compared with it financial and technology resources. This is true due to the fact that a resourceful and capable workforce is critical to achieving the overall goals and strategies of a firm (Osei & Ackah, 2015). In order to develop competent workforce managers, need to engage employees in the decision making process and this will provide continuous learning environment where needed skill be obtained. When employees have clear idea in-terms of job expectation and the strategic goals of the firm, task and jobs are designed in line with these set targets (Prasanna & Swarnalatha, 2018). This provides employees with job satisfaction and increases their commitment to both their individual jobs and the organization as a whole. Competent loyal employees' increase a firm's success potential since it would increase job efficiency and decrease waste (Osei & Ackah, 2015).

The performance and success of any organizations depends on its skilled employees and how efficient the organization can tap into that resource and make effective use of it. Despite this opportunity the dynamic nature of the business environment makes this process a complex one. Therefore, organizations should adapt strategic and processes to train its employees to adapt to this evolving environment both internally and externally. Training modifies employee's behavior, attitudes and values about their job and the organization as a whole. Employees' further gain requisite skills and this contributes to the performance of the organization (Cummings & Worley, 2014).

Although training is significant to the development and performance of either the employee or the organization achieving effective training process is hindered by many factors especially a non-friendly environment. Therefore, firms need to create an enabling environment and this is critical to organizational learning (Jimenez-Jimenez & Sanz-valle, 2011). Training and development activities should be aligned with firms' strategic activities through interaction activities within its internal and external environments. This increase the interaction process between various employees since each individual is unique and perform diverse task that are

integrated. Therefore, physical interaction turns out to be an efficient tool to promote learning among various actors on the job place (Nedzinskas, Pundzienė, Buožiūtė-Rafanavičienė & Pilkienė, 2013).

Along with continuous advances in communication and transport technologies, the need for continuous evolution of supply chain and effective management techniques is paramount (Simchi-Levi, Kaminsky, Simchi-Levi & Shankar, 2008). Supply chain management means managing the series of activities concerning the planning, coordinating and controlling movement of materials, parts and products from suppliers to customers. This includes the management of materials, information and financial flows in the supply chain. The decisions are made at strategic, tactical and operational levels throughout the supply chain (Simchi-Levi *et al.*, 2008).

Innovation and learning in supply chain performance evaluation impact on the ability of all entities in the supply chain to continuously renew not only products and services but also those processes that ensure that the supply chain as a whole maintains a competitive advantage. The product development cycle time, the ability to implement innovative distribution routes and processes and the ability to introduce increased flexibility into the supply chain are ways of innovation and learning. A key element in innovation and learning is the ability in the chain to create, maintain and improve partnerships. This is because partnerships enable the supply chain to take advantage of the capabilities, skills, knowledge and resources of new entities thereby introducing innovative dimensions to competitiveness and ultimately to delivering customer service (Croom, & Brandon-Jones, 2007)

2.4 Empirical Literature

Empirical literature review is a directed search of published works, including periodicals and books that has discussed theories and presented empirical results that are relevant to the topic of discussion (Zikmund, 2010). This section explains the variables of the study.

2.4.1 Influence of Inventory Control on Performance of manufacturing firms

Koumanakos (2008) conducted a study on the influence of inventory management on firm performance. Data for the analysis came from the ICAP database, which contains financial information on all medium to large Greek firms. The sample period extended from 2000 to 2002. For each year all manufacturing firms with the corporate form of society ´s anonyms operating in any one of the three representative industrial sectors in Greece food, textiles and chemicals were selected. Preliminary results, obtained by cross-section linear regressions, revealed that the higher the level of inventories preserved (departing from lean operations) by a firm, the lower its rate of returns.

Mwangi (2016) study focused on the influence of inventory management on firm profitability and operating cash flows of Kenya Breweries Limited, beer distribution firms in Nairobi County. This study sought to examine influence of inventory management on firm's profitability and operating cash flows of Kenya Breweries Limited beer distribution firms in Nairobi County. The study employed a descriptive research design. Population of the study involved six Kenya Breweries Limited beer distribution firms in Nairobi County thus the study carried out a census of the six firms in Nairobi County. The study used secondary data, which was collected using a data collection sheet from six firms for a period of 10 years from the years from 2006-2015. The study concluded that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi County, Kenya.

Munyao, Omulo, Mwithiga and Chepkulei (2015) also conducted a study on the 'role of inventory management practices on performance of production department a case of manufacturing firms. The study adopted the descriptive research design. The target population was textile, rolling mills and food and beverage manufacturing firms in Mombasa County. A survey was conducted which adopted stratified random sampling technique. Out of 150 manufacturing firms, a sample size of 45 manufacturing firms was used. A questionnaire was used as data collection instrument. The study found that despite the fact that that material requirement

planning was most effective in contributing to performance of the production department most organizations in the manufacturing industry used action level methods.

Bin Syed, Mohamad, Rahman and Suhaimi (2016) study focused on the relationship between inventory management and company performance. Interviews with the company management were conducted to identify the inventory management issues and system used by the company. The relationship between the inventory management and company performance was determined based on inventory days and return on asset (ROA) analysis. The research found that some of the inventory problems companies experience include unorganized inventory arrangement, large amount of inventory days / no cycle counting and no accurate records balance due to unskilled workers. The study also proved that there was a significant relationship between return on asset (ROA) and inventory management.

Lwiki, Ojera, Mugend and Wachira (2013) conducted a study on the impact of inventory management practices on financial performance of sugar manufacturing firms in Kenya. The research survey was conducted in all the eight operating sugar manufacturing firms from the period 2002- 2007. The primary data was collected using structured and semi-structured questionnaires administered to key informants in the organizations. Secondary data was obtained from annual financial performance statements available in the year Book sugar statistics. Descriptive statistics was used to test the impact of inventory management practices and Correlation analysis was used to determine the nature and magnitude of the relationship among inventory management variables. The results indicated that there exists a positive correlation between inventory management and Return on Sales and also with Return on Equity which were found to be statistically significant.

Wahdan and Emam (2017) sought to examine the impact of supply chain management on financial performance and responsibility accounting agribusiness case from Egypt. The main two research questions are: is there a significant impact of supply chain management on financial performance? And is there a significant relationship between supply chain management and financial performance as well as

responsibility accounting? To answer the research questions, data was collected from financial statements of agribusiness case from Egypt and the survey was conducted. The findings of the study indicated that there is a significant impact of supply chain management on financial performance through enhancing the productivity, decreasing the cost and improving profitability. Moreover, applying the efficient supply chain management can improve the use of responsibility accounting through the efficient usage for the budget of the crop.

Mayaka, (2015) effect of supply chain management practices on performance of Barclays Bank of Kenya Limited. The objective of this study was to establish the effect of supply chain management practices on performance of Barclays Bank Kenya Limited. The research is a case study as well as a causal research which was carried out to identify the extent and nature of cause and effect relationship between the variables. Primary data was collected by use of a questionnaire. Data analysis was by descriptive statistics and inferential analysis. From The results, the study depicted that supply chain management practices positively influence performance of the organization. In conclusion, supply chain management practices affect performance of the organization and that most heads of departments are aware of supply chain management practices and satisfied to a great extent with the banks performance. This study recommends that proper measures be put for each of the supply chain management practice that matches up with those of performance of commercial banks. The management must establish metrics in supply chain and show a clear link on all performance indicators.

Mwangi, (2016) focused on the effect of inventory management on firm profitability and operating cash flows of Kenya breweries limited, beer distribution firms in Nairobi County. This study sought to examine effect of inventory management on firm's profitability and operating cash flows of Kenya Breweries Limited beer distribution firms in Nairobi County. The study employed a descriptive research design. Population of the study involved six Kenya Breweries Limited beer distribution firms in Nairobi County thus the study carried out a census of the six firms in Nairobi County. The study used secondary data, which was collected using a data collection sheet from six firms for a period of 10 years from the years from

2006-2015. The data collected was analyzed using ordinary least squares in form of regression equations via the statistical package for social sciences. The study established a significant relationship between the management of inventory and the operating cash flows of Kenya Breweries Beer distribution firms in Nairobi County (Sathyamoorthi, Mapharing & Selinkie, 2018). The study concluded that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi County, Kenya.

2.4.2 Influence of Supplier Management on Performance of Manufacturing Firms

Wachira (2013) conducted a study on supplier relationship management and supply chain performance in the alcoholic beverage industry in Kenya. The specific objective of the study was to establish the extent of SRM in alcoholic beverage industry; to determine the impact of SRM on supply chain performance in alcoholic beverage industry in Kenya and to determine the challenges faced in implementing SRM in alcoholic beverage industry in Kenya. The study adopted descriptive design to describe the impact of SRM on organizational performance. The target population and sample was from Procurement staff from alcoholic beverage industries. Regression analysis was used to determine the relationships between the variables. The study concluded that firms in the alcohol beverage industry are moving towards collaborative relationships with their suppliers to improve on their supply chain performance. That SRM largely depends upon four major aspects.

- Mwirigi (2013) in his study sought to establish the role of supply chain relationships in the growth of small firms in Kenya. The target population of the study was small enterprises that are loan clients of FAULU Kenya. To understand the role played by supply chain relationships among respondent firms, the study examined various relationships. The research found out that supply chain relationships play a critical role in the growth of small enterprises. They contribute to the growth and profitability of these firms in many ways. Findings of this study indicated that a strong sustainable relationship between an enterprise and its customers on one hand, and its suppliers on the other hand have a bearing on the

speed of growth in transactions and profitability. The study concluded that there is need for the process of creation of supply chain relationships to be approached in a more structured way to enhance its role in the growth of small enterprises (Nishat Faisal, Banwet & Shankar, 2006).

Kosgei and Gitau (2016) study focused on the effect of supplier relationship management on organizational performance using case study of Kenya Airways Limited. The research involved a cross sectional study design that was carried out in Kenya Airways, where a sample of 82 respondents was selected from a target population of 272 KQ employees to answer research questions of interest. Stratified random sampling was used to come up with the sample size since the population in different departments at KQ was considered to be heterogeneous. The study established that understanding and practicing of supply chain management with key focus on supplier relationships is an essential prerequisite for staying competitive in the global race and enhancing profitably in the market.

On his part Kamau (2013) analysed buyer supplier relationships and organizational performance among manufacturing firms in Nairobi. The research design involved a cross sectional survey of 56 large manufacturing companies in Nairobi, Kenya. Data was collected using a questionnaire that was administered through drop and pick method. Percentages and frequencies were used to analyze objective one and objective two whereas regression analysis was used to analyze the relationship between buyer supplier relationships and organizational performance among manufacturing firms in Kenya. The findings are presented in tables. It is clear that there is a significant relationship between buyer supplier relationships and organizational performance represented by R^2 value of 0.723 which translates to 72.3% variance explained by the five independent variables of trust, communication, co-operation, commitment and mutual goals.

Al-Abdallah, Abdallah and Hamdan (2014) focused on the impact of supplier relationship management on competitive performance of manufacturing firms. Using international data collected in Japan, Korea, USA, and Italy as part of round 3 of High Performance Manufacturing (HPM) project, and after using statistical package

of social sciences (SPSS) to describe and analyze the data, the results show that two practices of supplier relationship management, supplier partnership/development and supplier lead time reduction significantly and positively affect the competitive performance of the buying firms.

Kosgei and Gitau (2016) effect of supplier relationship management on organizational performance a case study of Kenya Airways Limited. The study looked at two parameters; trust and commitment as elements of supplier relationships and the effect that these have on organizational performance. The research involved a cross sectional study design that was carried out in Kenya Airways, where a sample of 82 respondents was selected from a target population of 272 KQ employees to answer research questions of interest. Stratified random sampling was used to come up with the sample size since the population in different departments at KQ was considered to be heterogeneous. The study established that understanding and practicing of supply chain management with key focus on supplier relationships is an essential prerequisite for staying competitive in the global race and enhancing profitably in the market.

2.4.3 Influence of Procurement Cost Optimization on Performance of Manufacturing Firms

Thawiwinyu and Laptaned (2009) focused on the impact of strategic sourcing and E-procurement on supply chain performance management. 40 copies of questionnaire were distributed to cover all of GSK's partners; all of them were answered and gathered. The data collected was analyzed to answer research questions, descriptive statistics, including frequencies, percentages, means and standard deviations, was employed to analyze the data from part of questionnaire. The finding showed that many of today's business accept strategic sourcing as effective initiative in improving purchasing and firm level performance.

Ellram (2002) study focused strategic cost management in the supply chain a case of purchasing and supply management perspective. The purpose of this study was to explore best practices in strategic cost management among leading edge purchasing and supply management (PSM) organizations today. All of the core organizations

studied believe that they have been very successful in supplier cost management, as shown by the significant, documented savings supplier cost management has contributed to the bottom line of the organization. All reported savings ranging from millions of dollars, to tens of millions of dollars per year, and savings ranging from about 5 percent to over 10 percent in annual expenditures.

Sobhani, Malarvizhi, Al-Mamun and Jeyashree (2013) focused on the strategic procurement and financial performance of Iranian manufacturing companies. The objective of this study was to scrutinize the interrelation between the level of strategic procurement and financial performance of manufacturing companies in Iran. A cross-sectional explanatory study was designed to identify Iranian manufacturing company's procurement management practices and performance outcome. Findings of this study noted a positive relationship between the strategic procurement and financial performance of the companies.

Perumal (2009) focused on the influence of purchasing strategies on manufacturing performance with the moderating effect of purchasing strategic integration. A total of 750 questionnaires been distributed via email to manufacturing firms located in major industrial states at Malaysia and resulted with 158 questionnaires or 21% been returned with complete information to be used for statistical analysis. The analysis result shows that all independent variables except supply base management strategy when integrated with Purchasing Strategic Integration have significant influence on manufacturing performance.

Ngunyi (2014) study focused on the procurement practices and the performance of parastatals in Kenya. The objective of the study was to establish the effects of procurement practices on organizational performance of Parastatals in Kenya. The research adop

ted a descriptive research design. Data was collected using a self-administered questionnaire that was distributed to 76 senior and middle level managers at the firms. The finding of the study was that procurement is both a driving force to competitive strategy selection and an important resource to achieving improved organizational performance. It was found that if procurement practices are employed

effectively, and then is expected to improve firm-customer relationship, preserve the environment, motivate and improve the coordination of staff. One limitation of the study is that the researcher measured only the operational side of procurement and considering the early stages of procurement implementation on the organizations.

Kimantiria, (2014) study focused on the supply chain management practices and competitiveness in the national government of Kenya. The authors assert that a good organized and executed procurement will make it possible for companies to decrease their inventories, have better customer service, and diminish costs as well as aid fast inventory turns. One of the biggest advantages of procurement in the situation of short term objectives is increasing productivity and decreasing inventory and reducing lead time. Based on long term objectives, this factor has significant role in increasing company's market share and having outside integration of the procurement.

Paulraj, Chen and Flynn (2004) have documented how firms with strategic purchasing are able to foster long term, cooperative relationships and communication, and achieve greater responsiveness to the needs of their suppliers. Although other factors, such as restructuring and governance, and transaction cost economizing are also important for understanding strategic purchasing and its linkage to supply management, they are beyond the scope of this investigation. Strategic purchasing fosters communication, which is critical to achieving effective integration throughout the supply chain.

2.4.4 Influence of Supply Chain Automation on Performance of Manufacturing Firms

Kitheka (2012) conducted a study on the inventory management automation and the performance of supermarkets in western Kenya. Specifically, the study sought to address the following two objectives; to establish the extent of inventory management automation and to determine the effect of inventory management automation on the performance of supermarkets in Western Kenya. The study employed a descriptive survey design and targeted all the supermarkets in Kisumu, Kakamega and Bungoma. Data was gathered using structured questionnaires and

analysed using both descriptive and inferential statistics, with the help of Statistical Package for Social Sciences (SPSS). The findings of the study revealed that inventory management automation affected the performance of the supermarkets and that there was a positive linear relationship between inventory management automation and the performance of the supermarkets.

Magutu (2013) conducted a study on the effect of supply chain strategies, technology and performance of large-scale manufacturing firms in Kenya. A sample of one hundred and thirty-eight (138) firms was drawn using proportionate sampling from a total population of six hundred and twenty-seven (627) manufacturing firms in Kenya. The descriptive statistics, reliability and validity tests of the constructs: correlation, factor and regression analysis models were used to test the hypotheses. Equally, there is a very strong relationship between supply chain strategies, SC technology and firm supply chain performance outcome with the supply chain strategies and technology explaining 92.9% of the changes in the firm's SC performance outcome.

Qrunfleh and Tarafdar (2014) focused on supply chain information systems strategy: Impacts on supply chain performance and firm performance. Based on confirmatory analysis and structural equation modeling of survey data from members of senior and executive management in the purchase/materials management/logistics/supply chain functions, from 205 firms, the study validated these hypotheses and showed that the information system for efficiency information system strategy enhances the relationship between Lean SC strategy and supply chain performance. The results showed that specific SC strategies require the adoption of corresponding information system strategies such that they can more significantly impact supply chain performance.

Nyaoga, Magutu and Aduba (2015) conducted a study on the link between supply chain automation and firm performance. A sample of one hundred and thirty-eight (138) firms was drawn using proportionate sampling from a population of six hundred and twenty-seven (627) large-scale manufacturing firms in Kenya. The response rate was seventy-five (75) percent. The correlation analysis and regression

analysis models were used to test the hypotheses. The study findings indicate that Supply chain automation are useful predictors of the firm's performance as supply chain automation explain 76.7 % of the changes in the firm's performance.

2.4.5 Influence Staff Competence on Performance of Manufacturing Firms

Osei and Ackah (2015) conducted a study on employee's competency and organizational performance in the pharmaceutical industry. A total of 280 respondents were sampled for the field survey. The data acquired was used to test the hypothesis stated for this study. The linear regression analysis output supported the hypothesis stated for this study and this suggests that firms are aware of the enormous benefit that they enjoy as a result of having in place an effective and efficiency workforce. Study recommended that firms need to seize the opportunity to improve continuous learning in their organizations so as to improve the skills, attitude and behavior of employee towards the discharge of their individual tasks to be able to attain high performance potentiality.

Shang and Marlow (2007) focused on the effects of logistics competency on performance. This study applies the competency approach to explore logistics in Taiwan. A survey of 1,200 manufacturing firms was undertaken in order to examine the relationships between logistics competency, logistics performance, and financial performance, using exploratory factor analysis and the structural equation modelling technique. Four logistics competencies, namely, integration and knowledge competency, customer focused logistics competency, measurement competency, and agility competency were identified. The research findings revealed that logistics competency was significantly related to logistics performance but not significantly associated with financial performance, and logistics performance was positively associated with financial performance. These findings also implied that logistics competency has an indirect effect on financial performance through logistics performance.

Bi, Zhou and Cai (2014) focused on the impact of employee competence on organizational agility; the mediating role of IT alignment. Based on the dynamic capabilities perspective, this paper proposes a model to investigate how employee

competence (IT competence of business people and business competence of IT professionals) affects organizational agility through IT alignment. Data analysis results show that IT alignment fully mediates the influence of IT competence of business people and partially mediates the influence of business competence of IT professionals on organizational agility. In addition, the two kinds of competence are also positively interacting with each other to enhance IT alignment.

2.4.6 Performance of Manufacturing Firms

Performance measurement refers to the process of measuring the action's efficiency and effectiveness (Staudt, Alpan, Di Mascolo, & Rodriguez, 2015).. In the current business management, performance measurement is considered to be in a more critical role compared to quantification and accounting (Koufopoulos, Zoumbos, Argyropoulou & Motwani, 2008). This is consistent with Franco-Santos, Lucianetti and Bourne (2012) who described performance management as a process wherein the organization manages its performance to match its corporate and functional strategies and objectives. Additionally, the firm's value can be described as the benefits stemming from the firm's shares by the shareholders. The company's performance can be viewed from the financial statement reported by the company. Consequently, a good performing company will reinforce management for quality disclosure (Al-Matari *et al.*, 2014).

Performance comprises the actual output or results of an organization as measured against its intended outputs ((Staudt *et al.*, 2015). Firm performance includes multiple activities that help in establishing the goals of the organization, and monitor the progress towards the target. However, for any business to be successful, functions must be defined and accomplished. It is important for an organization to develop strategies that are designed around the skills that would enhance its performance. It is used to make adjustments to accomplish goals more efficiently and effectively. Firm performance is what business executives and owners are usually frustrated about (Ostroff & Bowen, 2016).

Firms are generally free to select the level of stock return (dividend) they wish to pay to holders of ordinary shares, although factors such as legal requirements, debt covenants and the availability of cash resources impose some limitations on this decision. It is thus not surprising that the empirical literature has recorded systematic variations in stock return behaviour across firms, countries, time and type of stock return (dividend). Variations amongst firms are noted, for example, in Fama and French (2012). They bring evidence to show that stock return paying firms tend to be large and profitable, while non-payers are typically small, less profitable but with high investment opportunities (Dean & Faff, 2008).

La Porta, Lopez-de-Silanes, Shleifer and Vishny (2010) carried out a study on the stock return policies of over 4000 firms from 33 countries around the world. It is found that stock return policies vary across legal regimes in a way that is consistent with the idea that stock return payment is the outcome of effective pressure by minority shareholders to limit agency behaviour. Thus, firms in common law countries with good legal protection of investors tend to have higher payout ratio compared with firms in countries with weaker legal protection.

Measurement of performance can offer significant invaluable information to allow management's monitoring of performance, report progress, improve motivation and communication and pinpoint problems; therefore, it is in the firm's best interest to evaluate its performance. Nevertheless, this is a management area characterized by lack of consistency as to what constitutes organizational performance. The countless number of ways has been brought forward to measure financial performance and among them are: measurement of performance as the level of Return on Assets (ROA), Return on Equity (ROE), Tobin-Q, and Profit Margin (PM), Market Share among many other measures (Al-Matari, Al-Swidi & Fadzil, 2014).

In measuring manufacturing firms performance, this study adopted ROA, ROE,sales growth and profit margins ratios. Use of return on asset ratio shows the amount of earnings that have been generated from invested capital assets (Epps & Cereola, 2008). Return on assets allows users to assess how well firms mechanisms are assist ing in securing and monitoring the efficiency of the management in utilizing assets to

generate profits (Mohamad, *et al.* 2011). Return on asset is a percentage (%), which measures the net income earned on assets;

$$ROA = \frac{\text{Profit before tax}}{\text{Total assets}}$$

ROE measures the firm's profitability by revealing how much profit the firm generates with the money common stock holders have invested in it (Vintila & Gherghina, 2012).

$$ROE = \frac{\text{Net income (Profit after tax)}}{\text{Shareholders‟ equity}}$$

Where:

-Net income is for the fiscal year before dividends paid to common stock holders but after payment of dividends to preferred stock.

- Shareholder's equity does not include preferred shares.

Sales growth is a metric that measures the ability of sales team to increase revenue over a fixed period of time. It'd be hard to overstate the importance of the sales growth metric because it is tied directly to revenue and profitability. Growth is the drumbeat by which all organizations march. Growth in sales' provides a measure of economic performance that reflects 'how well an organization relates to their environment' by successfully expanding their 'product- market scope. The equation for sales growth is: (Current Period Net Sales - Prior Period Net Sales) / Prior Period Net Sales * 100. Net sales is equal to gross, or total, sales revenue minus discounts, customer returns and allowances for damaged and defective merchandise.

Profit margin is one of the commonly used profitability ratios to gauge profitability of a business activity. It represents how much percentage of sales has turned into profits. Simply put, the percentage figure indicates how many cents of profit the business has generated for each dollar of sale.

Mathematically,

Profit Margin = Net Profits (or Income) / Net Sales (or Revenue)

= (Net Sales - Expenses) / Net

2.5 Critique of the Existing Literature Relevant to the Study

Koumanakos (2008) conducted a study on the effect of inventory management on firm performance. Data for the analysis came from the ICAP database, which contains financial information on all medium to large Greek firms. The sample period extended from 2000 to 2002. Since this study was conducted a lot of things might have changed hence the study finding may not apply in current times. Koumanakos (2008) study was conducted in Greece while the current study will be conducted in Kenya which may cause a variation in the findings.

Mwangi (2016) study focused on the effect of inventory management on firm profitability and operating cash flows of Kenya Breweries Limited, beer distribution firms in Nairobi County while Kosgei and Gitau (2016) study focused on the effect of supplier relationship management on organizational performance using case study of Kenya Airways Limited. Both Mwangi (2016) and Kosgei and Gitau (2016) were case studies therefore the findings may be unique to the companies they focused on. Therefore, there is a need to conduct a study that focuses on the various members within the same industry.

Munyao, Omulo, Mwithiga and Chepkulei (2015) also conducted a study on the 'role of inventory management practices on performance of production department a case of manufacturing firms. The study focused on Inventory management practices while the current study will widen the scope and focus on other variables such as supplier management, procurement cost optimization, supplier chain automation in addition to inventory control. Bin Syed, Mohamad, Rahman and Suhaimi (2016) study focused on the relationship between inventory management and company performance. Interviews with the company management were conducted to identify the inventory management issues and system used by the company. The study relies

on qualitative data collected via interview guides. The study failed to utilize quantitative data which would have provided conclusive findings. The current study will include various forms of data hence it would result to more conclusive findings.

Lwiki, Ojera, Mugend and Wachira (2013) conducted a study on the impact of inventory management practices on financial performance of sugar manufacturing firms in Kenya. The research survey was conducted in all the eight operating sugar manufacturing firms from the period 2002- 2007. The current study will widen the scope and focus on other variables such as supplier management, procurement cost optimization, supplier chain automation in addition to inventory control.

Wangeci (2013) conducted a study on supplier relationship management and supply chain performance in the alcoholic beverage industry in Kenya. The supply chain demands in alcoholic beverage industry may be different from the manufacturing industry. The findings of this study could be limited to alcoholic beverage industry hence the need for studies in manufacturing industry in Kenya. Mwirigi (2013) in his study sought to establish the role of supply chain relationships in the growth of small firms in Kenya. The target population of the study was small enterprises that are loan clients of FAULU Kenya. Mwirigi (2013) findings cannot be applied to Manufacturing industry since the study focused on small enterprises that have simple structures.

Kamau (2013) analysed buyer supplier relationships and organizational performance among manufacturing firms in Nairobi. The research design involved a cross sectional survey of 56 large manufacturing companies in Nairobi, Kenya. The study focused on effect of supplier relationships and performance while the current study will focus on other variables such inventory control, procurement cost optimization and supply chain automation. Al-Abdallah, Abdallah and Hamdan (2014) focused on the impact of supplier relationship management on competitive performance of manufacturing firms. Using international data collected in Japan, Korea. This study was conducted on manufacturing firms in developed countries. The scenario is completely different for manufacturing firms in developing and emerging countries such Kenya.

Perumal (2009) focused on the influence of purchasing strategies on manufacturing performance with the moderating effect of purchasing strategic integration while Thawiwinyu and Laptaned (2009) focused on the impact of strategic sourcing and E-procurement on supply chain performance management in Malaysia. Malaysia and Kenya have different socio-economic factors that influence supply chain management hence the findings of Thawiwinyu and Laptaned (2009) have limitations especially in the case of manufacturing firms in Kenya.

Sobhani *et al.* (2013) focused on the strategic procurement and financial performance of Iranian manufacturing companies. The current study has a different context hence the findings may vary from that of Sobhani *et al.* (2013) Perumal (2009) on the other hand focused on the influence of purchasing strategies on manufacturing performance with the moderating effect of purchasing strategic integration. A total of 750 questionnaires were distributed via email to manufacturing firms located in major industrial states at Malaysia. The current study has a different context hence the findings may vary from that of Perumal (2009).

Kitheka (2012) conducted a study on the inventory management automation and the performance of supermarkets in western Kenya. Specifically, the study sought to address the following two objectives; to establish the extent of inventory management automation and to determine the effect of inventory management automation on the performance of supermarkets in Western Kenya. The current study will focus on manufacturing industry inventory control, supplier management; procurement cost optimization and supply chain automation on performance of manufacturing firms in Kenya.

2.6 Summary of the Literature Review

This chapter has discussed in details the various study variables that inform the relationship between supply chain optimization and firm's performance. This research further reviewed the theories relevant to the study. This chapter also covers emphatically the theoretical literature and empirical literature reviews in related areas of the study. The current study focused on the purchasing portfolio theory, transaction cost analysis theory, theory of constraints, system theory, competency

theory and supply chain operations reference model. Portfolio approach was introduced by Kraljic (1983) to determine a set of differentiated purchasing strategies. The general idea is to minimize supply risk and make the most of buying power (Kraljic, 1983).

According to Coase article on the “The Problem of Social Cost", transaction costs include search and information costs, bargaining and decision costs and policing and enforcement costs (Williamson, 1979). It observes that market prices govern the relationships between firms but within firm decisions are made on a basis different from maximizing profit subject market price. The theory of constraints is a management philosophy that seeks to increase manufacturing throughput efficiency or system performance measured by sales through the identification of those processes that are constraining the manufacturing system (Goldratt & Goldratt, 2004). Theory of constraints is based on the principle that a chain is only as strong as the weakest link or constraint and to elevate and manage the constraint as necessary (Kairu, 2015)

Systems theory brings together various components of a complex supply chain (that is the human, capital, information, materials and financial resources etc.) to form a subsystem which is then part of a larger system of supply chains or network (Chandra, & Grabis, 2007). The theory argues that for a holistic perspective ST must be employed to understand the internal and external factors that shape an organization’s supply chain performance. The SCOR model describes high-level business processes associated with all phases of satisfying customer demand (SCC, 2000). The section also contains the conceptual framework illustration the relationship between study variables. The critique of the literature reviewed was done and research gaps identified.

2.7 Research Gap

Manufacturing industry is among the key industries in Kenya in term of job opportunities creation and foreign earnings through exports. A vibrant manufacturing is important for economic growth of a country. KAM membership constitutes 40 per cent of manufacturing value-add industries in Kenya and comprises of small,

medium and large enterprises (KAM, 2004). Oketch (2014) study focused on supply chain performance and performance of manufacturing pharmaceutical firms in Kenya. The author noted that monitoring the supply chain performance measurement could help give a firm competitive edge over the others.

Awino (2011) on the other hand focused on investigation of selected strategy variables on performance large private manufacturing firms in Kenya. Haron, and Arul (2012) study was based on the efficiency performance of manufacturing companies in Kenya. Mwangangi (2016) on the other hand focused on influence of logistics management on performance of manufacturing firms in Kenya. Gichuru, Iravo and Arani (2015) study focused on collaborative supply chain practices on performance of food and beverages companies. Studies that have been done in this areas include Kimani (2013) who pointed out that manufacturing companies have faced challenges of dealing with scope global market place and its supply chain while retaining speed and flexibility, elimination of wasted time, effort and materials from all point in the supply chain and meet the needs of customer without holding more inventories. Oketch (2014) study focused on supply chain performance and performance of manufacturing pharmaceutical firms in Kenya. The author noted that monitoring the supply chain performance measurement could help give a firm competitive edge over the others.

The above studies (Awino,2011; Haron & Arul, 2012; Mwangangi, 2016; Gichuru, Iravo & Arani, 2015) demonstrate that research has been conducted on the performance of manufacturing firms in Kenya, however none of the mentioned studies and generally little attention has been given on the role supply chain optimization on the performance of manufacturing firms in Kenya. Specifically, there is a knowledge gap on the influence of inventory optimization, supplier optimization; procurement cost optimization and supply chain automation on the performance of manufacturing firms in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter contains the discussion of the methods and procedures which were used in conducting the study. The chapter was divided into sections namely; research philosophy, research design, target population, Sampling frame, sample size and sampling technique, data collection instruments, data collection procedures, pilot test and finally data analysis and presentations.

3.2 Research Philosophy

The purpose of this study was to establish the influence of supply chain optimization on the performance of manufacturing firms in Kenya. Positivistic philosophical approach entails developing research hypotheses based on both empirical and theoretical review. The developed hypotheses are then tested using quantitative methods such as statistical analysis with the aim of answering the research questions to accomplish the research purpose. Ponterotto (2005) claimed that positivistic philosophical approach is the best way of achieving final results in research. The positivistic paradigm is scientific and systematic and may be applied to both qualitative and quantitative research.

The principles of positivism comprise an observable social reality therefore making it the preferred paradigm for this study. Only apparent phenomena produce reliable data (Saunders, Lewis & Thornhill, 2009). According Sekaran and Bougie (2016). the role to theories is to aid in developing hypotheses to testing while research tests the hypothesis and provide necessary information for formulation of law. The results produced in research are comparable to generalization produced by natural scientists positivism also emphasizes on quantifiable obsevations that are used for statistical analysis.

3.3 Research Design

The study adopted a cross sectional survey research design with descriptive approach. Cross sectional design was justified on grounds that data of different manufacturing firms was collected at a defined period (Connaway & Powell, 2010). Eriksson and Kovalainen (2008), research design is a plan that guides the research in the process of collecting, analyzing and interpreting observations; the researcher's blueprint for the methods and instruments used in collecting data and evaluating it, in order to respond to the research questions of the study.

Sekaran and Bougie (2016). further observed that descriptive approach is designed to obtain information concerning the current phenomenon and whatever possible to draw valid general conclusions from facts discussed. The design also has enough provision for protection of bias and maximized reliability (Kothari, 2017). In this study, inferential statistics and measures of central, dispersion and distribution were applied.

3.4 Target population

The target population of the study was 499 supply chain managers in manufacturing firms in Kenya, Population is generally a large collection of individuals or objects that is the main focus of a scientific query and to whose benefit the study is done (Bernard, 2017). According to Bernard (2017)., a research population is a well-defined collection of individuals or objects known to have similar characteristics and usually have a common, binding characteristic or trait. Burns and Grove (2003) describe a target population as the entire aggregation of respondents that meet the designated set of criteria. Parahoo (1999) defines population as the total number of units from which data can be collected such as individuals, artifacts, events or organizations.

3.5 Sampling Frame

The study's target population includes the 499 supply chain managers in manufacturing firms in Nairobi County. According to KAM (2014), there are a total

of 499 manufacturing firms operating in Nairobi where 80 per cent of their members are based. The 499 supply chain managers in manufacturing firms were the population for this study.

In this study the sampling frame was the list of 499 supply chain managers in charge of procurement departments in manufacturing firms operating in Nairobi in Kenya. A sampling frame describes the list of all population units from which the sample is selected (Cooper & Schindler, 2006). The elementary units or the group or cluster of units may form the basis of sampling process in which case they are called sampling units. A list containing all such sampling units is known as a sampling frame (Kothari, 2017). Thus sampling frame consists of a list of items from which the sample is to be drawn

3.6 Sample Size and Sampling Technique

The sample size of this study consisted of 222 supply chain managers in manufacturing firms in the Nairobi that were stratified and randomly selected from a list of 499 supply chain managers in manufacturing firms operating in Nairobi in Kenya. The research used Yamane sample calculation which is a way to determine the sample size for a study. The technique was the ideal method to use in this study because the size of the target population is known.

According to Kothari (2017) Sampling refers to the process of obtaining information about an entire population by examining only a part of it. Samples can either be probability samples or non-probability samples (Sauders, Lewis & Thornhill, 2003). Probability samples are those based on simple random sampling, systematic sampling, stratified sampling and cluster sampling. Non-probability samples are those based on convenient/ such as purposive sampling, judgment sampling and quota sampling (Kothari, 2017). According to Mugenda and Mugenda (2003), a simple random sample has an equal chance of inclusion in a sample. According to Polit and Beck (2003), a sample is a proportion of population to be researched while Kothari (2017) defines a sample as the selected respondent representing the population.

The Yamane sample size states that:

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

Where;

n = the sample size

N = the target population size (499 in the case of this study).

e= Margin of error based on the research condition at 0.05 significance.

The Sample will be allocated to the sectors using the formula in Equation 3.1 as provided by Kothari (2017)

$$n(\text{Sector}) = \frac{N(\text{Sector}) * n(\text{all Sectors})}{N(all\ Sectors)} \quad \text{..... Equation 3.1}$$

Where:

n (Sector) is the sample size at sector level.

N (Sector) is the population of a sector.

n (all sectors): is the sample size of the sectors combined.

N (all Sectors) is the population of the sectors.

Table 3.1: Sample Size

Sector	No. of supply chain managers	Unit of Analysis Sample Size
Building	20	9
Chemical	70	31
Energy	34	15
Food	71	32
Metal and Allied	66	29
Motor	27	12
Leather	7	3
Paper	63	28
Pharmaceuticals	21	9
Plastics	68	30
Textiles	35	16
Wood Products	17	8
Total	**499**	**222**

3.7 Data collection Instruments

This study relied on both primary and secondary data sources. Secondary data was collected for both independent and dependent variables for the period of between 2012 and 2016. This study utilized a questionnaire on the other hand to collect primary data. A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents (Lumpkin & Dess, 2001).

Primary data was collected using a self-administered questionnaire. The questionnaire was used to explore the selected respondents' observations, views and opinions on the variables under study. This method was preferred because of the technical nature of items since the scale and the need to ensure reliability of responses from the respondents. Each questionnaire was divided into two sections to obtain information covering various aspects of the study. Section A covered demographic characteristics of the respondent while Section B covered both independent variables and the dependent variable.

3.8 Data Collection Procedure

Data collection refers to the process of collecting raw and unprocessed information that can be processed into meaningful information, following the scientific process of data analysis (Gall, Gall & Borg, 2007). According to Rotich and Simam (2009), the sources of data can either be primary or secondary. The study used primary data. Gale, Heath, Cameron, Rashid and Redwood (2013) defined primary data as the original data which is originated for the purpose of the research at hand. Kothari (2017) describe primary data as those which are collected afresh and for the first time, and thus happen to be original in character. Navarro Sada and Maldonado (2007) describes primary data as those items that are original to the problem under study while Ember (2009) describe primary data as data collected by the investigator in various field sites explicitly for a comparative study. The primary data collection procedure started with identifying the respondents and their accessibility. The availability of the questionnaires and competent research assistants was ascertained. A letter of introduction as student was requested from the university.

The data collection procedure involved distribution of the questionnaires to the respondents by the researcher and four research assistants. They were collected on agreed upon time. The research assistants were instructed to ensure punctuality in appointments, friendliness and use of clear and simple language where the questionnaires will be physically delivered. Some questionnaires were sent electronically to save on time and where physical accessibility is a challenge. The data was collected through questionnaires which were administered by the researcher and research assistants. The questionnaires were administered preferably within the premises of the responding institutions to allow references where necessarily. Prior appointment was necessarily to allow the respondents to familiarize with the questions and make the necessarily reference.

3.9 Pilot Test

A pilot study was conducted on 22 supply chain managers in manufacturing firms which constituted 10 per cent of sample of 222 supply chain managers in the

manufacturing firms. The supply chain managers in manufacturing firms used in pilot testing were not used in data collection for the study but within the population of the study. The aim was to test the reliability and validity of the questionnaire. According to Sekaran (2006) a pilot study is conducted when a questionnaire is given to just a few people with an intention of pre-testing the questions. Pilot test is conducted to detect weaknesses in design and instrumentation and to provide proxy data for selection of a probability sample (Cooper & Schindler, 2011). It assists the research in determining if there are flaws, limitations or other weaknesses within the interview design and allows him or her to make necessary revisions to the questionnaire prior to the implementation of the study (Kvale, 2003). The pilot test sample was computed using the formula as shown in Equation 3.1 and presented in Table 3.2.

Table 3.2: Pilot Test Sample Size

Sector	Study Sample Size	Pilot Test Sample Size
Building	9	1
Chemical	31	2
Energy	15	2
Food	32	3
Metal and Allied	29	3
Motor	12	1
Leather	3	0
Paper	28	3
Pharmaceuticals	9	1
Plastics	30	3
Textiles	16	2
Wood Products	8	1
Total	**222**	**22**

3.9.1 Reliability of the Research Instrument

Reliability is the consistency of a set of measurement items or the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects (Cronbach, 1951). Cronbach's Alpha is a reliability coefficient that

indicates how well items in a set are positively correlated to one another (Sekaran, 2003). Mugenda and Mugenda (2003) define reliability as a measure of the degree to which a research instrument yields consistent results or data after repeated trial. Statistically reliability is based on the idea that individual items should produce results consistent with overall questionnaire. To establish reliability, Cohen *et al.*, (2014) recommends Cronbach's alpha α, which involves splitting data into two and computing correlation coefficient. According to Felder and Spurlin (2016 a value of 0.8 is generally acceptable for cognitive test as an indicator of reliability According to Bryman and Cramer (2005), generally reliability of 0.7 to 1.0 is considered acceptable. For this study an alpha coefficient of 0.7 and above was considered reliable.

3.9.2 Validity of the Research Instrument

Validity can be described as the extent to which instrument measures what it purports to measure (Jankowicz, 2005). Validity concerns the accuracy and meaningfulness of inferences which are based on the research results (Bryman & Cramer, 2005). There are three dimensions from which validity can be examined. These include, content, construct, and criterion validity (Orodho, 2009). The study relied on instruments developed in other related studies as well as concepts generated from a broad range of appropriate literature and experts' opinion. Content validity is based on the extent to which a measurement reflects the specific intended domain of content. Content validity was ensured by designing instrument according to the study variables and their respective indicators of measurement; construct validity, was maintained through restricting the questions to the conceptualizations of the variables and ensuring that the indicators of a particular variable fall within the same construct.

3.10 Data Analysis and Presentations

The raw data collected from the field was transformed into meaning information as it was cleaned, edited and then coded. Kothari (2017) defined data analysis as the computation of certain measures along with searching for patterns of relationships that exist among data groups. Data processing and analysis is essential to ensure that all relevant data is gathered for making contemplated comparisons and

analysis (Mugenda, 2008). The researcher used descriptive analysis, correlation analysis and regression analysis to analyse the data. The data collected using the open ended questions were analysed using content analysis.

According to Prasad (2008) content analysis is any research technique for making inferences by systematically and objectively identifying specified characteristics within text. Zhang and Wildemuth (2009) defined content analysis as a research method that uses a set of procedures to make valid inferences from text. Choy (2014) lists content analysis as a key non-reactive research methodology and described it as a technique for gathering and analysing the content of text. The 'content' refers to words, meanings, pictures, symbols, ideas, themes, or any message that can be communicated. The 'text' is anything written, visual, or spoken that serves as a medium for communication (Choy, 2014). The content analysis was used to analyse qualitative data. The texts of the open ended questions were studied and subdivided into themes guided by the objectives of the study. The themes then guided the researcher to analyse the data. According to Mbwesa (2006) and Mugenda and Mugenda (2003) descriptive analysis involves finding numerical summaries to provide a deeper insight into the characteristics and description of the variables under study.

Correlation analysis involves using the collected data to determine whether a relationship exists between two or more quantifiable variables where the magnitude and direction of correlation is expressed by correlation coefficient (Cohen *et al*., 2014). According to Cohen, West and Aiken (2014) linear regression analysis involves measuring the linear association between a dependent and an independent variable(s). It assumes the dependent variable is predicatively linked to the independent variable(s). Regression analysis therefore attempts to predict the values of a continuous interval or scaled dependent variable from the specific values of the independent variable(s).

The study used both qualitative and quantitative data as advocated for by Babbie (2013). Qualitative data from open ended questions were analysed using content analysis while Statistical Package for Social Sciences (SPSS) software version 21

was used in running the statistical tests. SPSS was chosen because as indicated by Babbie (2013) it is user friendly and gives all the possible analysis. The categories of responses were identified, coded and entered into SPSS variable data sheet for both descriptive and quantitative analysis.

Descriptive analysis generated measures of central tendency, that is, frequencies, percentages, means and standard deviation which were presented in tables and interpreted appropriately. Conditional linear regression tests were conducted before the data were analysed further. These tests are sampling adequacy test to determine adequacy of the sample size for factor analysis, autocorrelation tests to find out if there is correlation between the residue terms for any two observations, multicollinearity to test whether more than two independent variables are inter-correlated, outliers test to identify if there is any observation far placed from the other observations, Bartlett's test to examine if correlation matrix is an identity matrix and normality tests to determine if data is normally distributed. After conducting diagnostic tests, factor analysis will be done to identify factors which may not be instrumental to the study. Finally, correlation analysis and regression analysis was done.

3.10.1 Sampling Adequacy Test

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was conducted to determine adequacy of the sample size. According to Magd (2008) KMO is an index used to examine and justify the appropriateness of application of Factor Analysis; values between 0.5-1.0 indicate that a factor is significant. Moutinho and Hutcheson (2010) suggested that values between 0.7 and 0.8 are good for factor analysis.

3.10.2 Autocorrelation Test

Autocorrelation is correlation between the residue terms for any two observations; it is expected that the residue terms for any two observations should be independent (Field, 2005). Durbin-Watson test will be used to test for the presence of autocorrelation between variables. Gujarati (2003) observed that Durbin-Watson

statistic ranges from 0 to 4. A value near 0 indicates positive autocorrelation while a value close to 4 indicates negative autocorrelation. A value ranging from 1.5 to 2.5 indicates that there is no presence of autocorrelation.

3.10.3 Multicollinearity Test

Multicollinearity is a phenomenon where there is inter-correlation among the explanatory variables. Runkle, DeFusco, Anson, Pinto, and McLeavey (2013) posit that, multicollinearity occurs in statistics where two or more predictor variables in a multiple regression are highly correlated. The variables or items should be reasonably correlated to each other but not to the point of extreme multicollinearity or correlations greater than 0.90 (Tabachnick & Fidell, 2007). However, we only worry of multicollinearity when it is a very severe; otherwise if it is not severe, we can simply tolerate or accommodate the problem, and work with it. Multicollinearity results in the estimate of one variable impacting on the dependent variable while controlling for other variables that tends to be less precise than if predictors were uncorrelated. Murray (2013) observes that the bottom line is this; if two *x* variables are significantly correlated; only include one of them in the regression model, not both. If you include both, the computer won't know what numbers to give as coefficients for each of the two variables because they share their contribution to determining the value of *y*.

Multicollinearity occurs in statistics where two or more predictor variables in a multiple regression model are highly correlated (Bickel, 2010). The Gauss-Markov assumption only requires that there be no perfect multicollinearity and so long as there is no perfect multicollinearity the model is identified. This means the model can estimate all the coefficients and that the coefficients remained best linear unbiased estimates and that the standard errors were correct and efficient (Runkle et al., 2013). Variance Inflation Factor (VIF) was used to measure the problem of multicollinearity in the multiple regression models. VIF statistic of a predictor in a model is the reciprocal of tolerance and it indicates how much larger the error variance for the unique effect of a predictor (Baguley, 2012).

Cohen and Aiken (2014) defines Variance Inflation Factor (VIF) as an index of the amount that the variance of each regression coefficient is increased relative to a situation in which all of the predictor variables are uncorrelated and suggested a VIFs of 5 or more to be the rule of thumb for concluding VIF to be too large hence not suitable. Runkle *et al*. (2013) argued that if two or more variables have a Variance Inflation Factor (VIF) of 5 or greater than 5, one of them must be removed from the regression analysis as this indicates presence of multicollinearity. Thus in this study if two or more variables had a Variance Inflation Factor of 5 or greater than 5 one of them was to be removed from the model.

3.10.4 Normality Test

The normality test was performed on the dependent variable to determine if the data has a normal distribution. The assumption of a normal model for a population of responses will be required in order to perform inference procedures. So as to make deductions, from an analysis, assumption of a normally distributed dependent variable is important. If the observations follow approximately a normal distribution, the resulting plot should be roughly a straight line with a positive slope. Q-Q plot should be linear and is an exploratory graphical device used to check the validity of a distributional assumption for a data set. In general, the basic idea is to compute the theoretically expected value for each data point based on the distribution in question. If the data indeed follow the assumed distribution, then the points on the q-q plot will fall approximately on a straight line (Goldstein, 2011).

A test of normality was used to determine if the data is well modelled and normally distributed (Gujarati, 2002). According to Ghasemin and zahediasi (2012) the variables are supposed to be roughly normally distributed especially if the results are to be generalized beyond the sample. The study will use both kolmogorov-Sminorv and Shapiro-Wilk normality tests. In kolmogorov- smirnov test, if the tests of normality yield a figure of less than 0.05 it means that the data is not normally distributed but for Shapiro-wilk if the figure was less than 0.05 then the data will be normally distributed.

3.10.5 Factor Analysis

Factor analysis was done in two stages: during pilot study and after the main data was collected. In factor analysis, item communalities are considered “high” if they are all 0.8 or greater. According to Shenoy and Madan (2000), not all variable factors are statistically important in a research. Factor analysis acts as a gauge of the substantive importance of a given variable to the factor and it was used to identify and remove hidden constructs or variable items that do not meet the objectives of the study and which may not be apparent from direct analysis (Ledesma & Valero-Mora, 2007; David *et al*., 2010).

The communalities and eigenvalues was used to indicate the substantive importance of variable factors. A loading value of 0.7 is the rule of thumb and is believed to be satisfactory but due to the seemingly difficulties of meeting the 0.7 criterion a loading of up to 0.4 level is acceptable (Baggio & Klobas, 2017). In this study eigenvalues for each variable were extracted using principal component analysis. However, according to Velicer and Fava (1998) such values are difficult to obtain in relation to real data. In social science studies, moderate communalities values of 0.5640 and 0.70 are common and acceptable.

3.10.6 Correlation Analysis

Pearson correlation coefficient was used to determine the magnitude and the direction of the relationships between the dependent variable and independent variables. The values of the correlation coefficient are between -1 and +1. A value of 0 implies no relationship, +1 correlation coefficient indicates that the two variables are perfectly correlated in a positive linear sense, that is, both variables increase together while a values of -1 correlation coefficient indicates that two variables are perfectly correlated in a negative linear sense, that is, one variable increases as the other decreases (Kothari, 2017).

The purpose for the Pearson’s correlation coefficient was to establish the magnitude and direction of the relationship between each independent variable with the individual parameters. The correlation strengths were interpreted using Cohen and

Aiken (2014) decision rules where 0.1 to 0.3 indicates weak correlation, 0.31 to 0.5 indicates moderate correlation strength and greater than 0.5 indicates a strong correlation between the variables. The decision rule has been used by Nguyen and Thanh (2011) in their study of determination of the correlation between customer attitude towards consumer issues and expectations on government intervention

3.10.7 Regression Analysis

Regression analysis is a measure of the ability of independent variable(s) to predict an outcome of a dependent variable where there is a linear relationship between them. In this study regression analysis was done to establish whether independent variables predicted the dependent variable. The R square, t-tests and F-tests and Analysis of Variances (ANOVA) tests were generated by SPSS to test the significant of the relationship between the variables under the study and establish the extent to which the predictor variables explains the variation in dependent variable. Hierarchical Moderated Multiple Regression model was also used to determine the effect of the moderating variable on the whole model where the R2 values with and without the moderating variable were compared (Brace, Kemp & Snelgar, 2012). The research hypotheses were tested using the p value approach at 95% confidence level based on linear regression analysis output produced by SPSS. The decision rule was that the null hypothesis should be rejected if the calculated p-value was less than the significant level (0.05); and accepted if the calculated p-value was greater than the significance level (0.05). The significance of the independent variables was tested using F test and p value approaches. The decision rule was to reject the null hypotheses that the effect of independent variable(s) is insignificant if the computed F value exceeds the critical F value or if the P value was less critical value of 0.05.

The study has five objectives where five research hypotheses were identified. In the first four objectives, the study aimed to examine the effects of inventory control, supplier management; procurement cost optimization and supply chain automation on performance of manufacturing firms in Kenya where the following simple regression model was used:

$$Y = \beta_{oi} + \beta_i X_{i+} e_i \ldots\ldots\ldots\ldots \text{.....Equation 3.2}$$

Where;

=1,2,3,4

β_{oi} is the intercept of the variable Y

β_i is the the slope or gradient of the regression line which explains the manner in which Y relates with X_i

X_i's are Inventory Control, Supplier Management, Procurement cost Optimization and Supply Chain Automation

e_i is the error term.

Since the study had four independent variables a simple linear regression model will be used for each of them. The results for equation 3.2 indicated whether each individual independent variable had a significant relationship with the dependent variable. Multiple linear regression analysis was used to establish the combined relationship between all independent variables and dependent variable. Equation 3.3 was present the results for regression analysis of all the independent variables on dependent variable.

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e \ldots\ldots\ldots\text{.....Equation 3.3}$$

Where;

Y= Performance of Manufacturing Firms which was measured by Return On Assets, Return On Equity, Profit Margin and Sales Growth

X_1 = Inventory Control

X_2 = Supplier Management

X_3= Procurement Cost Optimization

X_4= Supply Chain Automation

ε = error term

β_o is the intercept of the variable Y

β_i is the the slope or gradient of the regression line which explains the manner in which Y relates to X_i

The moderation effect of Staff Competence was tested using the hierarchical Moderated Multiple Regression (MMR) analysis. Cohen, West and Aiken (2014) reported that the MMR approach involves the addition of interaction effects to a multiple regression model by comparing two different least squares regression equations. The dependent variable was regressed with cross product of each independent variable and staff competence to test for the interaction effects. Using the MMR analysis, the moderating effect of Staff Competence was analyzed by interpreting the R^2 change in the models obtained from the model summaries and the regressions coefficients for the product term obtained from the coefficients.

The study sought to test the moderating effect of staff competence on the relationship between supply chain optimization and performance of manufacturing firms in Kenya. Multivariate regression was conducted using interaction variables for all the variables. A significant interaction variable implied that the moderator has a significant effect on the relationship between the variables and the dependent variable. The moderation effect was tested using equation 3.4 where the combined relationship between the independent variables X_1*Z, X_2*Z, X_3*Z and X_4*Z and dependent variable was tested (Baron & Kenny, 1986).

$$Y = \beta_o + \beta_1 X_1 *Z + \beta_2 X_2*Z + \beta_3 X_3*Z + \beta_4 X_4*Z + e \text{.....Equation 3.4}$$

Where,

Y= Performance of Manufacturing Firms

X_1 = Inventory Control

X_2 = Supplier Management

X_3= Procurement cost Optimization

X_4= Supply chain Automation

Z = Staff Competence (moderating variable)

β_o is constant (Y- intercept) which is the value of dependent valuable when all the independent variables are zero

β_1, β_2, β_3 and β_4 are regression constants or the rate of change induced by X_1*Z, X_2*Z, X_3*Z and X_4 *Z on Y.

e is the standard error term.

The SPSS was used to generate the exact values of β_1, β_2, β_3 and β_4. The results for equation 3.4 indicated whether there is any moderating effect. The condition for rejecting the null hypothesis was a computed p value which was less than 0.05. The magnitude of moderation effect was shown by the change in R^2 in the model summary.

3.10.8 Variable Definition and Measurement

The independent variables for the study was inventory control, supplier management; procurement cost optimization and supply chain automation while the dependent variable was performance of manufacturing firms in Kenya. The study also had a moderating variable, which was staff competence. The variables were measured by the indicators as shown Table 3.2.

Table 3.3: Variables Operationalization

Variable	Operationalization	Indicator	Measurements
Firm Performance (Dependent Variable)	Financial performance	• ROE • ROA • Sales growth • Profit Margin	Ratios
Supply chain Optimization (Independent Variable)	Inventory Control	• Amount of stock held • Cost of holding stocks • Effective inventory management	Ordinal
	Supplier management	• Supplier appraisal • Supplier Risk Analysis • Supplier Responsiveness	Ordinal
	Procurement cost optimization	• Strategic sourcing • Consolidation of suppliers • Improvement contract management	Ordinal Ordinal
	Supply chain automation	• IT-supported processes • Integrated Planning and Execution Systems • E-procurement	Ordinal
Moderating Variable	Staff competence	• Skills and experience • Professional Qualification	Ordinal

.

3.10.9 Tests of the Hypotheses

The hypotheses of the study were tested using various analyses as shown in Table 3.2.

Table 3.4: Hypotheses tests

Objective	Hypothesis	Analysis tests	Interpretation
To establish the influence of inventory control on performance of manufacturing firms in Kenya.	$1H_0$: There is no significant influence of inventory control on the performance of manufacturing firms in Kenya.	Pearson correlation Linear regression analysis	If p value is less than 0.05 reject null hypothesis If p value is greater than 0.05 fail to reject the null hypothesis.
To assess the influence of supplier management on performance of manufacturing firms in Kenya.	H_0: There is no significant effect of Supplier management on the performance of manufacturing firms in Kenya	Pearson correlation Linear regression analysis	If p value is less than 0.05 reject null hypothesis If p value is greater than 0.05 fail to reject the null hypothesis
To determine the influence of procurement cost optimization on performance of manufacturing firms in Kenya.	H_0:There is no significant effect of Procurement cost optimization on the performance of manufacturing firms in Kenya	Pearson correlation Linear regression analysis	If p value is less than 0.05 reject null hypothesis If p value is greater than 0.05 fail to reject the null hypothesis
To assess the influence of supply chain automation on performance of manufacturing firms in Kenya.	H_0: There is no significant effect of Supply chain automation on the performance of manufacturing firms in Kenya..	Pearson correlation Moderated multiple regression analysis	If p value is less than 0.05 reject null hypothesis If p value is greater than 0.05 fail to reject the null
To explore the moderating effect of staff competence on the relationship between supply chain optimization and performance of manufacturing firms in Kenya.	H_0: There is no significant moderating influence of Staff competence on the relationship between supply chain optimization and the performance of manufacturing firms in Kenya.	Pearson correlation Moderated multiple regression analysis	If p value is less than 0.05 reject null hypothesis If p value is greater than 0.05 fail to reject the null

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter contains research findings and discussions of the study. The section contains the results on demographics characteristics, descriptive results both for secondary and primary data, diagnostic tests and inferential results which include correlation test, univariate and multivariate regression analysis results and moderated multivariate regression analysis results. The chapter further contains the optimal model results and summary of the tested research hypotheses. The presentation of the results was done using charts and tables.

4.2 Response Rate

The study targeted a total of 222 supply chain managers in charge of procurement department in manufacturing firms in Nairobi County of which 22 of them were involved in the pilot test , thus excluded in the final study. Two hundred (200) questionnaires were dropped in all the sampled manufacturing companies and picked after a period of between two and five days depending on the responses. The questionnaires were filled by the supply chain managers in charge of procurement departments in the sampled firms. Table 4.1 presents the results for response rate obtained.

Table 4.1: Respose Rate

Sector	Sample Target	Response	Percent Response
Building	8	8	100
Chemical	29	27	93.10
Energy	13	12	92.31
Food	29	28	96.55
Metal and Allied	26	25	96.15
Motor	11	10	90.91
Leather	3	3	100.00
Paper	25	25	100.00
Pharmaceuticals	8	7	87.50
Plastics	27	25	92.59
Textiles	14	13	92.86
Wood Products	7	7	100.00
Total	**200**	**190**	**95.00**

A total of 190 questionnaires were properly filled and collected from the various companies while the remaining 10 questionnaires were either not dully filled or were not returned. The study recorded a response rate of 95% as shown in Table 4.1. This response rate was considered adequate based on the proposition of scholars such as Babbie, (2004) and Mugenda and Mugenda (2003) who posited that in a descriptive study, a response rate of above 50% was adequate for analysis. The responses in all sectors met the threshold.

4.3 Results of the Pilot Study

Pilot test of the study was carried out prior to implementation of the study to ensure that the questionnaires measured what was intended (Cooper & Schindler, 2010).

4.3.1 Reliability Test Results

Reliability is an indication of the stability and consistency with which the instrument measures a concept and helps to assess the goodness of a measure (Cooper &

Schindler, 2011). According to Zinbarg (2005) Cronbach's Alpha of 0.70 or higher indicated that the gathered data is reliable as it has a relatively high internal consistency and can be generalized to reflect opinions of all respondents in the target population (Zinbarg, 2005). Serakan (2003) points out that a value of 0.70 is the minimum acceptable value for Cronbach's Alpha reliability. The Cronbach's alpha was used in this study to measure the internal consistency of the variables. Reliability test was done where Cronbach's Coefficient Alpha was used. According to Kline (2014) a value of 0.8 is generally acceptable for cognitive test as an indicator of reliability. For social-science constructs values below 0.7 can be expected because of the diversity of the construct being measured. The items on each of the variables in the questionnaire were subjected to Cronbach's Coefficient Alpha test of all the items were found to be reliable for measurement because the reliability coefficient were found to be above the recommended threshold of 0.7 (Kline, 2014) as indicated in Table 4.2.

Table 4.2: Summary of Reliability Test Results

Variables	Cronbach's Alpha	Number of Items	Comment
Inventory Control	0.875	6	Accepted
Supplier Management	0.700	7	Accepted
Procurement Cost Optimization	0.841	6	Accepted
Supply Chain Automation	0.875	5	Accepted
Staff Competence	0.889	6	Accepted

The findings in Table 4.2 show that the scales were reliable as they surpassed the minimum Cronbach's alpha value threshold of 0.7 that is recommended by Serakan (2003). The construct of inventory control had a Cronbach's alpha value of 0.875; supplier management had a Cronbach's alpha value of 0.700; procurement cost optimization had a Cronbach's alpha value of 0.841; and, supply chain automation had a Cronbach's alpha value of 0.875, while staff competence had a Cronbach's alpha value of 0.889. Accordingly, none of the items in the questionnaire were deleted after the pilot study. The questionnaire was adequate to be used in the final study.

Validity test was done to ensure that the degree with which a measurement procedure or a questionnaire measures the characteristic it is intended to measure (Saunders, Lewis & Thornhill, 2009). These include, content, construct, and criterion validity (Orodho, 2009). Content validity was done by designing the questionnaires according to the study variables and their respective indicators of measurement; construct validity, was done through restricting the questions to the conceptualizations of the variables and ensuring that the indicators of a particular variable fall within the same construct

4.4 Demographic Information of the Respondents

The study sought to find the demographic characteristics of the respondents. These included the gender, highest level of education and the work experience of the respondents. The results were presented in tables.

Table 4.3: Gender of the Respondents

Category	Frequency	Percent
Female	63	33
Male	127	67
Total	**190**	**100**

The results showed that majority of the procurement heads in manufacturing industry were male at 67% while 33% were female. These findings revealed that the sector has adhered to two thirds gender rule as enshrined in the constitutions. However, the results showed that male gender still dominates in the private sector compared to women. The results concur with Sud (2002) who in her study on gender disparities in the Kenyan labour market indicated that female labour force participation in the modern sector has remained below 30% over the last several years compared to men who hold a disproportionately larger share of the modern sector jobs.

Table 4.4: Level of Education of the Respondents

Level of Education	Frequency	Percent
Secondary level	0	0
Polytechnic / College level	20	10
University level	127	67
Post graduate level	43	23
Total	**190**	**100**

On the highest level of education, the study findings showed that 67% of the procurement heads were university graduates, 23% had postgraduate level of education while 10% had college level of education. None of the respondents had secondary level of education (Table 4.`4). The finding implied that target population was very educated and this is justified by high professionalism required in procurement functions and the critical role played by procurement department in manufacturing sector. According to Raymond (2008), professionalism in public procurement relates not only to the levels of education and qualifications of the workforce but also to the professional approach in the conduct of business activities.

Table 4.5: Experience of the Respondents

Experience	Frequency	Percent
Less than 2 years	24	12
3 to 5 years	102	54
Over 5 years	64	34
Total	**190**	**100**

The study finally, sought to establish the years of experience of the respondents in procurement in manufacturing industry. The results showed 54% of the respondents had between 3 and 5 years of experience, 34% had over 5 years of experience while remaining 12% had less than 2 years of experience. These findings implied that majority of the respondents in this study were experienced enough to understand and

respond to information sought by the study. Dokko, Wilk, and Rothbard (2009) also found positive effect of prior related experience on task-relevant knowledge and skill is related to higher levels of experience within the current firm.

4.5 Descriptive Analysis of Secondary Data

This section contains descriptive analysis of the study variables. These include averages, standard deviation, minimum and maximum of various costs related to inventory control. The section further provides trends analysis to show how procurement costs have been changing across the study period. This section was purely based on secondary data collected between 2012 and 2016 from the sampled manufacturing companies.

4.5.1 Descriptive Results for Inventory Control

The study sought to establish to what extent manufacturing firms in Kenya control their inventory. The study analyzed the materials costs, fixed operational costs, carrying costs, logistics costs and redistribution costs for sampled companies for a period of five years. The results are presented in Table 4.6.

Table 4.6: Descriptive Results for Inventory Costs

Inventory Control	Statistics	2012	2013	2014	2015	2016
Materials Cost	Mean	30466.13	30470.9	26441.61	34312	33815.17
	Std. Deviation	42366.47	44558.51	30261.63	40680.31	37990.43
	Minimum	1051	1097	1846	1863	1632
	Maximum	181370	212711	128204	148846	128266
Fixed Operational Costs	Mean	52908.34	53002.83	49910.1	45856.69	48561.28
	Std. Deviation	24832.1	24268.93	27738.74	24008.05	27783.36
	Minimum	10445	10715	7260	9546	8688
	Maximum	91913	96159	97094	86723	91828
Carrying Costs	Mean	43780.69	45826.17	55395.86	48772.28	48220.28
	Std. Deviation	28860.05	29213.01	26029.38	24458.72	29065.95
	Minimum	7400	7674	10112	8005	6680
	Maximum	98372	93486	92020	97190	98687
Logistics Costs	Mean	53189.86	57657.14	47301.59	47974.9	50290.48
	Std. Deviation	25471.33	25281.01	27420.79	28588.32	22847.01
	Minimum	6645	11891	8400	9981	13032
	Maximum	95153	91589	96104	99898	97883
Redistribution Costs	Mean	53637.21	50422.41	53239.55	45910.97	53390.48
	Std. Deviation	27715.73	24541.97	28491.45	26680.15	25295.5
	Minimum	8488	10307	10042	7417	8099
	Maximum	99010	97438	99350	99187	95331

The findings revealed that there was an increase in average material costs among manufacturing companies in Kenya. For instance, in 2012, the companies average spending was Kshs 30.5 million compared to over 33 million spent in 2016. The highest materials cost for the period was 128 million while the lowest was 18 million. The standard deviation was very high across the period indicating that material costs varied largely depending on the company.

The findings further revealed that fixed operational costs reduced from an average of 52.9 million in 2012 to 48.6 million in 2016. The finding implied that manufacturing companies in Kenya control their fixed operational costs in efficiently way. The results further showed that there was an increase in carrying costs and a reduction in logistics costs across the study period. The average company increased their carrying costs by about 5 million but reduced their logistics costs by about 3 million over the five years of the study. The findings revealed that there almost no significant change in redistribution costs since the average redistribution costs was 53.6 million in 2012 and 53.3 million in 2016 indicating a very slight change.

The finding implied that manufacturing firms in Kenya moderated their cost associated with their inventory management. The finding further implied that firms had adopted supply chain optimization to minimize their costs. These findings concur with Mwangi (2016) who found that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi County, Kenya. Munyao, Omulo, Mwithiga and Chepkulei (2015) also highlighted that inventory problems firms experience includes unorganized inventory arrangement, large amount of inventory days / no cycle counting and no accurate records balance due to unskilled workers.

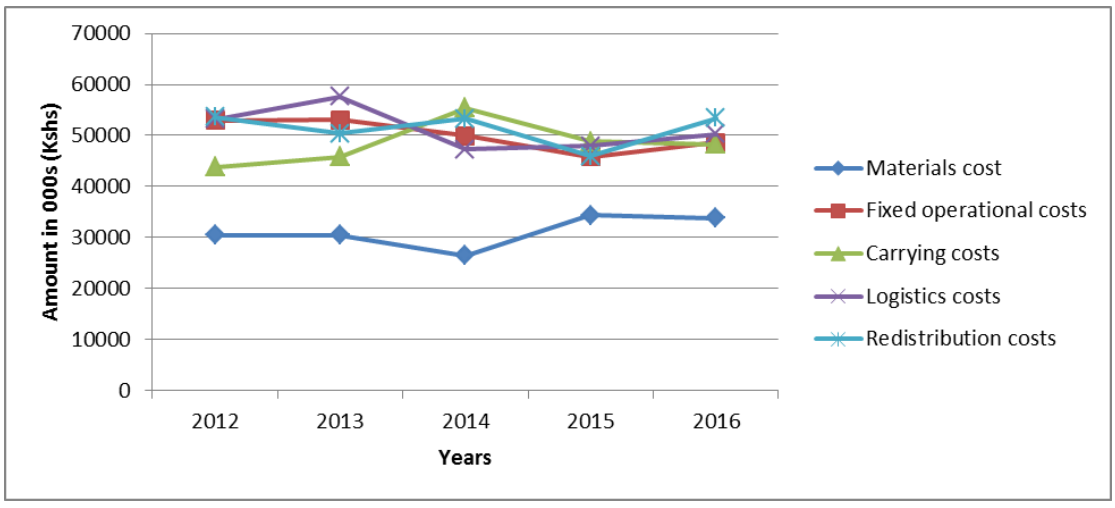

Figure 4.1: Trends for Inventory Costs

The findings presented in figure 4.1 indicated that inventory control cost including materials costs, fixed operational costs, carrying costs, logistics costs and redistribution costs for sampled firms increased slightly between 2012 and 2016. This increase does not necessarily imply lack of inventory control; it could be as results of firms' expansion plan and increase in production capacitor of the company hence the need for more inventories. Bartmann and Bach (2012) argued that excess inventories guarantee uninterrupted supply of materials and components, to meet production schedules and finished goods to meet customers demand. Too less of inventory on the other hand, releases working capital for alternative uses and reduces carrying costs and increases ordering costs. But there is the risk of stock out costs.

4.5.2 Descriptive Results for Supplier Management

The second hypothesis of the study was that there is no significant influence of Supplier management on the performance of manufacturing firms in Kenya. Table 4.7 presents the results on the analysis of supplier management costs such as supplier appraisal cost, supplier risk analysis cost and supplier responsiveness in manufacturing sector in Kenya.

Table 4.7: Descriptive Results for Supplier Management Costs

	Statistics	2012	2013	2014	2015	2016
Supplier appraisal cost	Mean	50669.76	46380.07	57271.79	52237.48	54629.24
	Std. Deviation	28000.82	22026.72	29118.02	29569.25	26801.74
	Minimum	8958	13230	8093	8170	10451
	Maximum	99690	97906	99166	99709	91896
Supplier Risk Analysis cost	Mean	60672.38	50551.55	58000.9	49542.62	56509.9
	Std. Deviation	23470.95	31851.65	27124.42	27244.65	26208.52
	Minimum	11075	7623	8290	10087	12029
	Maximum	93988	99878	99280	97715	98118
Supplier Responsiveness	Mean	53734.07	58972	65558.38	62395.66	49520.14
	Std. Deviation	25439.15	24786.2	22567.28	22112.02	27837.12
	Minimum	11629	6728	20343	21977	6921
	Maximum	91830	97597	99065	99121	95375

The results showed that manufacturing firms averagely spend more on supplier appraisal costs. The average for 2012 was 50 million while in 2016 54 million was averagely spend on appraising the suppliers. The maximum amount spend on supplier appraisal was 91 million while the least was 8 million. The findings further revealed that supplier risk analysis costs and supplier responsiveness costs reduced over the study period.

The results implied that firms prioritize suppliers' appraisal hence the increase in appraisal costs. Kosgei and Gitau (2016) also posited that practicing of supply chain management with key focus on supplier relationships is an essential prerequisite for staying competitive in the global race and enhancing profitably in the market. Al-Abdallah, Abdallah and Hamdan (2014) results also show that two practices of supplier relationship management, supplier partnership/development and supplier lead time reduction significantly and positively affect the competitive performance of the buying firms.

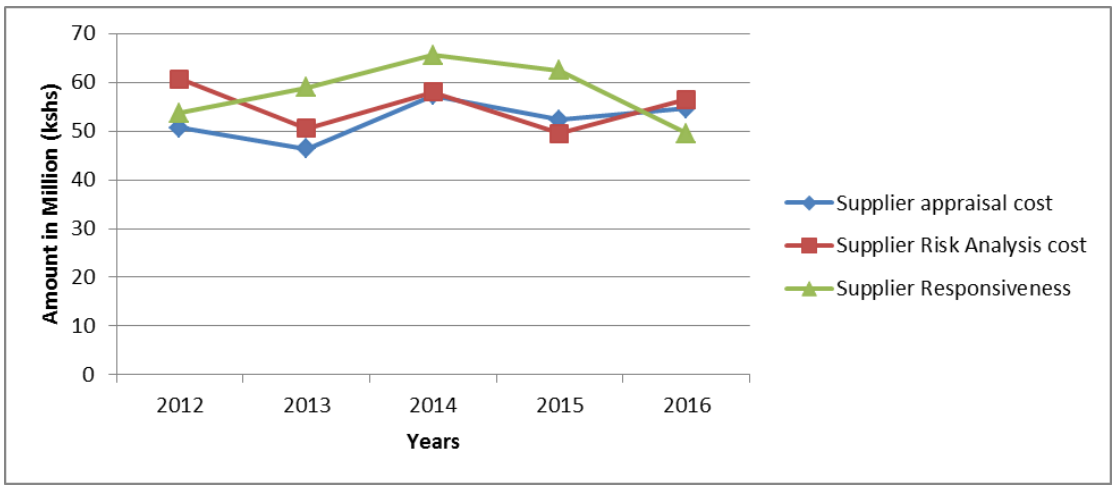

Figure 4.2: Trends for Supplier Management Costs

The findings presented in figure 4.2 further confirmed that while supplier appraisal costs increased, the costs associated with supplier risk analysis and supplier responsiveness decreased across the study period. These finding indicated that manufacturing industry players in Kenya are conscious of the supplier management costs. The findng also concurs with Kosgei and Gitau (2016) and Abdallah and

Hamdan (2014) who pointed out that supplier management is a critical component of ensuring high firm performance.

4.5.3 Descriptive Results for Procurement Cost Optimization

The study further analyzed some of the cost related to procurement functions with the intention of establishing the extent manufacturers in Kenya optimized such costs. The study focused on cost optimization through strategic outsourcing, consolidation of suppliers and improvement of contracts. The findings are presented in Table 4.8.

Table 4.8: Descriptive Results for Procurement Optimization Costs

	Statistics	2012	2013	2014	2015	2016
Strategic sourcing	Mean	52083.72	51578.17	47766.41	65150	50603.28
	Std. Deviation	30490.84	26391.11	25426.73	25878.71	28207.07
	Minimum	12089	6978	6648	8035	6761
	Maximum	99811	95338	91918	99351	97357
Consolidation of suppliers	Mean	58822.24	61034.83	61258.76	42756.79	53358.31
	Std. Deviation	25707.45	25685.17	30147.46	22062.22	28955.69
	Minimum	7569	6667	9258	11034	7514
	Maximum	98398	95689	100022	87662	99895
Improvement contract	Mean	61934.1	50135.41	57528.72	54003.52	50649.48
	Std. Deviation	30078.69	25732.76	27102.77	30597.53	25989.64
	Minimum	6660	8443	10070	6798	11389
	Maximum	98276	94886	99928	96151	99414

The findings revealed that through strategic outsourcing, consolidation of supplier and improvement of contracts, manufacturers in Kenya minimized procurement costs from an average of 52 million in 2012 to 50 million in 2016 through strategic outsourcing while from 58 million to 53 million through consolidation of suppliers and finally improvement of contract reduced costs from an average of 61 million to 50 million in five years. The findings implied that procurement cost optimization is critical in reducing procurement expenses. Ehrlenspiel, Kiewert, Lindemann and Hundal (2007) also argued that cost optimization is a process that should be carried

out throughout to ensure that the cost of the manufacturing is kept within the estimated cost limits.

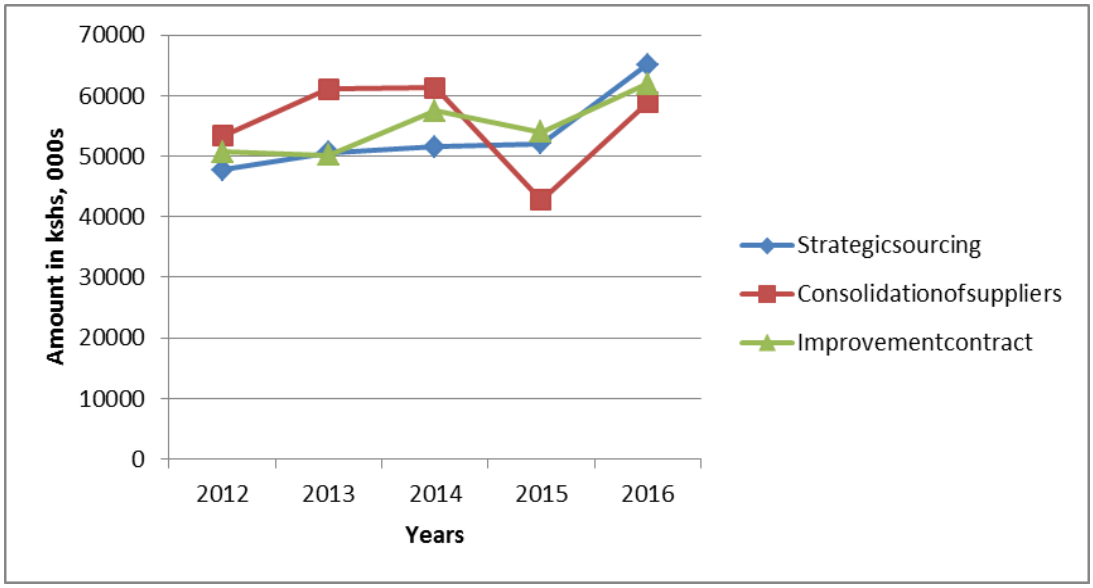

Figure 4.3: Trends for Procurement Optimization Costs

The results presented in the figure 4.3 further confirmed that procurement cost optimization has been very critical in management cost related to procurement function. The trends indicate slight changes in procurement costs as results of procurement cost optimization.

4.5.4 Descriptive Results for Supply Chain Automation

The study further sought to analyze the cost related to supply chain automation in manufacturing firms in Kenya. These include IT supported processes, E procurement adoption and integrated planning and execution systems costs. Table 4.9 contains the results of supply chain automation costs in manufacturing sector in Kenya.

Table 4.9: Descriptive Results for Supply Chain Automation Costs

	Statistics	2012	2013	2014	2015	2016
IT-supported processes	Mean	61309.28	60188.41	59457.1	52303.45	49649.76
	Std. Deviation	23781.58	25412.73	28637.94	27192.57	28657.15
	Minimum	15898	6612	9643	10072	8280
	Maximum	99108	95752	98107	94379	99634
E-procurement	Mean	53564.79	60070.21	53814.76	49441.48	50996.52
	Std. Deviation	30434.2	27656.98	23784.03	25108.75	27701.08
	Minimum	7724	18366	8449	7582	8208
	Maximum	97325	98302	95630	94463	98435
Integrated Planning and I	Mean	51578.97	51146.1	50726	52293	54245.17
	Std. Deviation	27614	24210.95	26812.55	25195.08	24964.82
	Minimum	8491	11869	8693	7999	16558
	Maximum	97622	92606	95496	97018	93137

The results revealed that the average costs related to supply chain automation more specifically IT supported processes and E procurement adoption cost significantly reduced over the five years. This could be because integrated of this system is done once and further costs are used for maintenance and upgrading of the same. On the other hand, the result indicated that large percentage of manufacturer in Kenya have adopted supply chain automation as a strategy to enhance supply chain optimization in bid to boost their firm performance. Kitheka (2012) also established a positive linear relationship between inventory management automation and the performance of the supermarkets.

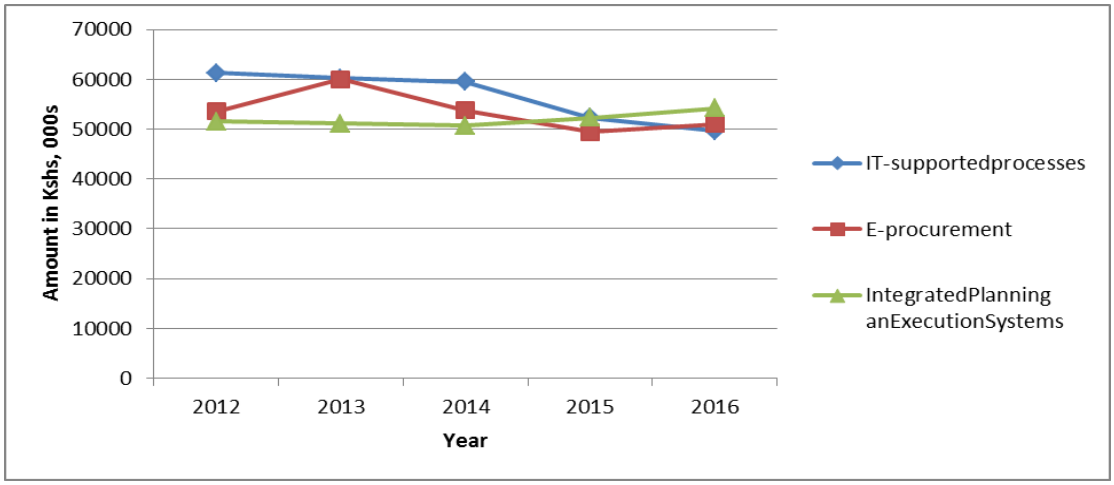

Figure 4.4: Trends for Supply Chain Automation Costs

The trend analysis reported in Figure 4.4 further confirmed a reduction in the cost related to supply chain automation by manufacturers in Kenya between 2012 and 2016. These findings further implied that the cost of supply chain automation reduced over time while improving supply chain optimization.

4.5.5 Descriptive Results for Staff Competence

This section presents the results on the level of staff competence among manufacturing sector in Kenya. Table 4.10 provides the results on various aspects on competence of supply chain staff in the selected manufacturing firms in Kenya.

Table 4.10: Descriptive Results for Staff Competence

Statement	SD	D	N	A	SA	Mean	Std Dev
Our company has highly skilled procurement staff	10.0	7.9	26.8	28.9	26.3	3.54	1.24
Employees in the supply chain management in our company have high academic qualification	10.5	10.5	25.8	26.3	26.8	3.48	1.28
Employees in the procurement department have vast previous experience in supply chain performance	12.1	14.2	23.2	21.1	29.5	3.42	1.36
Our company only hires professional supplier chain managers	10.5	6.8	25.3	25.3	32.1	3.62	1.29
Our supply chain management staff are equip to handle technological change in the supply chain management	17.4	6.3	27.9	26.3	22.1	3.29	1.35
Employees in the supply chain management in our company are flexible depending on the company's demand	9.5	10.0	29.5	19.5	31.6	3.54	1.29

The study sought to establish whether the manufacturing firms in Kenya had highly skilled procurement staff. The results showed that respondents that agreed and strongly agreed were 55.1, 26 were neutral, 10 strongly disagreed while 7.9 disagreed. These finding implied that not all the manufacturing firms in Kenya had highly skilled individuals in their procurement departments. These findings concur with those of demographic characteristics presented above that showed that 10.53 and 12.63 of the respondents had college certificate in procurement and had less than 2 years of work experience respectively.

The study further sought to establish whether employees in the supply chain management in the firms have high academic qualification. The results showed that 26.8 and 26.3 of the respondents agreed and strongly agreed respectively, 25.8 were neutral on the statement while 10.5 and 10.5 disagreed and strongly disagreed respectively. The standard deviation of 1.28 implied that education qualification greatly varied across various respondents.

The results also showed that previous experience of employees in the procurement department varied greatly as shown by the standard deviation of 1.36. This implied that while some firms had experienced procurement staff other had less experienced procurement department employees. The study further sought to establish whether firms only hire professional supplier chain managers, the findings showed that the response varied widely across different respondents. The results showed that 32.1 strongly agreed while on the other hand 10.5 strongly disagreed which implied that not all the manufacturing firms in Kenya hired professional supplier chain managers.

The result also showed that respondents' response varied widely on whether supply chain management staff is equipped to handle technological change in the supply chain management and whether employees in the supply chain management were flexible depending on the company's demand. The overall implication of these findings was that the competence of procurement staffs varied from one firm to firm. While some firms had highly skilled staff other had less skilled supply chain management staff.

4.5.6 Descriptive Results for Firm Performance Indicators

This section contains the analysis of firm performance of manufacturing firms in Kenya. To measure the firm performance, the study used the return on asset, return on equity, total sales and profit margins. The findings were as shown in Table 4.11.

Table 4.11: Descriptive Results for Firm Performance Indicators

	Statistics	2012	2013	2014	2015	2016
ROE	Mean	14.79	17.71	17.32	17.54	17.58
	Std. Deviation	6.655	7.792	6.351	8.366	7.407
	Minimum	6	7	6	6	8
	Maximum	29	29	30	30	29
ROA	Mean	3.07	3.02	3.17	2.94	3
	Std. Deviation	1.775	1.843	2.062	2.263	1.735
	Minimum	1.0	0.0	0.0	0.0	0.0
	Maximum	7.0	8.0	9.0	10.0	7.0
Total Sales (million)	Mean	265.49	202.29	433.44	329.96	413.25
	Std. Deviation	341.52	265.16	650.95	457.66	655.00
	Minimum	41.35	69.23	35.85	183.29	114.11
	Maximum	1439.28	1066.23	2354.34	1700.65	3202.09
Profit Margin (Million)	Mean	66.37	70.80	173.37	82.49	157.85
	Std. Deviation	34.15	26.51	65.09	45.76	65.50
	Minimum	21.33	49.23	15.85	15.32	23.411
	Maximum	439.28	966.231	1354.34	743.653	1672.09

The results revealed that on average there was an increase in ROE between 2012 and 2016 for players in the manufacturing industry in Kenya. Return on Assets almost maintained a constant trend across the study period whiles both total sales and profit margins fluctuated during the study period. The performance of the sector players was low in 2013 specially returns on assets, totals sales and profit margin. This could be justified on the basis that manufacturing sector is responsive to political environment and this was the tie when Kenya was undergoing general elections. According to KPMG (2014) real growth in the manufacturing sector averaged 4.1%

p.a. during 2006-2013, which was lower than the average annual growth in overall real GDP of 4.6%. As a result, the manufacturing sector's share in output has declined in recent years.

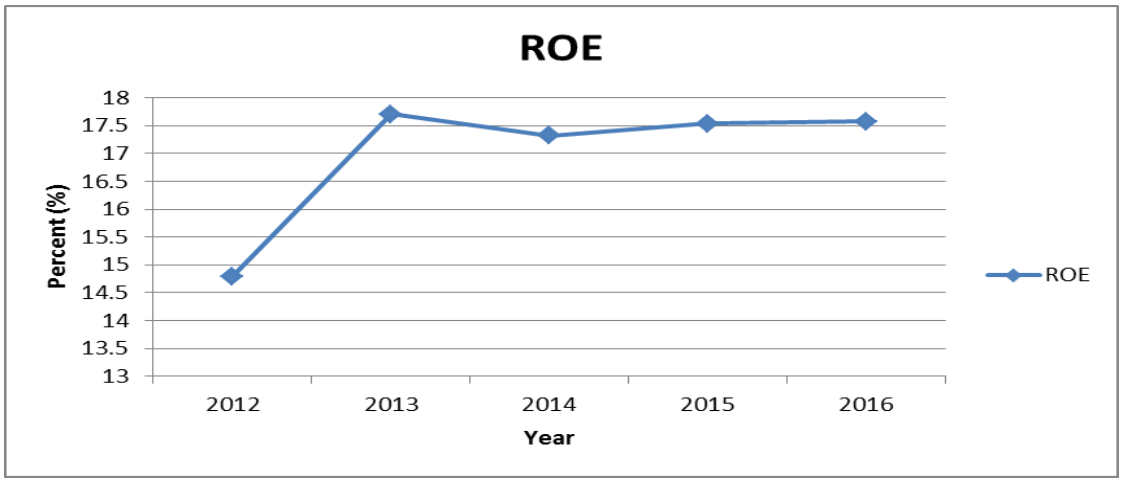

Figure 4.5: Trends for Average Return on Equity

The trend analysis for return on equity showed that ROE was lowest in 2012 but improved in consequent years. The sector recorded an almost constant ROE between 2014 and 2016. This could be attribued to increase in business environment as results of conducive political environment after intense elcetioneering experienced in 2013. According to report by KNBS, (2016), the manufacturing sector in Kenya grew at 3.5% in 2015 and 3.2% in 2014, contributing 10.3% to gross domestic product (GDP). On average, however, manufacturing has been growing at a slower rate than the economy, which expanded by 5.6% in 2015. This implies that the share of manufacturing in GDP has been reducing over time.

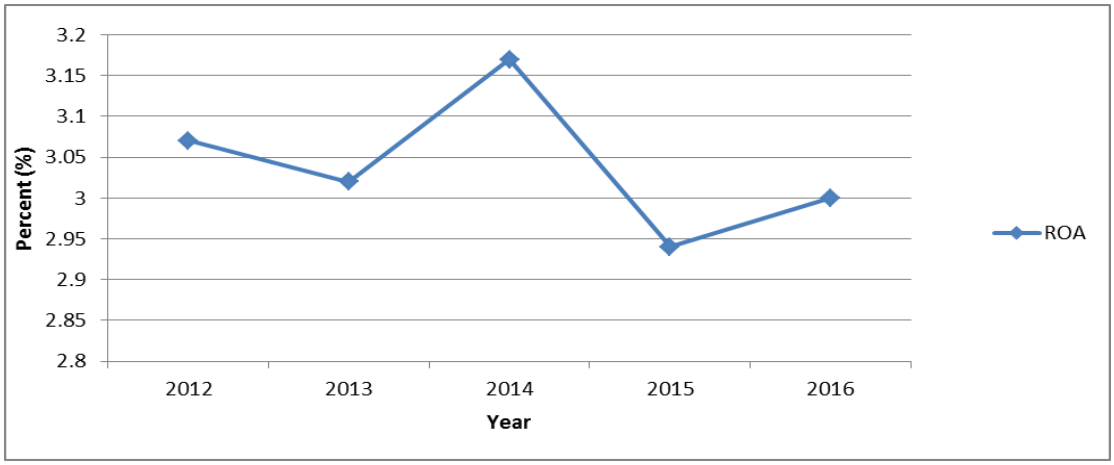

Figure 4.6: Trends for Average Return on Assets

The trend analysis for return on assets on the other hand showed that ROA was lowest in 2015. On average the finding showed the ROA reduced during the period between 2013 and 2015. These finding jusitifed why the overall performance was slow durig the study period as reported by KNBS (2016).

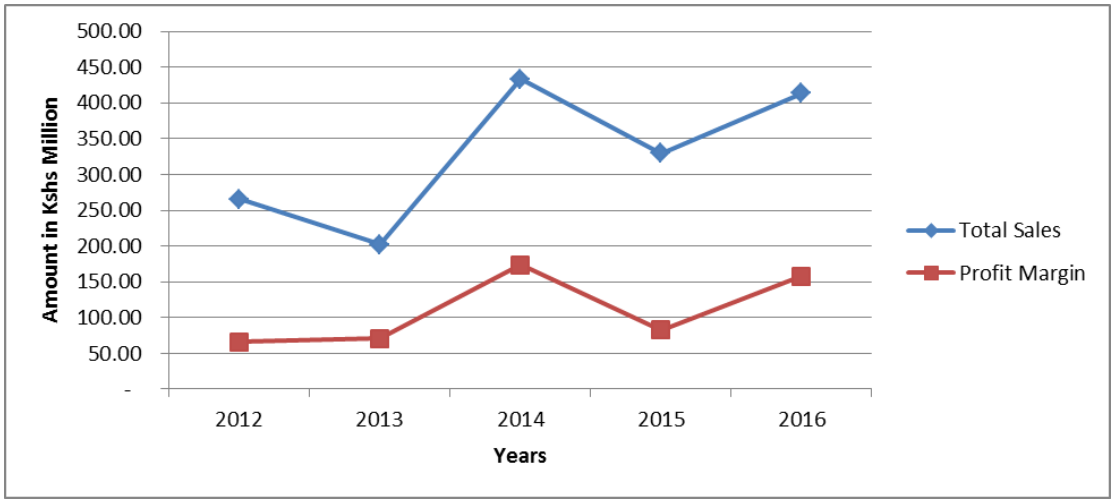

Figure 4.7: Trends for Average Total Sales and Profits Margin

The finding presented in figure 4.7 revealed that both total sales and profit margins for manufacturing sector players were volatile during the study period. Some players performed very well as shown by maximum values in Table 4.11 while other performed poorly. However, on average there seem to be an increasing trend in total sales and profit margins for manufacturing sector player in Kenya. These findings

concur with the KPMG (2014) that suggested that there is still a lot of room for expansion in Kenya's manufacturing sector, but for this to happen, reforms to the business environment need to be made to factor in the influence of contingencies in the manufacturing sector in Kenya.

4.6 Descriptive Analysis of Primary Data

This section contains the results on how the respondents responded to various statements used to measure variables in this study. The study used frequencies and percentages in the analysis and presented the findings using tables. This section was done in line with the research objectives.

4.6.1 Influence of Inventory Control on Performance of Manufacturing Firms

The first objective of this study was to establish the influence of inventory control on performance of manufacturing firms in Kenya. The findings presented in the Table 4.12 shows the respondents views on the statement used to measure inventory control mechanism used by manufacturing firms in Kenya. The study used percentages, mean and standard deviation in the analysis.

Table 4.12: Descriptive Results for Inventory Control in Percentage

	SD	D	N	A	SA	Mean	Std. Dev
Our company has a fixed annual inventory budget	2.6	9.5	22.1	35.8	30.0	3.81	1.05
The total amount of inventory stored by our company is manageable and cost effective	2.6	3.7	23.2	44.2	26.3	3.88	0.93
Our company invest a lot of financial resources in holding its stock	0.0	4.7	18.4	50.0	26.8	3.99	0.80
Cost of holding stock is sometimes unbearable to the company	1.1	3.2	15.8	47.9	32.1	4.07	0.84
Management of the our company sets optimized re-order and safety stock levels for inventory	3.7	4.7	21.1	35.3	35.3	3.94	1.04
Our company adhere to the fixed annual inventory budget	3.7	4.2	20.0	47.4	24.7	3.85	0.96

The study sought to establish whether manufacturing firms in Kenya had a fixed annual inventory budget. The finding presented in Table 4.12 showed that 35.8% and 30.0% of the respondents agreed and strongly agreed with the statement. The statement had a mean of 3.8 which confirmed that majority of the respondents agreed with the statement. The standard deviation of 1.05 indicates that the response varied slightly from the mean. The finding implied that majority of the manufacturing firms in Kenya had fixed annual inventory budget set to control their inventory.

The findings also revealed that majority of the respondents agreed as shown by the mean of 3.88 that the total amount of inventory stored by our company was manageable and cost effective. The total percentage for those who agreed and strongly agreed was 75.3% while a small combined percent of 5.8% disagreed and strongly disagreed. The finding implied that whereas majority of the manufacturing firms stored manageable inventory, there was small percent that store excess inventory.

On whether, manufacturing firms invested a lot of financial resources in holding its stock, the mean response obtained was 3.99 which confirmed that majority of the respondents agreed and strongly agreed with the statement. These finding implied that majority of the manufacturing firms incurred a lot of costs in holding of the inventory. The results similarly, revealed that 47.9% and 32.1% of the respondents agreed and strongly agreed that costs of holding stock were sometimes unbearable to their companies.

On whether management of the manufacturing firms' sets optimized re-order and safety stock levels for inventory, the results revealed that 35.3% and 35.3% of the respondents agreed and strongly agreed respectively, 21.1% were neutral while 4.7% and 3.7% of the respondents disagreed and strongly disagreed respectively. Finally, the study finding showed that 47.4% and 24.7% of the respondents agreed and strongly agreed that their firms adhered to the fixed annual inventory budget.

These findings implied that manufacturing firms in Kenya had inventory control practices in place to effectively manage their inventory. Effective inventory management enhances costs reductions hence improving performance. These

findings concur with Mwangi (2016) who found that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi County, Kenya.

4.6.2 Influence of Supplier Management On Performance of Manufacturing Firms

The second objective of the study was to assess the influence of supplier management on performance of manufacturing firms in Kenya. The study also used percentages, mean and standard deviation to analyze the response on supplier management among manufacturing industry players in Kenya.

Table 4.13: Descriptive Results for Supplier Management in Percentage

Statement	SD	D	N	A	SA	Mean	Std Dev
Our company usually conduct frequent supplier appraisal	2.6	2.6	24.2	36.8	33.7	3.96	0.96
Our company conduct risk analysis for all our suppliers	2.6	3.2	18.9	40.0	35.3	4.02	0.95
Our suppliers respond quickly to the demand of the company	1.1	1.1	9.5	45.3	43.2	4.28	0.77
Our company work closely with all the supplier to demonstrate our worthiness as their customers	0.0	1.1	21.1	38.4	39.5	4.16	0.79
Our company has a trimmed number of suppliers that can easily be management	0.5	1.1	18.4	30.5	49.5	4.27	0.83
Our company has a good communication channels with all the suppliers	1.6	1.1	12.6	49.5	35.3	4.16	0.80
Our company's manageable administrative cost for supplier management	2.6	0.0	13.7	44.2	39.5	4.18	0.86

The study sought to establish whether manufacturing firms usually conduct frequent supplier appraisal. The finding showed that 36.8% and 33.7% of the respondents

agreed and strongly agreed with the statement. The mean of 3.96 further showed that majority of the respondents agreed. The statement had a standard deviation of 0.96 which confirmed that the response varied slightly from the mean.

On whether manufacturing firms conducted risk analysis for all our suppliers, the results also indicated that 40.0% and 35.3% of the respondents agreed and strongly agreed respectively. The results further showed that majority of the respondents as shown the mean of 4.2 agreed that their suppliers responded quickly to the demand of the company. The study further sought to find out whether firms work closely with all the suppliers to demonstrate their worthiness as their customers. The results showed that 39.5% and 38.4% of the respondents strongly agreed and agreed with the statement respectively.

The study also sought to establish whether manufacturing firms had overtime trimmed their number of suppliers that can easily be management. The findings showed that 49.5% and 30.5% of the respondents strongly agreed and agreed respectively. The statement had a mean and standard deviation of 4.27 and 0.83 respectively which implied that majority of the respondents agreed and strongly agreed respectively.

The study also sought to establish whether manufacturing firms had a good communication channels with all the suppliers and whether manufacturing firms had manageable administrative cost for supplier management. The statement had means of 4.16 and 4.18 respectively. These finding implied that majority of the respondents agreed that they had a good communication channels with all the suppliers and also they had manageable administrative cost for supplier management.

The findings implied that majority of the manufacturing firms in Kenya had invested in suppliers' management to enhance supply chain optimization. Supplier appraisal, effective communication, supplier risk analysis was among the practices carried out to management suppliers by manufacturing firms in Kenya. Al-Abdallah, Abdallah and Hamdan (2014) results also show that two practices of supplier relationship management, supplier partnership/development and supplier lead time reduction significantly and positively affect the competitive performance of the buying firms.

4.6.3 Influence of Procurement Cost Optimization on Performance of Manufacturing Firms

The third objective of the study was to determine the influence of procurement cost optimization on performance of manufacturing firms in Kenya. The study similarly used percentage, mean and standard deviation in this section.

Table 4.14: Descriptive Results for Procurement Cost Optimization

	Category	Response
Approximate number of supplier your company has	Less than 50	40.00%
	50-100	35.00%
	101-200	15.00%
	Over 200	10.00%
Indicate the rate of increase in the company's procurement costs for the last five years	Less than 20%	18%
	20-50%	26%
	50-100%	32%
	Over 100%	23%

The study sought to establish the average number of the suppliers that manufacturing firms had. The findings showed that 40% of the respondents indicated their firms had less than 50 suppliers, 35% indicated their firms had between 50 and 100 suppliers, 15% indicated their firms had between 101 and 200 suppliers while only 10% indicated that their firms had over 200 suppliers.

The findings presented in Table 4.14 further revealed that 32% of the manufacturing firms that participated in the study had seen an increase of between 50 and 100% in their procurement costs in the last five years, while 26.3% recorded an increase of between 20 and 50%, 23% indicated they had increased their procurement costs by over 100%. These finding implied that procurement costs have been increasing across the board for almost all the manufacturers in Kenya.

Table 4.15: Descriptive Results for Procurement Cost Optimization in Percentage

Statements	SD	D	N	A	SA	Mean	Std Dev
Our company trimmed the number of supplier to reduce cost associated with procurement	0.0	0.5	20.5	42.6	36.3	4.15	0.76
Our company does business with suppliers that are able to offer a variety of stocks	0.5	2.1	11.6	42.6	43.2	4.26	0.78
We have low cases of contract cancellation with our suppliers	0.0	1.1	11.1	55.3	32.6	4.19	0.67
Consolidation of suppliers helps our company to cuts procurement cost	0.5	1.1	14.2	52.6	31.6	4.14	0.73
The company conducts early budgeting and planning for all procurement activities to manage the procurement costs	1.1	0.5	13.2	53.7	31.6	4.14	0.74
Our company has adopted strategic cost management models which has significantly reduced procurement cost	1.1	0.5	7.9	44.7	45.8	4.34	0.74

On whether manufacturing firms in Kenya had trimmed the number of supplier to reduce cost associated with procurement, the results showed that 42.6% and 36.3% of the respondents agreed and strongly agreed respectively. On whether, manufacturing firms do business with suppliers that are able to offer a variety of stocks, the finding showed that majority as shown by the mean of 4.26 that majority of the respondents agreed and strongly agreed with the statement.

The study further sought to find whether manufacturer in Kenya had low cases of contract cancellation with their suppliers. The results showed that 55.3% and 32.6% of the respondents agreed and strongly agreed with the statement. The results further

showed that respondents agreed that consolidation of suppliers helps their company to cuts procurement cost.

The study also sought to establish whether manufacturing firms conducted early budgeting and planning for all procurement activities to manage the procurement costs. The finding presented in Table 4.15 showed that 53.7% and 31.6% of the respondents agreed and strongly agreed with the statement respectively. The mean of 4.14 also confirmed that majority of the respondents agreed.

Finally, the study sought to establish whether manufacturing firms had adopted strategic cost management models which had significantly reduced procurement cost. The findings revealed that 44.7% and 45.8% of the respondents agreed and strongly agreed. The findings also showed that the statement had a mean of 4.34 which further confirmed that manufacturing firms had adopted strategic cost management models which had significantly reduced procurement cost.

These findings implied that manufacturing firms in Kenya had procurement cost optimization practices in place to reduce the amount spend on procurement functions. The finding concurs with those of Ehrlenspiel, Kiewert, Lindemann & Hundal, (2007) who also argued that cost optimization is a process that should be carried out throughout to ensure that the cost of the manufacturing is kept within the estimated cost limits.

4.6.4 Influence of Supply Chain Automation On Performance of Manufacturing Firms

The fourth specific objective of the study was to assess the influence of supply chain automation on performance of manufacturing firms in Kenya. The study also used percentages, mean and standard deviation to analyze the response on supply chain automation among manufacturing industry players in Kenya.

Table 4.16: Descriptive Results for Supply Chain Automation in Percentage

	SD	D	N	A	SA	Mean	Std Dev
Our company has adopted the use of IT supported process in supply chain management	1.1	1.1	16.3	54.2	27.4	4.06	0.76
Our company has an integrated planning and execution systems	1.6	0.5	3.2	41.6	53.2	4.44	0.73
All our procurement activities are done online	1.1	1.1	11.1	43.2	43.7	4.27	0.78
E-procurement had led to reduction of procurement costs for our company	0.0	0.5	12.6	43.2	43.7	4.30	0.70
The use of IT supported process in supply chain management simplified the procurement process for our company	0.5	0.0	16.3	44.2	38.9	4.21	0.75

The study sought to establish whether manufacturing industry players had adopted the use of IT supported process in supply chain management. The results presented in Table 4.16 showed that 54.2 agreed while 27.4 strongly agreed. These finding implied that over 80 of the participants in this study had adopted the use IT supported process in supply chain management.

The study similarly sought to establish whether manufacturing firms had an integrated planning and execution systems in their supply chain management. More than half (53.2) of the respondents strongly agreed while another 41.6 of the respondents agreed. The statement had a mean of 4.44 and standard deviation of 0.73 shown in Table 4.16.

The means for the statement on whether all our procurement activities are done online, whether the use of IT supported process in supply chain management simplified the procurement process for our company and on whether E-procurement had led to reduction of procurement costs for our company were 4.27, 4.30 and 4.21 respectively. These means implied that majority of the respondents agreed and strongly agreed with the above statements. Their standard deviation further showed that the response varied slightly from the mean.

These findings implied that majority of the players in manufacturing sector in Kenya had automated their supply chain management systems. The findings of this study concurs with those of Kitheka (2012) who revealed that inventory management automation affected the performance of the supermarkets and that there was a positive linear relationship between inventory management automation and the performance of the supermarkets. Similarly, Magutu (2013) reported that there is a very strong relationship between supply chain strategies, SC technology and firm supply chain performance outcome with the supply chain strategies and technology explaining 92.9 of the changes in the firm's SC performance outcome.

4.6.5 Moderating Effect of Staff Competence

This section presents the results on the level of staff competence among manufacturing firms in Kenya. Table 4.17 provides the results on various aspects on competence of supply chain staff in the selected manufacturing firms in Kenya.

Table 4.17: Descriptive Results for Staff Competence in Percentage

Statement	SD	D	N	A	SA	Mean	Std Dev
Our company has highly skilled procurement staff	10.0	7.9	26.8	28.9	26.3	3.54	1.24
Employees in the supply chain management in our company have high academic qualification	10.5	10.5	25.8	26.3	26.8	3.48	1.28
Employees in the procurement department have vast previous experience in supply chain performance	12.1	14.2	23.2	21.1	29.5	3.42	1.36
Our company only hires professional supplier chain managers	10.5	6.8	25.3	25.3	32.1	3.62	1.29
Our supply chain management staff are equip to handle technological change in the supply chain management	17.4	6.3	27.9	26.3	22.1	3.29	1.35
Employees in the supply chain management in our company are flexible depending on the company's demand	9.5	10.0	29.5	19.5	31.6	3.54	1.29

The study sought to establish whether the manufacturing firms in Kenya had highly skilled procurement staff. The results showed that respondents that agreed and strongly agreed were 55.1, 26 were neutral, 10 strongly disagreed while 7.9 disagreed. These finding implied that not all the manufacturing firms in Kenya had highly skilled individuals in their procurement departments. These findings concur with those of demographic characteristics presented above that showed that 10.53 and 12.63 of the respondents had college certificate in procurement and had less than 2 years of work experience respectively.

The study further sought to establish whether employees in the supply chain management in the firms have high academic qualification. The results showed that 26.8 and 26.3 of the respondents agreed and strongly agreed respectively, 25.8 were neutral on the statement while 10.5 and 10.5 disagreed and strongly disagreed respectively. The standard deviation of 1.28 implied that education qualification greatly varied across various respondents.

The results also showed that previous experience of employees in the procurement department varied greatly as shown by the standard deviation of 1.36. This implied that while some firms had experienced procurement staff other had less experienced procurement department employees. The study further sought to establish whether firms only hire professional supplier chain managers, the findings showed that the response varied widely across different respondents. The results showed that 32.1 strongly agreed while on the other hand 10.5 strongly disagreed which implied that not all the manufacturing firms in Kenya hired professional supplier chain managers.

The result also showed that respondents' response varied widely on whether supply chain management staff is equipped to handle technological change in the supply chain management and whether employees in the supply chain management were flexible depending on the company's demand. The overall implication of these findings was that the competence of procurement staffs varied from one firm to firm. While some firms had highly skilled staff other had less skilled supply chain management staff.

4.7 Results for Conditional Tests for Multiple Linear Regression

Regression can only be accurately estimated if the basic assumptions of multiple linear regressions are observed Greene (2003). The study performed tests on statistical assumptions, that is, test of regression assumptions. This included test of factor analysis, normality, multi-collinearity, to make sure the data used was adequate to conduct inferential analysis. The tests were conducted to make sure that the statistical analysis conducted adhered to regression assumptions hence avoid spurious and bias findings.

4.7.1 Factor Analysis

The importance of conducting a factor analysis was to summarize the information contained in a number of original variables into a smaller number of factors without losing much information. The results of factor analysis were presented in Table 4.18.

Table 4.18: Communalities of the Variables

Statements	Initial	Extraction
Inventory Control		
Our company only stores the necessary inventory	1.000	.960
The total amount of inventory stored by our company is manageable and cost effective	1.000	.907
Our company invest a lot of financial resources in holding its stock	1.000	.979
Cost of holding stock is sometimes unbearable to the company	1.000	.981
Management of the our company sets optimized re-order and safety stock levels for inventory	1.000	.984
Our company has a fixed annual inventory budget	1.000	.914
Supplier Management		
Our company usually conduct frequent supplier appraisal	1.000	.962
Our company conduct risk analysis for all our suppliers	1.000	.978
Our suppliers respond quickly to the demand of the company	1.000	.959
Our company work closely with all the supplier to demonstrate our worthiness as their customers	1.000	.977
Our company has a trimmed number of suppliers that can easily be management	1.000	.972
Our company has a good communication channels with all the suppliers	1.000	.916
Our company's manageable administrative cost for supplier management	1.000	.908

Table 4.18: Communalities of the variables (Continued)

Procurement Cost Optimization		
Our company trimmed the number of supplier to reduce cost associated with procurement	1.000	.957
Our company does business with suppliers that are able to offer a variety of stocks	1.000	.969
We have low cases of contract cancellation with our suppliers	1.000	.979
Consolidation of suppliers helps our company to cuts procurement cost		
Our company has adopted strategic cost management models which has significantly reduced procurement cost	1.000	.973
The company conducts early budgeting and planning for all procurement activities to management the procurement costs.	1.000	.978
Supply Chain Automation		
Our company has adopted the use of IT supported process in supply chain management	1.000	.984
Our company has an integrated planning and execution systems	1.000	.978
All our procurement activities are done online	1.000	.978
E-procurement had led to reduction of procurement costs for our company		
The use of IT supported process in supply chain management simplified the procurement process for our company	1.000	.974
Staff Competence		
Our company has highly skilled procurement staff	1.000	.980
Employees in the supply chain management in our company have high academic qualification	1.000	.975
Employees in the procurement department have vast previous experience in supply chain performance	1.000	.977
Our company only hires professional supplier chain managers	1.000	.972
Our supply chain management staff are equip to handle technological change in the supply chain management	1.000	.986
Employees in the supply chain management in our company are flexible depending on the company's demand	1.000	.985
Performance of Manufacturing Firms		
In the last annual reports our company recorded an increase in return on equity	1.000	.902
In the last annual reports our company recorded an increase in return on Return on Asset	1.000	.938
In the last annual reports our company recorded an increase in sales growth on Asset	1.000	.988
In the last annual reports our company recorded an increase in profit margins on Asset	1.000	.978

The results in Table 4.18 show that the extracted communalities values of this study were ranging from 0.914 to 0.988 which indicates satisfactory factorability for all items of the variables. This means that the variables fitted well with other variables in their factors (Pallant & Manual, 2010). The factor analysis found out that none of the variables was removed because all of them had a coefficient of greater than 0.4 exceeded the criterion of o.4 (Baggio & Klobas, 2017). Communalities shows how much of the variance in the variables was accounted for by the extracted factor; that is, it shows the variations from the expected initial value which is one (Baggio & Klobas, 2017) the implication of this is that the newly created variables should represent the fundamental constructs, which underlie the original variables factor Gorsuch, 1990).

4.7.2 Normality Test

Tests of normality were used to determine if the data was well modelled and normally distributed (Gujarati, 2002). The results were presented in Table 4.19.

Table 4.19: Summary of Normality Test Results

		X_1	X_2	X_3	X_4	Z	Y
	N	190	190	190	190	190	190
Normal			3.542	3.461	3.530	3.467	3.576
Parametersa,b	Mean	3.5	1	4	8	5	3
	Std.	0.649	0.605	0.693	0.748	0.727	0.728
	Deviation	24	65	23	91	78	82
Most Extreme							
Differences	Absolute	0.107	0.128	0.127	0.14	0.129	0.131
	Positive	0.069	0.068	0.064	0.066	0.066	0.08
		-	-	-		-	-
	Negative	0.107	0.128	0.127	-0.14	0.129	0.131
Kolmogorov-Smirnov Z		0.469	0.76	0.757	0.935	0.776	0.806
Asymp. Sig. (2-tailed)		0.007	0.004	0.001	0.003	0.004	0.004

a Test distribution is Normal.
b Calculated from data.

The results obtained indicate that Kolmogorov-Smirnov statistic for all the variables was greater than 0.05, with a p value of less than 0.05 which was the level of significance of 0.05, thus the study concluded that the data for all the variables was

normally distributed and therefore fit for linear regression analysis. The variables were roughly normally distributed because the results were generalized beyond the sample (Ghasemin & zahediasi, 2012).

4.7.3 Test for Multi-collinearity

Multi-collinearity is said to exist between two independent variables when a strong relationship exists between them. The results were presented in Table 4.20.

Table 4.20: Multi-collinearity Test Results

	Tolerance	VIF
Inventory Control	0.536	1.867
Supplier Management	0.489	2.045
Procurement Cost Optimization	0.531	1.884
Supply Chain Automation	0.61	1.642
Staff Competence	0.556	1.797

a Dependent Variable: Performance of manufacturing firms

The findings presented in Table 4.20 revealed that inventory control had a VIF of 1.867, corporate supplier management 2.045, procurement cost optimization 1.884, Supply Chain Automation 1.640 and Staff Competence 1.797. These results indicated that the VIF values of the variables were within the threshold of 5 (Curwin and Slater, 2008). This indicated that there was no significant threat of multicollinearity and therefore, the study used linear regression model because there was no independent variable with a strong linear relationship with any other independent variable(s).

4.7.4 Autocorrelation Test

Autocorrelation is correlation between the residue terms for any two observations; it is expected that the residue terms for any two observations should be independent

(Field, 2005). Durbin-Watson test was used to test for the presence of autocorrelation between variables. The results were presented in Table 4.21.

Table 4.21: Measure of Autocorrelation - Durbin-Watson

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.727[a]	.528	.515	.50758	1.735
2	.879[b]	.773	.549	.54095	1.632

a. Predictors: (Constant), X_4, X_3, X_2, X_1
b. Predictors: (Constant), X_4*Z, X_3*Z, X_2*Z, X_1*Z
c. Dependent Variable: Y

Table 4.21 shows that the value for Durbin-Watson for model 1 (without moderating variable) was 1.735 and model 2 (with moderating variable) was 1.632 implying that the variables were not correlated in any statistically significant way and this ensured the independence of errors and enhanced accuracy of the regression models (Gujarati, 2003).

4.7.5 Sampling Adequacy Test

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was conducted to determine adequacy of the sample size. The results were presented in Table 4.22.

Table 4.22: Kaiser-Meyer-Olkin (KMO) andBartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.923
Bartlett's Test of Sphericity	Approx. Chi-Square	6975.135
	df	15
	Sig.	.000

The results in Table 4.22 show that the KMO test of the variables of this study generated a sufficient value of 0.923 which is more than 0.7 implying that the sample size was adequate for further analysis (Magd, 2008). This was supported by the Bartlett's test of sphericity which had a chi-square value of 6975.135with a p

value of 0.000 which is less than 0.05. Since the p value is less than 0.05 this shows that there is a strong relationship among the study variables under investigation and hence the Bartlett's test is highly significant (Moutinho & Hutcheson, 2010).

4.8 Correlation Analysis

This section contains results of correlation tests conducted to test the association between independent and dependent variables. According to Kothari (2017) the importance of correlation is to determine the extent to which changes in the value of an attribute is associated with changes in another attribute. This study used correlation to test the association between the independent variables and the dependent variable.

Table 4.23: Correlation Matrix

	Inventory Control	Supplier Management	Procurement Cost Optimization	Supply Chain Automation	Performance Of Manufacturing Firms
Inventory Control	1				
Supplier Management	0.279	1			
Procurement Cost Optimization	0.155	0.125	1		
Supply Chain Automation	0.239	0.235	0.167	1	
Performance Of Manufacturing Firms	0.622**	0.613**	0.562**	0.539**	1

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

4.8.1 Correlation Analysis for Inventory Control and Performance of Manufacturing Firms

The results presented in Table 4.23 revealed that there is a significant correlation between inventory control and performance of manufacturing firms with p- value of 0.000 which is less than 0.01 and Pearson correlation coefficient was 0.622 while

other independent variables were held constant. This implies that there was a significant strong positive relationship between inventory control and performance of manufacturing firms. According to Mugenda and Mugenda (2008) a correlation coefficient (r) of 0.3 is enough to conclude that there is a significant relationship between the dependent variable and independent variable. The positive correlation coefficient value implies that there is a positive relationship between inventory control and performance of manufacturing firms in Kenya, that is, as the inventory control improves the performance of manufacturing firms improves. The study concluded that there is a significant strong positive relationship between inventory control and performance of manufacturing firms in Kenya. This finding concurs to those of Mwangi (2016) who found that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi county, kenya. Munyao, Omulo, Mwithiga and Chepkulei (2015) also highlighted that inventory problems firms experience includes unorganized inventory arrangement, large amount of inventory days / no cycle counting and no accurate records balance due to unskilled workers.

4.8.2 Correlation Analysis for Supplier Management and Performance of Manufacturing Firms

The results of the study as shown in Table 4.23 revealed that there is a significant correlation between supplier management and performance of manufacturing firms with p- value of 0.000 which is less than 0.01 and Pearson correlation coefficient was 0.613 while other independent variables were held constant. This implies that there was a significant relationship between supplier management and performance of manufacturing firms in Kenya. The positive correlation coefficient value implies that there is a positive relationship between supplier management and performance of manufacturing firms in Kenya, that is, as the supplier management improves the performance of manufacturing firms improves. The study concluded that there is a significant strong positive relationship between supplier management and performance of manufacturing firms in Kenya. The results are in line with al-Abdallah, Abdallah and Hamdan (2014) who in their study showed that true practices of supplier relationship management, supplier partnership /development and supplier

lead time reduction significantly and positively affect the competitive performance of the buying firms. The findings also concur with Kosgei and Gitau (2016) and Abdallah and Hamdan (2014) who pointed out that supplier management is a critical component of ensuring high firm performance.

4.8.3 Correlation Analysis for Procurement Cost Optimization and Performance of Manufacturing Firms

The results in Table 4.22 revealed that there is a significant correlation between procurement cost optimization and performance of manufacturing firms with p-value of 0.000 which is less than 0.01 and Pearson correlation coefficient was 0.562 while other independent variables were held constant. This implies that there was a significant relationship between procurement cost optimization and performance of manufacturing firms in Kenya. The positive correlation coefficient value implies that there is a positive relationship between procurement cost optimization and performance of manufacturing firms in Kenya, that is, as the procurement cost optimization improves the performance of manufacturing firms improves. The study concluded that there is a significant strong positive relationship between procurement cost optimization and performances of manufacturing firms in Kenya. The findings are in line with Claycomb, Dröge and Germain (1999) who found out that there is a significant strong positive relationship between supplier development and operational performance of manufacturing firms in Nairobi city. The findings also concur with Mose, Njihia and Magutu (2013) who found out that there is a significant strong relationship between procurement cost minimisation and performances of manufacturing firms.

4.8.4 Correlation Analysis for Supply Chain Automation and Performance of Manufacturing Firms

The study revealed that there is a significant correlation between supply chain automation and performance of manufacturing firms with p- value of 0.000 which is less than 0.01 and Pearson correlation coefficient was 0.562 while other independent variables were held constant. This implies that there was a significant influence of supply chain automation on performance of manufacturing firms in Kenya.the

positive correlation coefficient value implies that there is a positive relationship between supply chain automation and performance of manufacturing firms in Kenya, that is, as the supply chain automation improves the performance of manufacturing firms improves. The study concluded that there is a significant strong positive relationship between supply chain automation and performance of manufacturing firms in Kenya. The findings are supported by Valmohammadi (2011) who found that there is a significant positive relationship between supply chain automation and performance of Iranian manufacturing firms. The results are supported by ningDeh, Richardson and Zmud (2007) who in their study found that there is a positive relationship between supply chain automation and performance of manufacturing firms.

4.9 Univariate Regression Analysis

According to Kothari (2017), regression is the determination of a statistical relationship between two or more variables. In simple regression, there are two variables, one variable (defined as independent) is the cause of the behavior of another one (defined as dependent variable). Regression analysis was done in order to measure the ability of the independent variable(s) to predict an outcome in the dependent variable where there is a linear relationship between t h e m . In order to test the hypotheses of the of the regression model that there is no significant relationship between the supply chain optimization and performance of manufacturing firms in Kenya, Analysis of Variance (ANOVA) was used (Cooper & Schindler, 2010). According to Anderson, Sweeney and Williams (2002) Analysis of Variance can be used to test the relationship between independent variables on the performance of manufacturing firms in Kenya and to test the goodness of fit of the regression model that is how well the model fits the data.

Cooper and Schindler (2010) argued that regression analysis can also be used determine the strength of the relationship between the independent and dependent variables and to determine the combined influence of all the independent variables on the dependent variable. The coefficient of determination (R^2) was used to measure the change in dependent variable explained by the change in independent variable(s).

F –test was carried out to evaluate the significance of the overall model and to define the relationship between the dependent variable and independent variables; t- test was used to test the significance of the individual independent variables to the dependent variable.

4.9.1 Regression Analysis for Inventory Control and Performance of Manufacturing Firms in Kenya

The first hypothesis of the study was that there is no significant influence of inventory control on the performance of manufacturing firms in Kenya. The findings of univariate regression analysis are presented in Table 23 to 25.

Table 4.24: Regression Analysis for Inventory Control and Performance of manufacturing firms

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.622	0.386	0.383	0.57248

a. Predictors: (Constant), Inventory Control
b. Dependent Variable: Performance of manufacturing firms

The model summary results presented in Table 4.24 indicated that the model had R-square of 0.386 which implied that other factors held constant inventory control explained 38.6% of the variation in performance of manufacturing firms in Kenya. The remaining 61.4% variation in performance of manufacturing firms in Kenya was explained by other variables which are not in this model. The findings are in line with Kitheka (2012) who revealed that inventory management automation affected the performance of the supermarkets and that there was a positive linear relationship between inventory management automation and the performance of the supermarkets. The results are in line with Kimaiyo and Ochiri (2014) who in their study concluded that inventory management plays a very important role on the Performance of manufacturing firms.

Table 4.25: ANOVA Test for Inventory Control and Performance of Manufacturing Firms

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	38.780	1	38.780	118.331	0.000
	Residual	61.613	189	.328		
	Total	100.393	190			

a. Predictors: (Constant), Inventory Control

b. Dependent Variable: Performance of manufacturing firms

Table 4.25 presented the results of analysis of variance (ANOVA). The F-statistic obtained was 118.331 with a p-value of 0.000. The findings implied that inventory control has a significant influence of Inventory Control on the performance of manufacturing firms in Kenya. The findings further confirmed that inventory control was a significant predictor of performance of manufacturing firms in Kenya. Thus the null hypothesis was rejected and concluded that there was a significant influence of Inventory Control on the performance of manufacturing firms in Kenya. The findings are supported by Awino (2011) who found that inventory control has a significant influence on the performance of manufacturing firms. The findings are also in line with Ondiek and Odera (2012) who concluded that materials management has a significantly affects the performance of manufacturing firms.

Table 4.26: Beta Coefficients for Inventory Control and Performance of manufacturing firms

	B	Std. Error	Beta	t	Sig.
(Constant)	1.134	0.228		4.969	0.000
Inventory Control	0.698	0.064	0.622	10.878	0.000

a. Predictors: (Constant), Inventory Control

b. Dependent Variable: Performance of manufacturing firms

The results in Table 4.26 shows beta coefficients summary in which t-values were 4.969 and 10.878 with p-values of 0.000 which are less than 0.05 hence the model was statistically significant, thus the beta coefficient 1.134 and 0.698 were statistically significant. The model is defined as $Y = 1.134 + 0.698X_1$, where Y was the Performance of Manufacturing Firms and X_1 was Inventory Control this implies that a unit change in inventory control would result to 0.698 units change in performance of manufacturing firms in Kenya. This further confirmed that there was a significant strong positive linear relationship between inventory control and performance of manufacturing firms in Kenya. These findings concur with Mwangi (2016) who found that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi County, Kenya. The findings are in line with Koumanakos (2008) who found that the higher the level of inventories preserved (departing from lean operations) by a firm, the lower its rate of returns. The findings are supported by Munyao *et al* (2015) who found that despite the fact that that material requirement planning was most effective in contributing to performance of the production department most organizations in the manufacturing industry used action level methods.

4.9.2 Regression Analysis for Supplier Management and Performance of manufacturing firms in Kenya

The second hypothesis of the study was that there is no significant influence of Supplier management on the performance of manufacturing firms in Kenya. The results of the regression analysis were presented in Table 4.27 to Table 4.29.

Table 4.27: Regression Analysis for Supplier Management and Performance of manufacturing firms

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.613	0.376	0.373	0.57712

a. Predictors: (Constant), Supplier Management

b. Dependent Variable: Performance of manufacturing firms

The model summary results presented in Table 4.27 indicated that the model had R-square of 0.376 which implied that other factors held constant supplier management alone explained 37.6% of the variation in performance of manufacturing firms in Kenya. The remaining 62.4% variation in performance of manufacturing firms in Kenya was explained by other variables which are not in this model. The findings are supported by Wachira (2013) who concluded that firms in the alcohol beverage industry are moving towards collaborative relationships with their suppliers to improve on their performance. The findings are also supported by Kosgei and Gitau (2016) who established that understanding and practicing of supply chain management with key focus on supplier relationships is an essential prerequisite for staying competitive in the global race and enhancing profitably in the market.

Table 4.28: ANOVA for Supplier Management and Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.776	1	37.776	113.419	0.000
	Residual	62.617	189	.333		
	Total	100.393	190			

a. Predictors: (Constant), Supplier Management

b. Dependent Variable: Performance of manufacturing firms

Table 4.28 presented the results of analysis of variance (ANOVA) for the model of supplier management and performance of manufacturing firms in Kenya. The F-statistic obtained was 113.419 with a p-value of 0.000. The findings implied that univariate model used for the influence supplier management and firm performance was statistically significant. The findings revealed that supplier management was a significant predictor of performance of manufacturing firms in Kenya. Thus the null hypothesis was rejected and concluded that there was a significant influence of Supplier Management on the performance of manufacturing firms in Kenya. The findings are in line with Mwirigi (2011) who concluded that there is need for the process of creation of suppliers' relationships in order to enhance growth of small enterprises. The findings are supported by Mwikali and Kavale (2012) who found out

that supplier management was a significantly affects the performance of manufacturing firms.

Table 4.29: Regression Coefficients for Supplier Management and Performance

	β	Std. Error	Beta	t	Sig.
(Constant)	0.962	0.249		3.861	0.000
Supplier Management	0.738	0.069	0.613	10.65	0.000

a. Predictors: (Constant), Supplier Management

b. Dependent Variable: Performance of manufacturing firms

The results in Table 4.29 shows beta coefficients summary in which t-values were 3.861 and 10.65 with p-values of 0.000 which were less than 0.05 hence the model was statistically significant, thus the beta coefficient 0.962 and 0.738were statistically significant. The model is defined as $Y = 0.962 + 0.738X_2$, where Y was the Performance of Manufacturing Firms and X_2 was supplier management, this implies that a unit change in inventory control would result to 0.738 units change in performance of manufacturing firms in Kenya. These findings revealed that that there was a significant positive linear relationship between supplier management and performance of manufacturing firms. The findings are supported by Al-Abdallah, Abdallah and Hamdan (2014) results which showed that supplier relationship management practices such as supplier partnership/development and supplier lead time reduction significantly and positively affect the competitive performance of the buying firms. The results are also supported by Kamau (2013) who analyzed buyer supplier relationships and organizational performance among large manufacturing firms in Nairobi and found out that there is a significant relationship between buyer supplier relationships and organizational performance

4.9.3 Regression Analysis for Procurement Cost Optimization and Performance of Manufacturing Firms in Kenya

The third hypothesis of the study was that there is no significant influence of Procurement Cost Optimization on the performance of manufacturing firms in Kenya. The study used univariate regression analysis to test whether procurement

costs optimization influence the performance of manufacturing firms in Kenya. The findings of univariate regression analysis are presented in Table 4.30 to Table 4.32.

Table 4.30: Model Summary for Procurement Cost Optimization and Performance of Manufacturing Firms

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.562	0.316	0.312	0.60456

a. Predictors: (Constant), Procurement Cost Optimization

b. Dependent Variable: Performance of manufacturing firms

The results of the model summary presented in Table 4.30 revealed that the R-square was 0.316. These findings implied that procurement cost optimization accounted for 31.6% of the variation in performance of manufacturing firms in Kenya other factors held constant. The remaining 68.4% variation in performance of manufacturing firms in Kenya was explained by other variables which are not in this model. The results are in line with Dehning, Richardson and Zmud (2007) who found out that procurement cost minimization accounted for the highest variation in performance of manufacturing firms. The results are also supported by Vickery, Jayaram, Droge and Calantone (2003) who found out that procurement cost optimization affects profitability of manufacturing firms

Table 4.31: ANOVA for Procurement Cost Optimization and Performance of Manufacturing Firms

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.682	1	31.682	86.683	0.000
	Residual	68.712	189	.365		
	Total	100.393	190			

a. Predictors: (Constant), Procurement Cost Optimization

b. Dependent Variable: Performance of manufacturing firms

Table 4.31 presented the results of analysis of variance (ANOVA) for the model of procurement cost optimization and performance of manufacturing firms in Kenya. The F-statistic obtained was 86.683 with a p-value of 0.000. The findings implied that univariate model of procurement cost optimization and firm performance was statistically significant. The findings revealed that procurement cost optimization was a significant predictor of performance of manufacturing firms in Kenya. Thus the null hypothesis was rejected and concluded that there was a significant influence of Procurement Cost Optimization on the performance of manufacturing firms in Kenya.

Table 4.32: Regression Coefficients for Procurement Cost Optimization and Performance of manufacturing firms

	β	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	1.532	0.224		6.842	0.000
Procurement Cost Optimization	0.591	0.063	0.562	9.380	0.000

a. Predictors: (Constant), Procurement Cost Optimization

b. Dependent Variable: Performance of manufacturing firms

Table 4.32 shows regression coefficients summary in which t-values were 6.842 and 9.380 with p-values of 0.000 which are less than 0.05 hence the model was statistically significant, thus the beta coefficient 1.532 and 0.591 were statistically significant. The model is defined as $Y = 1.532 + 0.591X_3$, where Y was the Performance of Manufacturing Firms and X_3 was procurement cost optimization this implies that a unit change in procurement cost optimization would result to 0.591 units change in performance of manufacturing firms in Kenya. This further confirmed that there was a significant strong positive linear relationship between Procurement Cost Optimization and performance of manufacturing firms in Kenya. These findings revealed that that there was a significant positive linear influence of procurement cost optimization and performance of manufacturing firms. The findings are in line with Ehrlenspiel, Kiewert, Lindemann and Hundal (2007) who

also argued that cost optimization is a process that should be carried out throughout to ensure that the cost of the manufacturing is kept within the estimated cost limits.

4.9.4 Regression Analysis for Supply Chain Automation and Performance of Manufacturing Firms in Kenya

The fourth hypothesis of the study was that there is no significant influence of Supply Chain Automation on the performance of manufacturing firms in Kenya. This section presents the results of univariate regression analysis conducted to establish the influence of supply chain automation and performance of manufacturing firms in Kenya.

Table 4.33: Regression Analysis for Supply Chain Automation and Performance of Manufacturing Firms

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.539	0.291	0.287	0.61529

a. b. Predictors: (Constant), Supply Chain Automation

c. Dependent Variable: Performance of manufacturing firms

The model summary results presented in Table 4.33 indicated that the model had R-square of 0.291 which also implied that implied that other factors held constant supply chain automation alone explained 29.1% of the variation in performance of manufacturing firms in Kenya. The remaining 70.9% variation in performance of manufacturing firms in Kenya was explained by other variables which are not in this model. Magutu (2013) conducted a study on the effect of supply chain strategies, technology and performance of large-scale manufacturing firms in Kenya and found out there is a very strong relationship between supply chain strategies, Supply Chain technology and performance of large-scale manufacturing firms in Kenya.

Table 4.34: ANOVA for Supply Chain Automation and Performance of Manufacturing Firms

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.219	1	29.219	77.180	0.000
	Residual	71.174	189	0.379		
	Total	100.393	190			

a. Predictors: (Constant), Supply Chain Automation

b. Dependent Variable: Performance of manufacturing firms

Table 4.34 presented the results of analysis of variance (ANOVA) for the model of supply chain automation and performance of manufacturing firms in Kenya. The F-statistic obtained was 77.180 with a p-value of 0.000. The findings implied that univariate model of supply chain automation and firm performance was statistically significant. The findings revealed that supply chain automation was a significant predictor of performance of manufacturing firms in Kenya. Thus the null hypothesis was rejected and concluded that there was a significant influence of Supply Chain Automation on the performance of manufacturing firms in Kenya. The findings concur with Nyaoga, Magutu and Aduba (2015) who conducted a study on the link between supply chain automation and firm performance and found out that Supply chain automation are useful predictors of the firm's performance.

Table 4.35: Regression Coefficients for Supply Chain Automation and Performance of Manufacturing Firms

	β	Std. Error	Beta	t	Sig.
(Constant)	1.723	0.216		7.987	0.000
Supply Chain Automation	0.525	0.06	0.539	8.785	0.000

a. Predictors: (Constant), Supply Chain Automation

b. Dependent Variable: Performance of manufacturing firms

The results in Table 4.35 shows beta coefficients summary in which t-values were 7.987and 8.785with p-values of 0.000 which are less than 0.05 hence the model was statistically significant, thus the beta coefficient 1.723 and 0.525were statistically significant. The model is defined as $Y = 1.723 + 0.525X_4$, where Y was the Performance of Manufacturing Firms and X_4 was supply chain automation this implies that a unit change in supply chain automation would result to 0.525 units change in performance of manufacturing firms in Kenya. This further confirmed that there was a significant strong positive linear relationship between supply chain automation and performance of manufacturing firms in Kenya. These findings revealed that that there was a significant positive linear influence of supply chain automation and performance of manufacturing firms. The findings of this study concurs with those of Kitheka (2012) who revealed that inventory management automation affected the performance of the supermarkets and that there was a positive linear relationship between inventory management automation and the performance of the supermarkets.

Similarly, Magutu (2013) reported that there is a very strong relationship between supply chain strategies, supply chain technology and firm supply chain performance outcome with the supply chain strategies and technology explaining 92.9 of the changes in the firm's supply chain performance outcome. The findings are also supported by Qrunfleh and Tarafdar (2014) whose study results showed that specific Supply Chain strategies require the adoption of corresponding information system strategies such that they can more significantly impact supply chain performance.

4.10 Multivariate Regression Analysis for Secondary Data

This section presents the findings of regression analysis based on the secondary data. The study conducted four regression models with each measure of performance as the dependent variable.

4.10.1 Influence of Supply Chain Optimization on ROA of Manufacturing Firms in Kenya

The study sought to test the influence of supply chain automation, procurement cost optimization, inventory control and supplier management on Return On Assets (ROA) of manufacturing firm in Kenya. The results were presented in Table 3.5 to 3.7.

Table 4.36: Regression Analysis for Supply Chain Optimization and ROA

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.549	0.301	0.281	2.047

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Return On Assets (ROA)

The model summary results presented in Table 4.36 indicated that the model had R-square of 0.301 which implied that other factors held constant supply chain automation, procurement cost optimization, inventory control, supplier management explained 30.1% of the variation in Return On Assets (ROA) of manufacturing firms in Kenya, the remaining 69.9% variations is explained by the other factors not in the model. The results are in line with the findings of Bin Syed *et al* (2016) who found that there was a significant relationship between return on asset (ROA) and inventory management. The findings concur with Hofmann and Kotzab (2010) who found that return on assets of a firm depends on supply chain optimization strategies of the firm.

Table 4.37: ANOVA for Supply Chain Optimization and ROA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	242.235	4	60.559	14.459	0.000
	Residual	561.233	186	4.188		
	Total	803.467	190			

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Return On Assets (ROA)

Table 4.37 presented the results of analysis of variance (ANOVA) for the model of supply chain automation, procurement cost optimization, inventory control, supplier management and supplier management and Return On Assets (ROA) of manufacturing firms in Kenya. The F-statistic obtained was 14.459 with a p-value of 0.000. The findings implied that supply chain automation, procurement cost optimization, inventory control, supplier management and supplier management were significant predictors of Return On Assets (ROA) of manufacturing firms in Kenya. The findings are supported Mulure (2013) who concluded that supply chain management strategies affect the return on assets of Small and Medium Manufacturing Enterprises. The findings are in line with the findings of Kinyanjui (2016) who found that inventory management practices influence the performance of world food programme partners in Kenya.

Table 4.38: Regression Coefficients for Supply Chain Optimization and ROA

	B	Std. Error	t	Sig.
(Constant)	0.411	0.739	3.288	0.000
Inventory Control	0.540	0.595	1.758	0.005
Supplier Management	0.754	0.613	2.741	0.000
Procurement Cost Optimization	0.852	0.329	5.642	0.003
Supply Chain Automation	0.317	0.514	2.127	0.016

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Return On Assets (ROA)

The beta coefficient summary in Table 4.38 shows that the p values for all the predictor variables are less than 0.05 indicating that the model was statistically significant. The model was defined as: $Y = 0.411 + 0.540X_1 + 0.754 X_2 + 0.852X_3 + 0.317X_4$ where; Y was Return On Assets (ROA), X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization and X_4 was Supply Chain Automation, which indicates that all the independent variables influences the Return On Assets (ROA) of manufacturing firms in Kenya. The results show that there is positive influence of inventory control, supplier management, procurement cost optimization and supply chain automation on the Return On Assets (ROA) of manufacturing firms in Kenya. These findings concur with those of primary data, hence the study concluded that supply chain optimization significant influence Return On Assets (ROA) of manufacturing firms in Kenya. Similarly, Magutu (2013) reported that there is a very strong relationship between supply chain strategies, supply chain technology and firm supply chain performance outcome with the supply chain strategies and technology explaining 92.9% of the changes in the firm's supply chain performance outcome. The findings are supported by Mogikoyo, Magutu and Dolo (2017) who in their study found out that Supplier Evaluation Attributes influences the performance of government owned entities. The results concur with Sikuku (2014) concluded that supply chain optimization significantly influences return on assets sugar companies in Kenya.

4.10.2 Influence of Supply Chain Optimization on ROE of Manufacturing Firms in Kenya

This section presented the finding on the influence of staff competence, supply chain automation, procurement cost optimization, inventory control and supplier management and ROE of manufacturing firms in Kenya.

Table 4.39: Model Summary for Supply Chain Optimization and ROE

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate
1	0.601	0.361	0.168	7.096

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Return On Equity (ROE)

The model summary results presented in Table 4.39 indicated that the model had R-square of 0.361 which also implied that implied that other factors held constant supply chain automation, procurement cost optimization, inventory control, supplier management explained 36.1% of the variation in ROE of manufacturing firms in Kenya, the remaining 63.9% variations is explained by the other factors not in the model. The results are supported by Randall and Theodore (2009) who found out that supply chain optimization strategies affect the return on equity of listed firms. These findings concur with Lee (2002) who found that aligning supply chain strategies improves the financial performance of firms. The results are also supported by Choon, Lyman and Wisner (2002) who found out that supply chain optimization affects the profitability of manufacturing firms.

Table 4.40: ANOVA for Supply Chain Optimization and ROE

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	592.944	4	148.236	2.944	0.024
	Residual	5136.720	186	50.360		
	Total	5729.664	190			

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Return On Equity (ROE)

Table 4.40 presented the results of analysis of variance (ANOVA) for the model of Supply Chain Automation, Procurement Cost Optimization, Inventory Control, Supplier Management and Return On Equity (ROE) of manufacturing firms in

Kenya. The F-statistic obtained was 2.944 with a p-value of 0.024. The findings implied that Supply Chain Automation, Procurement Cost Optimization, Inventory Control, Supplier Management were significant predictors of ROE of manufacturing firms in Kenya. The findings are in line with Lwiki *et al* (2013) who in their study found that there exists a positive correlation between inventory management and Return on Sales and also with Return on Equity which were found to be statistically significant

Table 4.41: Regression Coefficients for Supply Chain Optimization and ROE

	B	Std. Error	Beta	t	Sig.
(Constant)	0.678	0.454		1.493	0.006
Inventory Control	0.642	0.489	0.094	1.313	0.011
Supplier Management	0.368	0.357	0.357	1.031	0.015
Procurement Cost Optimization	0.432	0.243	0.334	1.778	0.010
Supply Chain Automation	0.723	0.361	0.100	2.003	0.004

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation
b. Dependent Variable: Return On Equity (ROE)

Table 4.41 shows that the p values for all the predictor variables are less than 0.05 indicating that the model was statistically significant. The model was defined as: $Y = 0.678 + 0.642X_1 + 0.368X_2 + 0.432X_3 + 0.723X_4$ where; Y was Return On Equity (ROE), X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization and X_4 was Supply Chain Automation, which indicates that all the independent variables influences the Return On Equity (ROE)of manufacturing firms in Kenya. The results show that there is positive influence of inventory control, supplier management, procurement cost optimization and supply chain automation on the Return On Equity (ROE)of manufacturing firms in Kenya. These findings concur with those of primary data, hence the study concluded that supply chain optimization significantly influence Return On Equity (ROE)of manufacturing firms in Kenya. The findings are supported by Magutu (2013) who found out that Supply chain strategies had a positive effect on the performance of large-scale manufacturing firms in Kenya. The findings are supported by Samuel and

Ondiek (2014) who found that inventory management automation influences the profitability of supermarkets in western Kenya.

4.10.3 Influence of Supply Chain Optimization on Sales Growth of Manufacturing Firms

This section presented the finding on the influence of Supply Chain Automation, Supplier Management, Inventory Control Composite, Procurement Cost Optimization on sales growth of manufacturing firms in Kenya.

Table 4.42: Model Summary for Supply Chain Optimization and Sales Growth

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.625	0.391	0.371	1.55438

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Sales Growth

The model summary results presented in Table 4.42 indicated that the model had R-square of 0.391 which also implied that other factors held constant supply chain automation, procurement cost optimization, inventory control, supplier management explained 39.1% of the variation in Sales Growth of manufacturing firms in Kenya, the remaining 60.9% variations is explained by the other factors not in the model. The findings agree with Flynn and Zhao (2010) who found that supply chain optimization strategies improve the sales volume of a firm. The findings agree with Chen and Paulra (2004) who found out that supply chain optimization increases the sales of a firm.

Table 4.43: ANOVA for Supply Chain Optimization and Sales Growth

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	194.716	4	48.679	20.148	0.000
	Residual	304.427	186	2.416		
	Total	499.144	190			

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Sales Growth

Table 4.43 presented the results of analysis of variance (ANOVA) for the model linking staff competence, supply chain automation, procurement cost optimization, inventory control and supplier management and Sales Growth of manufacturing firms in Kenya. The F-statistic obtained was 20.148 with a p-value of 0.000. The findings implied that Supply Chain Automation, Supplier Management, Inventory Control and Procurement Cost Optimization were significant predictors of Sales Growth of manufacturing firms in Kenya.

Table 4.44: Regression Coefficients for Supply Chain Optimization and Sales Growth

	B	Std. Error	t	Sig.
(Constant)	0.393	0.612	0.642	0.000
Inventory Control Composite	0.519	0.448	1.158	0.025
Supplier Management	0.427	0.459	0.930	0.003
Procurement Cost Optimization	0.453	0.272	1.665	0.005
Supply Chain Automation	0.467	0.488	0.957	0.000

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Sales Growth

The beta coefficient summary in Table 4.44 shows that the p values for all the predictor variables are less than 0.05 indicating that the model was statistically significant. The model was defined as: $Y = 0.393 + 0.519X_1 + 0.427 X_2 + 0.453X_3 + 0.467X_4$ where; Y was Sales Growth X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization and X_4 was Supply Chain Automation, which indicates that all the independent variables influences the Sales Growth of manufacturing firms in Kenya. The results show that there is positive influence of inventory control, supplier management, procurement cost optimization and supply chain automation on the Sales Growth of manufacturing firms in Kenya. These findings concur with those of primary data, hence the study concluded that supply chain optimization has significant influence on Sales Growth of manufacturing firms in Kenya. The findings are supported by Al-Abdallah *et al* (2014) who concluded that supplier partnership and supplier lead time reduction significantly and positively affect the sales growth of the firms. The results agree with Green, Whitten and Inman (2008) who in their study found out that procurement cost optimization and supply chain automation improve the Sales of manufacturing firms.

4.10.4 Influence of Supply Chain Optimization on Profit Margins of Manufacturing Firms

The study further sought to establish the influence of Inventory Control, Supplier Management, Procurement Cost Optimization and Supply Chain Automation on profit margins of manufacturing firms in Kenya.

Table 4.45: Model Summary for Supply Chain Optimization and Profit Margins

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.569	0.324	0.302	1.63654

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation
b. Dependent Variable: Profit Margins

The results showed that Inventory Control, Supplier Management, Procurement Cost Optimization and Supply Chain Automation had a significant influence on profit margins of manufacturing firms. The model summary results further revealed R-square of 0.324 which implied that Inventory Control, Supplier Management, Procurement Cost Optimization and Supply Chain Automation accounted for 32.4% of the variation in profit margins of manufacturing firms in Kenya, the remaining 67.6% variations is explained by the other factors not in the model. The findings concur with Mayaka (2015) who did a study on the effects of supply chain management practices on performance of Barclays Bank of Kenya Limited and found out that supply chain management practices affect the profit margin of an organization.

Table 4.46: ANOVA for Supply Chain Optimization and Profit Margins

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	161.682	4	40.421	15.092	0.000
	Residual	337.462	186	2.678		
	Total	499.144	190			

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Profit Margins

Table 4.46 presented the results of analysis of variance (ANOVA) for the model of Inventory Control, Supplier Management, Procurement Cost Optimization and Supply Chain Automation and profit margins of manufacturing firms in Kenya. The F-statistic obtained was 15.092 with a p-value of 0.000. The findings implied that that Inventory Control, Supplier Management, Procurement Cost Optimization and Supply Chain Automation were significant predictors of profit margins of manufacturing firms in Kenya. The findings are supported by Kanda and Deshmukh (2008) who concluded that supply chain optimization affects the profit margin of the products of manufacturing firms.

Table 4.47: Regression Coefficients for Supply Chain Optimization and Profit Margins

	β	Std. Error	t	Sig.
(Constant)	0.678	0.179	3.796	0.009
Inventory Control Composite	0.472	0.176	2.685	0.001
Supplier Management	0.687	0.322	2.132	0.006
Procurement Cost Optimization	0.372	0.176	2.111	0.012
Supply Chain Automation	0.627	0.151	4.147	0.003

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Profit Margins

The results in Table 4.47 shows that the p values for all the predictor variables were less than 0.05 indicating that the model was statistically significant. The model was defined as: $Y = 0.678 + 0.472X_1 + 0.687 X_2 + 0.372X_3 + 0.627X_4$ where; Y was Profit Margins, X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization and X_4 was Supply Chain Automation, which indicates that all the independent variables influences the Profit Margins of manufacturing firms in Kenya. The results show that there is positive influence of inventory control, supplier management, procurement cost optimization and supply chain automation on the Profit Margins of manufacturing firms in Kenya. These findings concur with those of primary data, hence the study concluded that supply chain optimization significant influence Profit Margins of manufacturing firms in Kenya. The findings are in line with Sobhani *et al* (2013) who in their study noted that there is a positive relationship between the strategic procurement and profit margins of the companies.

4.11 Multivariate Regression Analysis for Primary Data

A multivariate regression model was conducted to test the joint influence of the supply chain optimization (independent variables) on the performance of manufacturing firms in Kenya (dependent variable).

Table 4.48: Model Summary for Multivariate Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.727	0.528	0.515	0.50758

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Performance of manufacturing firms

The results in Table 4.48 showed that inventory control, supplier management, procurement cost optimization, supply chain automation had a significant influence on performance of manufacturing firms (R=0.727). The model summary results further revealed R-square of 0.528 which implied that jointly inventory control, supplier management, procurement cost optimization and supply chain automation accounted for 52.8% of the variation in Performance of manufacturing firms in Kenya, the remaining 47.2% influence is caused by the other factors not in the model. The findings are in line with Ngunyi (2014) who concluded that supply chain optimization is both a driving force to competitive strategy selection and an important resource to achieving improved organizational performance.

Table 4.49: ANOVA for Multivariate Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.988	4	10.598	41.134	0.000
	Residual	47.405	186	.258		
	Total	100.393	190			

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Performance of manufacturing firms

Table 4.49 presented the results of analysis of variance (ANOVA) for the model of inventory control, supplier management, procurement cost optimization and supply chain automation and performance of manufacturing firms in Kenya. The F-statistic obtained was 41.134 with a p-value of 0.000. The findings implied that multivariate

model for inventory control, supplier management, procurement cost optimization and supply chain automation and performance of manufacturing firms in Kenya was statistically significant. The findings revealed that supply chain optimization practices used in this study were significant predictors of performance of manufacturing firms in Kenya. The findings are in line with Kimantiria (2014) who asserted that a good organized and executed procurement will make it possible for companies to decrease their inventories, have better customer service, and diminish costs as well improve the performance of the firms.

Table 4.50: Regression Coefficients for Multivariate Regression

	B	Std. Error	Beta	t	Sig.
(Constant)	0.125	0.245		0.510	0.011
Inventory Control	0.307	0.078	0.273	3.946	0.000
Supplier Management	0.275	0.087	0.228	3.151	0.002
Procurement Cost Optimization	0.151	0.073	0.144	2.071	0.004
Supply Chain Automation	0.149	0.063	0.153	2.355	0.003

a. Predictors: (Constant), Inventory Control, Supplier Management, Procurement Cost Optimization, Supply Chain Automation

b. Dependent Variable: Performance of manufacturing firms

The beta coefficient summary in Table 4.50 shows that the p values for all the predictor variables are less than 0.05 indicating that the model was statistically significant. The model was defined as: $Y = 0.125 + 0.307\ X_1 + 0.275\ X_2 + 0.151\ X_3 + 0.149\ X_4$ where; X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization and X_4 was Supply Chain Automation, which indicates that all the independent variables influences the Performance of manufacturing firms in Kenya. The results show that there is positive influence of inventory control, supplier management, procurement cost optimization and supply chain automation on the performance of manufacturing firms in Kenya. the study found out that the major factors were supplier management and procurement cost optimization.

These findings concur with Mwangi (2016) who found that inventory management significantly influences firm profitability and operating cash flows of Kenya Breweries beer distribution firms in Nairobi County, Kenya. Al-Abdallah, Abdallah and Hamdan (2014) results also showed that supplier relationship management practices such as supplier partnership/development and supplier lead time reduction significantly and positively affect the competitive performance of the buying firms. The findings of this study concurs with those of Kitheka (2012) who revealed that inventory management automation affected the performance of the supermarkets and that there was a positive linear relationship between inventory management automation and the performance of the supermarkets. Similarly, Magutu (2013) reported that there is a very strong relationship between supply chain strategies, supply chain technology and firm supply chain performance outcome with the supply chain strategies and technology explaining 92.9% of the changes in the firm's supply chain performance outcome.

4.12 Moderated Multiple Regression Results Using Secondary Data

This section presented the test of moderating effect of staff competence using secondary data. The study conducted regression analysis with and without the moderating variables and the results were presented in Tables 4.50 to 4.61.

4.12.1 Moderating effect of Staff Competence on influence of supply chain optimization on the Return on Assets

Moderated Regression analysis was done in order to test the moderating effect of staff competence (moderating variable) on the influence of supply chain optimization on the Return On Assets of manufacturing firms in Kenya. The moderation effect of staff competence on the influence of supply chain optimization on the Return On Assets of manufacturing firms in Kenya was tested using the hierarchical Moderated Multiple Regression (MMR) model and the results were presented in Table 4.51.

Table 4.51: Regression Analysis of Moderating Variable on the Return On Assets

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.549[a]	0.301	0.281	2.047
2	0.632[b]	0.399	0.161	1.042

a. Predictors: (Constant), X_1, X_2, X_3, X_4

b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z

c. Dependent Variable: Return On Assets (ROA)

The results in Table 4.51 shows that coefficient of correlation (R) was 0.549 without the moderating variable, indicating that there is an influence of supply chain optimisation (X_1 - Inventory Control, X_2- Supplier Management, X_3 - Procurement Cost Optimization, X_4 - Supply Chain Automation) on Return On Assets (ROA) of manufacturing firms without staff competence, it increased to 0.632 when staff competence was introduced. The results further show that when moderating variable in the model was absent R squared was 0.301 (30.1%) and it increased to 0.399 (39.9 %) when staff competence was introduced, which implies that staff competence increases the influences of supply chain optimisation on Return On Assets (ROA) of manufacturing firms in Kenya.

Table 4.52: ANOVA for Moderated Multivariate Regression on Return on Assets

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	242.235	4	60.559	14.459	0.000
	Residual	561.233	186	4.188		
	Total	803.467	190			
2	Regression	57.278	4	14.320	22.523	0.001
	Residual	631.135	186	3.393		
	Total	688.413	190			

a. Predictors: (Constant), X_1, X_2, X_3, X_4

b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z

c. Dependent Variable: Return On Assets (ROA)

The ANOVA results shown in Table 4.52 show that model 2 which is the overall regression model of the influence of supply chain optimisation on Return On Assets (ROA) of manufacturing firms in Kenya with the moderating variable (staff competence) was significant as F statistics was 22.523 and the p-value of 0.001 which is less 0.05, thus moderated multivariate model used was statistically significant.

Table 4.53: Coefficients for Moderated Multivariate Regression and ROA

	β	Std. Error	Beta	t	Sig.
(Constant)	0.523	0.131		3.992	0.000
X_1*Z	0.663	0.025	0.356	26.520	0.012
X_2*Z	0.839	0.026	0.216	32.269	0.005
X_3*Z	0.901	0.023	0.005	39.174	0.006
X_4*Z	0.422	0.022	0.129	19.182	0.001

a. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z
b. Dependent Variable: Return On Assets (ROA)

According to the results in Table 4.53**,** there was a significant difference in the beta coefficients before and after the introduction of the moderating variable. This is supported by the fact that the p values were all less than 0.05. The regression model equation with staff competence as moderating variable was defined as; $Y = 0.523+ 0.663X_1*Z - 0.839X_2*Z +0.901X_3*Z +0.422X_4*Z$, where X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization, X_4 was Supply Chain Automation and Z was staff competence. The model was compared with the model without the moderating variable $Y = 0.411+ 0.540X_1 + 0.754 X_2 + 0.852X_3 + 0.317X_4$ where a significant change in beta coefficients was noted. This implies that with the introduction of staff competence there was an improvement in the influence of supply chain optimization on the Return On Assets (ROA) of manufacturing firms in Kenya. According to the Moderated Multiple Regression analysis results the study found out that staff competence had a moderating effect on the influence of supply chain optimization on the Return On Assets (ROA) of manufacturing firms in Kenya.

4.12.2 Moderating effect of Staff Competence on influence of supply chain optimization on the Return on Equity

Moderated Regression analysis was done in order to test the moderating effect of staff competence (moderating variable) on the influence of supply chain optimization on the Return On Equity of manufacturing firms in Kenya. The moderation effect of staff competence on the influence of supply chain optimization on the Return On Equity of manufacturing firms in Kenya was tested using the hierarchical Moderated Multiple Regression (MMR) model and the results were presented in Table 4.54.

Table 4.54: Regression Analysis of Moderating Variable on the ROE

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.601[a]	0.361	0.168	7.096
2	0.741[b]	0.549	0.271	1.042

a. Predictors: (Constant), X_1, X_2, X_3, X_4

b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z

c. Dependent Variable: Return On Equity (ROE)

The results in Table 4.54 shows that coefficient of correlation (R) was 0.601 without the moderating variable, indicating that there is an influence of supply chain optimisation (X_1 - Inventory Control, X_2- Supplier Management, X_3 - Procurement Cost Optimization, X_4 - Supply Chain Automation) on Return On Equity (ROE) of manufacturing firms without staff competence, it increased to 0.741 when staff competence was introduced. The results further show that when moderating variable in the model was absent R squared was 0.361 (36.1%) and it increased to 0.549 (54.9%) when staff competence was introduced, which implies that staff competence increases the influences of supply chain optimisation on Return On Equity (ROE) of manufacturing firms in Kenya. The findings are in line with Shang and Marlow (2007) whose findings implied that logistics competency has a direct effect on financial performance of firms

Table 4.55: ANOVA for Moderated Multivariate Regression Return On Assets

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	592.944	4	148.236	2.944	0.024
	Residual	5136.720	186	50.360		
	Total	5729.664	190			
2	Regression	147.678	4	36.920	27.578	0.005
	Residual	735.439	186	3.954		
	Total	883.117	190			

c. Predictors: (Constant), X_1, X_2, X_3, X_4

d. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z

e. Dependent Variable: Return On Equity (ROE)

The ANOVA results shown in Table 4.55 show that model 2 which is the overall regression model of the influence of supply chain optimisation on Return On Equity (ROE) of manufacturing firms in Kenya with the moderating variable (staff competence) was significant as F statistics was 27.578 and the p-value of 0.005 which is less 0.05, thus moderated multivariate model used was statistically significant.

Table 4.56: Coefficients for Moderated Multivariate Regression and ROE

	β	Std. Error	Beta	t	Sig.
(Constant)	0.873	0.284		3.074	0.002
X_1*Z	0.763	0.365	0.256	2.090	0.022
X_2*Z	0.539	0.396	0.326	1.361	0.015
X_3*Z	0.771	0.273	0.215	2.824	0.006
X_4*Z	0.822	0.271	0.189	3.033	0.000

a. Predictors: (Constant), X_1, X_2, X_3, X_4

b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z

c. Dependent Variable: Return On Equity (ROE)

The results in Table 4.56 shows that there was a significant difference in the beta coefficients before and after the introduction of the moderating variable. This is supported by the fact that the p values were all less than 0.05. The regression

model equation with staff competence as moderating variable was defined as; $Y = 0.873+ 0. 0.763X_1*Z + 0.539X_2*Z +0.771X_3*Z +0.822X_4*Z$, where, Y was Return On Equity (ROE), X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization, X_4 was Supply Chain Automation and Z was staff competence. The model was compared with the model without the moderating variable $Y = 0.678+ 0.642X_1 + 0.368X_2 + 0.432X_3 + 0.723X_4$ where a significant change in beta coefficients was noted. This implies that with the introduction of staff competence there was an improvement in the influence of supply chain optimization on the Return On Equity (ROE)of manufacturing firms in Kenya. According to the Moderated Multiple Regression analysis results the study found out that staff competence had a moderating effect on the influence of supply chain optimization on the Return On Equity (ROE) of manufacturing firms in Kenya. The findings are supported by Osei and Ackah (2015) who recommended that firms need to seize the opportunity to improve continuous learning in their organizations so as to improve the skills, attitude and behavior of employee towards the discharge of their individual tasks to be able to attain high performance potentiality

4.12.3 Moderating effect of Staff Competence on influence of supply chain optimization on the Sales Growth

Moderated Regression analysis was done in order to test the moderating effect of staff competence (moderating variable) on the influence of supply chain optimization on the Sales Growth of manufacturing firms in Kenya. The moderation effect of staff competence on the influence of supply chain optimization on the Sales Growth of manufacturing firms in Kenya was tested using the hierarchical Moderated Multiple Regression (MMR) model and the results were presented in Table 4.57.

Table 4.57: Regression Analysis of Moderating Variable on the Sales Growth

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.625[a]	0.391	0.371	1.55438
2	0.715[b]	0.511	0.234	3.76522

a. Predictors: (Constant), X_1, X_2, X_3, X_4

b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z

c. Dependent Variable: Sales Growth

The results in Table 4.57 shows that coefficient of correlation (R) was 0.625 without the moderating variable, indicating that there is an influence of supply chain optimisation (X_1 - Inventory Control, X_2- Supplier Management, X_3 - Procurement Cost Optimization, X_4 - Supply Chain Automation) on Sales Growth of manufacturing firms without staff competence, it increased to 0.715 when staff competence was introduced. The results further show that when moderating variable in the model was absent R squared was 0.391 (39.1%) and it increased to 0.511 (51.1%) when staff competence was introduced, which implies that staff competence increases the influences of supply chain optimisation on Sales Growth of manufacturing firms in Kenya. The findings are in line with Wahdan and Emam (2017) who concluded that there is a significant effect of financial performance caused by enhancing the qualification and experience of the staff working the procurement department.

Table 4.58: ANOVA for Moderated Multivariate Regression on Sales Growth

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	194.716	4	48.679	20.148	0.000
	Residual	304.427	186	2.416		
	Total	499.144	190			
2	Regression	431.897	4	107.974	34.675	0.021
	Residual	643.675	186	3.461		
	Total	1075.572	190			

a. Predictors: (Constant), X_1, X_2, X_3, X_4
b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z
c. Dependent Variable: Sales Growth

The ANOVA results shown in Table 4.58 show that model 2 which is the overall regression model of the influence of supply chain optimisation on Sales Growth of manufacturing firms in Kenya with the moderating variable (staff competence) was significant as F statistics was 34.675 and the p-value of 0.005 which is less 0.05, thus moderated multivariate model used was statistically significant.

Table 4.59: Coefficients for Moderated Multivariate Regression and Sales Growth

	β	Std. Error	Beta	t	Sig.
(Constant)	0.578	0.349		1.656	0.013
X_1*Z	0.669	0.343	0.256	1.950	0.027
X_2*Z	0.598	0.301	0.326	1.987	0.019
X_3*Z	0.654	0.354	0.215	1.847	0.000
X_4*Z	0.549	0.298	0.189	1.842	0.007

a. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z
b. Dependent Variable: Sales Growth

According to the results in Table 4.59, there was a significant difference in the beta coefficients before and after the introduction of the moderating variable. This is supported by the fact that the p values were all less than 0.05. The regression model equation with staff competence as moderating variable was

defined as; $Y = 0.578 + 0.\ 0.669X_1*Z + 0.598X_2*Z + 0.654X_3*Z + 0.549X_4*Z$, where, Y was Sales Growth, X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization, X_4 was Supply Chain Automation and Z was staff competence. The model was compared with the model without the moderating variable $Y = 0.393 + 0.519X_1 + 0.427\ X_2 + 0.453X_3 + 0.467X_4$ where a significant change in beta coefficients was noted. This implies that with the introduction of staff competence there was an improvement in the influence of supply chain optimization on the Sales Growth of manufacturing firms in Kenya. According to the Moderated Multiple Regression analysis results the study found out that staff competence had a moderating effect on the influence of supply chain optimization on the Sales Growth of manufacturing firms in Kenya.

4.12.4 Moderating effect of Staff Competence on influence of supply chain optimization on the Profit Margins

Moderated Regression analysis was done in order to test the moderating effect of staff competence (moderating variable) on the influence of supply chain optimization on the Profit Margins of manufacturing firms in Kenya. The moderation effect of staff competence on the influence of supply chain optimization on the Profit Margins of manufacturing firms in Kenya was tested using the hierarchical Moderated Multiple Regression (MMR) model and the results were presented in Table 4.60.

Table 4.60: Regression Analysis of Moderating Variable on the Profit Margins

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.569[a]	0.324	0.302	1.63654
2	0.683[b]	0.466	0.365	6.89023

a. Predictors: (Constant), X_1, X_2, X_3, X_4

b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z

c. Dependent Variable: Profit Margins

The results in Table 4.60 shows that coefficient of correlation (R) was 0.569 without the moderating variable, indicating that there is an influence of supply chain optimisation (X_1 - Inventory Control, X_2- Supplier Management, X_3 - Procurement Cost Optimization, X_4 - Supply Chain Automation) on Profit Margins of manufacturing firms without staff competence, it increased to 0.683 when staff competence was introduced. The results further show that when moderating variable in the model was absent R squared was 0.324 (32.4%) and it increased to 0.466 (46.6%) when staff competence was introduced, which implies that staff competence increases the influences of supply chain optimisation on Profit Margins of manufacturing firms in Kenya.

Table 4.61: ANOVA for Moderated Multivariate Regression on Profits Margin

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	161.682	4	40.421	15.092	0.000
	Residual	337.462	186	2.678		
	Total	499.144	190			
2	Regression	587.794	4	146.949	12.584	0.001
	Residual	392.657	186	2.111		
	Total	980.451	190			

a. Predictors: (Constant), X_1, X_2, X_3, X_4
b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z
c. Dependent Variable: Profit Margins

The ANOVA results shown in Table 4.61 show that model 2 which is the overall regression model of the influence of supply chain optimisation on Profit Margins of manufacturing firms in Kenya with the moderating variable (staff competence) was significant as F statistics was 12.584 and the p-value of 0.001 which is less 0.05, thus moderated multivariate model used was statistically significant.

Table 4.62: Coefficients for Moderated Multivariate Regression and Profits Margin

	β	Std. Error	Beta	t	Sig.
(Constant)	0.793	0.276		2.875	0.011
X_1*Z	0.596	0.167	0.256	3.569	0.000
X_2*Z	0.795	0.215	0.326	3.698	0.010
X_3*Z	0.523	0.265	0.215	1.974	0.005
X_4*Z	0.745	0.304	0.189	2.451	0.001

a. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z
b. Dependent Variable: Profit Margins

According to the results in Table 4.62, there was a significant difference in the beta coefficients before and after the introduction of the moderating variable. This is supported by the fact that the p values were all less than 0.05. The regression model equation with staff competence as moderating variable was defined as; $Y = 0.793 + 0.596X_1*Z + 0.795X_2*Z + 0.523X_3*Z + 0.745X_4*Z$, where, Y was Profit Margins, X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization, X_4 was Supply Chain Automation and Z was staff competence. The model was compared with the model without the moderating variable $Y = 0.678 + 0.472X_1 + 0.687 X_2 + 0.372X_3 + 0.627X_4$ where a significant change in beta coefficients was noted. This implies that with the introduction of staff competence there was an improvement in the influence of supply chain optimization on the Profit Margins of manufacturing firms in Kenya. According to the Moderated Multiple Regression analysis results the study found out that staff competence had a moderating effect on the influence of supply chain optimization on the Profit Margins of manufacturing firms in Kenya.

4.13 Moderated Multiple Regression Results Using Primary Data

The fifth hypothesis of the study was that there is no significant moderating effect of staff competence on the influence of supply chain optimization on the performance of manufacturing firms in Kenya. Moderated Regression analysis was done in order to test the moderating effect of staff competence (moderating variable) on the

influence of supply chain optimization on the performance of manufacturing firms in Kenya. Regression analysis was conducted for all independent variables with the moderating variable and dependent variable. The moderation effect of staff competence on the influence of supply chain optimization on the performance of manufacturing firms in Kenya was tested using the changes in R-square after the moderating variable was introduced. The condition for rejecting the null hypothesis was a computed p value which was less than 0.05. The magnitude of moderation effect was shown by the change in R^2 in the model summary.

In Table 4.63 Model 1 represented multiple linear regression analysis of supply chain optimisation and performance of manufacturing firms in Kenya without moderating variable while model 2 represented hierarchical Moderated Multiple Regression analysis of supply chain optimisation and performance of manufacturing firms in Kenya with the moderating variable.

Table 4.63: Model Summary for all Variables with Moderating Variable

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.727[a]	0.528	0.515	0.50758
2	0.879[b]	0.773	0.549	0.54095

a. Predictors: (Constant), X_1, X_2, X_3, X_4
b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z

The results in Table 4.63 shows that coefficient of correlation (R) was 0.727without the moderating variable, indicating that there is an influence of supply chain optimisation (X_1 - Inventory Control, X_2- Supplier Management, X_3 - Procurement Cost Optimization, X_4 - Supply Chain Automation) on performance of manufacturing firms without staff competence, it increased to 0.879 when staff competence was introduced. The results further show that when moderating variable in the overall model was absent R squared was 0.528 (52.8) and it increased to 0.773 (77.3 %) when staff competence was introduced which implies that staff competence increases the influences of supply chain optimisation on performance of manufacturing firms in Kenya.

Table 4.64: ANOVA for Moderated Multivariate Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.988	4	10.598	41.134	0.000
	Residual	47.405	186	.258		
	Total	100.393	190			
2	Regression	46.258	4	11.564	39.520	0.000
	Residual	54.135	186	.293		
	Total	100.393	190			

a. Predictors: (Constant), X_1, X_2, X_3, X_4

b. Predictors: (Constant), X_1*Z, X_2*Z, X_3*Z, X_4*Z

The ANOVA results shown in Table 4.64 show that model 2 which is the overall regression model of the influence of supply chain optimisation on performance of manufacturing firms in Kenya with the moderating variable (staff competence) was significant as F statistics was 39.520 and the p-value of 0.000 which is less 0.05. This implied that moderated multivariate model used was statistically significant.

Table 4.65: Regression Coefficients for Moderated Multivariate Regression

	β	Std. Error	Beta	t	Sig.
(Constant)	0.623	0.131		4.756	0.000
X_1*Z	0.563	0.025	0.356	22.520	0.012
X_2*Z	0.739	0.026	0.216	28.423	0.005
X_3*Z	0.401	0.023	0.005	17.435	0.006
X_4*Z	0.722	0.022	0.129	32.818	0.001

a. Dependent Variable: Performance of manufacturing firms

According to the results in Table 4.65**,** there was a significant difference in the beta coefficients before and after the introduction of the moderating variable. This is supported by the fact that the p values were all less than 0.05. The overall regression model equation with staff competence as moderating variable was defined as; $Y = 0.623+ 0.563X_1*Z + 0.739X_2*Z +0.401X_3*Z +0.722X_4*Z$, where X_1 was Inventory Control, X_2 was Supplier Management, X_3 was Procurement Cost Optimization, X_4 was Supply Chain Automation and Z was staff competence. The model was compared with the model without the moderating variable $Y = 0.678+ 0.472X_1 + 0.687 X_2 + 0.372X_3 + 0.627X_4$ where a significant change in beta coefficients was noted. This implies that with the introduction of staff competence there was an improvement in the influence of supply chain optimization on the performance of manufacturing firms in Kenya. According to the Moderated Multiple Regression analysis results the study found out that staff competence had a moderating effect on the influence of supply chain optimization on the performance of manufacturing firms in Kenya.

4.14 Revised Conceptual Framework

All the four independent variables were found to have an influence on the performance of manufacturing firms in Kenya. The independent variables were; Inventory Control, Supplier Management, Procurement Cost Optimization and Supply Chain Automation. When each variable was considered alone Inventory Control (0.386), was found to have the highest influence on the performance of manufacturing firms in Kenya followed by Supplier Management (0.376), Procurement Cost Optimization (0.316) and finally Supply Chain Automation (0.291). this is in line with the findings of Okello and Were (2014) who found that inventory control is the most important factor that influences the performance of the Nairobi Securities Exchange's listed, food manufacturing companies in Nairobi. The findings are also supported by Kimaiyo and Ochiri (2014) who found that Inventory Management plays an important role on the Performance of Manufacturing Firms in Kenya.

In multiple regression model where all the variables were regressed together it was found that Supplier Management was strongest factor that influences performance of manufacturing firms in Kenya followed by Supply Chain Automation, Inventory Control and finally Procurement Cost Optimization. The study also tested the moderating effect of Staff Competence and the results indicated that Staff Competence moderated influence of supply chain optimization on the performance of manufacturing firms in Kenya. The moderating variable staff competence had an insignificant influence on the performance of manufacturing firms in Kenya when used as independent variable. Thus the study found out that staff competence could only act as a moderating variable but not an independent variable, this is supported by Asfaw, Argaw and Bayissa (2015) who found that there is an. impact of training and development on the performance and effectiveness of a firm. The revised conceptual framework is as shown in Figure 4.8.

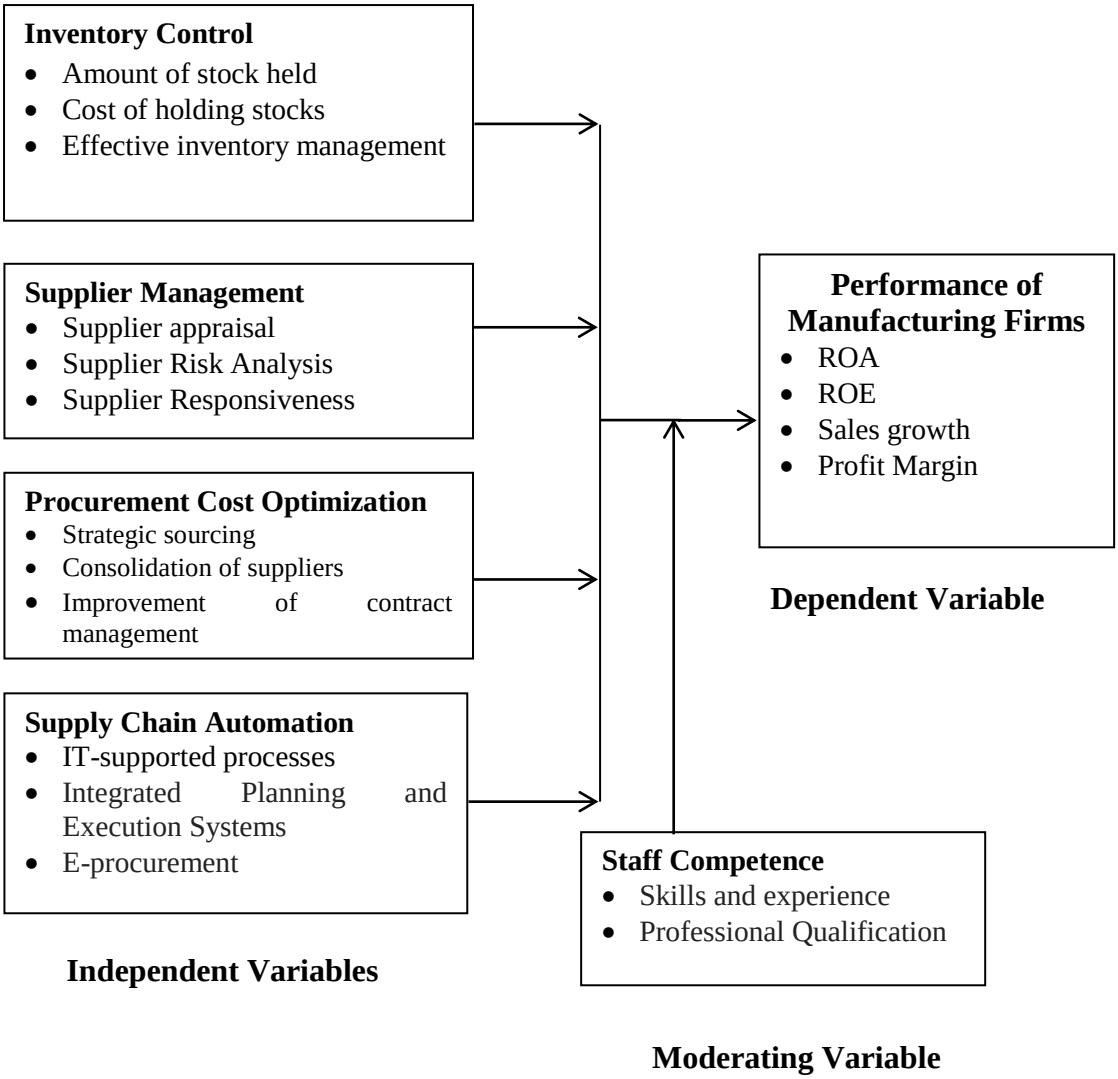

Figure 4.8: Revised Conceptual Framework

4.15 Qualitative Data Analysis

The study used both quantitative and qualitative data. The qualitative data were analyzed using content analysis, where the texts were categorized into themes corresponding to the study's objectives and interoperated accordingly. The text of the open ended questions was studied and subdivided into themes guided by the objectives of the study. The themes then guided the researcher to analyze the data (Mbwesa, 2006; Mugenda & Mugenda, 2008). The respondents were requested to explain other ways which inventory control impact on the performance of manufacturing firms in Kenya. Most of the respondents (72.4%) indicated that by storing only the necessary inventory, firms are able to reduce the dead stock which

hold firm's funds which could have been used for more profitable activities. Most of the responds felt that by storing manageable and cost effective inventory would contribute to a profitable firm. The respondents held that by holding an optimum stock levels would make a firm more profitable, because it reduces the finances held up in stock. Most of the respondents indicated that fixing annual inventory budget enables the firm to avoid wastages, thus making a firm profitable.

The respondents were requested to explain ways in which a company can manages its suppliers. Majority of the respondents suggested that by conducting frequent supplier appraisal and risk analysis for all the suppliers a firm would be able to manage their suppliers efficiently. Other respondents indicated that if a firm works closely with all the suppliers, the firm will be able to win the confidence of the suppliers. Still others argued that by reducing the number of suppliers the firm is able to manage the effectively. Most of the respondents indicated that by having a good communication channels with all the suppliers will enable the firm to have a good management, thus improved performance. The responds also suggested that firms should minimize suppliers' handling costs for a better performance.

Respondents were asked to explain other ways which a company can adopted to optimize its procurement costs. Most of them (67.5%) indicated that reduced number of supplier can reduce cost associated procurement and doing business with suppliers that are able to offer a variety of stocks can reduce the costs for the firm. Other respondents suggested that firms should avoid cancelling contracts with the suppliers in order to avoid extra costs as a result of penalties and firms should consolidate suppliers in order to cut on procurement costs. Respondents indicated that firms should conduct early budgeting and planning for all procurement activities so that they can reduce the procurement costs.

Respondents were requested to explain ways which a company can adopt in automating its supply chain management. Most of the respondents argued that use of Information Technology supported process in supply chain management and integrated planning and execution systems can assist the firm to automate its supply Chaim management. The responds suggested that all procurement activities should

be done online. Respondents were asked to explain how supply chain automation impacted on the firm's performance. Majority of the respondents said that use of e-procurement and IT supported processes in supply chain management can enable the firm to reduce procurement costs, hence improved performance of the manufacturing firms.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the findings of the study based on the objectives of the study, presents the conclusions from the findings and gives recommendations to the beneficiaries of the study and areas of further research in order to fill the gaps left out in the study. The study sought to assess the influence of supply chain optimization on the performance of manufacturing firms in Kenya. The supply chain optimization in the study were inventory control, supplier management, procurement cost optimization and supply chain automation which were independent variables of the study. The study also had a moderating variable which was staff competence.

5.2 Summary of Major Findings

This section provides a summary of the findings of the study which were based on the specific objectives of the study. The purpose of the study was to assess the influence of supply chain optimization on the performance of manufacturing firms in Kenya. The specific objectives of the study were to establish the influence of inventory control, supplier management, procurement cost optimization, supply chain automation on performance of manufacturing firms in Kenya. The study further explored the moderating effect of staff competence on the influence of supply chain optimization on the performance of manufacturing firms in Kenya. The study focused on the purchasing portfolio theory, transaction cost analysis theory, theory of constraints, systems theory, competency theory and supply chain operations reference model.

The study used cross sectional survey research design. Cross sectional design was justified on grounds that data of different manufacturing firms were collected at a defined period. The study's target population was supply chain managers in manufacturing firms in Nairobi County. The 499 supply chain managers in

manufacturing firms were used as the population for this study. The sample of this study consisted of 222 supply chain managers in manufacturing firms in Nairobi that was stratified and randomly selected from a list of 499 supply chain managers in manufacturing firms operating in Nairobi in Kenya.

This study relied on both primary and secondary data sources. Secondary data was collected for performance of the selected manufacturing firms for the period of between 2012 and 2016. This study utilized a questionnaire on the other hand to collect primary data. Quantitative techniques were used in analyzing the data. Descriptive analyses that used included: mean, standard deviation, frequencies and percentages. Inferential statistics such as correlation analysis and regression were used to test for the relationship among the variables.

5.2.1 Influence of Inventory Control on the Performance of Manufacturing Firms in Kenya

The first objective of this study was to establish the influence of inventory control on performance of manufacturing firms in Kenya. The findings of descriptive statistics implied that manufacturing firms in Kenya had inventory control practices in place to effectively manage their inventory. Effective inventory management enhances costs reductions hence improving performance. The finding further implied that manufacturing firms in Kenya moderated their costs associated with their inventory management.

The results of correlation analysis indicated that inventory control had a strong, positive and significant influence on the performance of manufacturing firms in Kenya. The finding of univariate and multivariate regression analysis further confirmed that there was a significant positive linear relationship between inventory control and performance of manufacturing firms in Kenya. Secondary data analysis also confirmed that inventory control had a strong, positive and significant influence on Return On Assets, Return On Equity, sales growth and profit margins which imply significant influence of inventory control and performance of manufacturing firms in Kenya. The study therefore rejected the null hypothesis that there is no significant influence of inventory control on the performance of manufacturing firms

in Kenya, hence the study conclude that inventory control significantly influences the performance of manufacturing firms in Kenya.

5.2.2 Influence of Supplier Management on the Performance of Manufacturing Firms in Kenya

The second objective of the study was to assess the influence of supplier management on the performance of manufacturing firms in Kenya. The findings of descriptive statistics implied that majority of the manufacturing firms in Kenya had invested in suppliers' management to enhance supply chain optimization. Supplier appraisal, effective communication and supplier risk analysis were among the practices carried out to management suppliers by manufacturing firms in Kenya.

The correlation analysis finding further established that supplier management had a positive, strong and significant influence on the performance manufacturing firms in Kenya. The results of correlation analysis implied that increase in supplier management practices would result to a higher performance of manufacturing firms in Kenya. The findings of univariate and multivariate regression analysis both for primary data and secondary data revealed that that there was a significant positive and strong influence of supplier management on the performance of manufacturing firms in Kenya. The influence of supplier management on the performance of manufacturing firms in Kenya was statistically significant with the p value of less than 0.05, thus the study rejected the null hypothesis that there is no significant influence of supplier management on the performance of manufacturing firms in Kenya hence the study concluded that supplier management significantly influences the performance of manufacturing firms in Kenya.

5.2.3 Influence of Procurement Cost Optimization on the Performance of Manufacturing Firms in Kenya

The third objective of the study was to determine the influence of procurement cost optimization on performance of manufacturing firms in Kenya. The descriptive analysis findings implied that manufacturing firms in Kenya had procurement cost optimization practices in place to reduce the amount spent on procurement functions.

The study further used correlation, univariate regression and multivariate regression analysis to test influence of procurement cost optimization on performance of manufacturing firms in Kenya. The findings of correlation and regression analysis conducted using both primary data and secondary data revealed that that there was a significant positive linear relationship between procurement cost optimization and performance of manufacturing firms in Kenya. The influence of procurement cost optimization on the performance of manufacturing firms in Kenya was statistically significant with the p value of less than 0.05. The study therefore rejected the null hypothesis that there is no significant influence of procurement costs optimization on the performance of manufacturing firms in Kenya hence the study concluded that procurement costs optimization significantly influences the performance of manufacturing firms in Kenya.

5.2.4 Influence of Supply Chain Automation on the Performance of Manufacturing Firms in Kenya

The fourth specific objective of the study was to assess the influence of supply chain automation on performance of manufacturing firms in Kenya. This study revealed that that majority of the players in manufacturing sector in Kenya had automated their supply chain management systems. The study through correlation analysis indicated that supply chain automation had a strong, positive and significant influence on the performance of manufacturing firms in Kenya. These finding implied that increase in supply chain automation will result to positive increase in manufacturing firm performance.

The findings of univariate and multivariate regression analysis conducted using both primary data and secondary data further revealed that supply chain automation was a significant predictor of performance of manufacturing firms in Kenya.

The influence of supply chain automation on the performance of manufacturing firms in Kenya was statistically significant with the p value of less than 0.05, thus the study rejected the null hypothesis that there is no significant effect of supply chain automation on the performance of manufacturing firms in Kenya, hence the study

conclude that supply chain automation significantly influences the performance of manufacturing firms in Kenya.

5.2.5 Moderating Effect of Staff Competence

The fifth specific objective of the study was to explore the moderating effect of staff competence on the influence of supply chain optimization on performance of manufacturing firms in Kenya. The moderating variable staff competence had an insignificant influence with performance of manufacturing firms in Kenya when used as independent variable. This implies that staff competence could only act as a moderating variable but not an independent variable.

The study adopted moderated multiple regression analysis to test the moderating effect of staff competence on the influence of supply chain optimization practises on the performance of manufacturing firms in Kenya. In the moderated regression analysis, the results showed that staff competence significantly moderated the influence of inventory control on the performance of manufacturing firms in Kenya. The moderating effect of staff competence on the influence of inventory control, supplier management, procurement cost optimization, supply chain automation on performance of manufacturing firms was statistically insignificant. The moderating effect of staff competence on influence of supply chain optimization on the performance of manufacturing firms in Kenya was statistically significant with the p value of less than 0.05. Therefore, the hypothesis that there is no significant moderating effect of staff competence on the influence of supply chain optimization on the performance of manufacturing firms in Kenya was rejected at 5% significance level. The study therefore concluded that staff competence significantly moderated the influence of supply chain optimization on the performance of manufacturing firms in Kenya.

5.3 Conclusion

Based on the findings, the study concluded that inventory control plays a significant role in supply chain optimization and consequently on overall performance of the firms. Firms that have managed to control their cost of holding stock and optimized

re-order and safety stock levels for inventory have also managed to optimize their supply chain management leading to better performance.

The study also concluded that supplier management is a key component of supply chain optimization. Conducting frequent supplier appraisal, trimming the number of suppliers to manageable number, company maintaining a good communication channels with all the suppliers and working with suppliers who respond quickly to the demand of the company are among major strategies of enhancing supplier management in a manner that will enhance overall firm performance.

On the influence of procurement cost optimization and performance of manufacturing firms, the study concluded that by working with suppliers that are able to offer a variety of stocks, to the firms can enhance their performance. Supplier with a wide portfolio of products and services reduces the costs that are related to acquiring new supplier such as supplier appraisal costs.

The study also concluded that adoption of integrated planning and execution systems, use of E-procurement and the use of Information Technology (IT) supported process in supply chain management simplifies the procurement process hence enhancing supply chain optimization. The study finally concluded that in order to benefit from supply chain optimization, firms must have a competent team in the procurement departments just like in other sector to enhance the overall performance. Firms that perform better in supply chain functions also have a highly skilled procurement staff both academically and experience wise.

5.4 Recommendations of the Study

This section provides the recommendations that study made based on the findings and discussions presented in chapter four.

5.4.1 Inventory Control

This study established that some of the manufacturing firms had a fixed annual inventory budget while other had not. The study recommends that manufacturing firms through their supply chain managers should forecast their inventory demand

for the year based on previous year's demand so that they can come up with an annual budget for inventory. This would assist in controlling and managing inventory to avoid unnecessary and unexpected spending because of holding excess inventory or incurring extra costs to procure again in case of shortage. The study further recommends that manufacturing firms should optimize the total amount of inventory stored by the company to a manageable and cost effective level.

5.4.2 Supplier Management

This study recommended that manufacturing firms should conduct frequent supplier appraisal for instance semiannually or annually for both the new suppliers and the old suppliers to access their ability to meet the firms demand in terms of variety of products and services required and time frames. This will ensure that the firms maintain trimmed number of suppliers that are easily manageable and can meet the demand of the company. The study further recommended that management of manufacturing firms should work closely with all the suppliers to demonstrate their worthiness as their customers by ensuring a good communication channels with all the suppliers. The study recommended that firms must trim their number of suppliers to a number that can easily be management.

5.4.3 Procurement Cost Optimization

On the influence of procurement cost optimization on the performance of manufacturing firms, the study recommended that manufacturing firms that wish to optimize their procurement costs should start by trimming the number of suppliers to reduce cost associated with procurement. The firms should also do business with suppliers that are able to offer a variety of stocks to reduce the number of suppliers. The study also recommended consolidation of suppliers to help the firms to cuts procurement cost by conducting early budgeting and planning for all procurement activities to manage the procurement costs. The study finally recommended that management of the listed firms should adopt strategic cost management models which significantly reduce procurement cost.

5.4.4 Supply Chain Automation

The study also established that supply chain automation influenced the performance of the firm positively and significantly. Although the study established that majority of manufacturing firms in Kenya had automated their supply chain systems, there is a small fraction that is still to automate their systems. The study recommended firms that are yet to integrate IT system in their supply chain management should do so to enhance their competitive advantage in the industry.

5.4.5 Moderating Effect of Staff Competence

Staff competence was found to have a significant moderating effect on the influence of supply chain optimization on the performance of manufacturing firms. The study recommended that firms with less qualified and competent supply chain team should overhaul and hire competent individuals to keep abreast of the competition.

5.5 Suggestions for Further Research

In the overall model the study revealed that supply chain optimization practices such as inventory management, supplier management, procurement cost optimization and supply chain automation accounted for 52.8% of the variation in Performance of manufacturing firms in Kenya. Therefore, further studies should be conducted to establish other factors that account for the remaining 47.2% of the variation in performance of manufacturing firms in Kenya.

Similarly, supply chain optimization is generally a new concept and a new area of study therefore further studies should focus on supply chain optimization in other industries to establish supply chain optimization practices that have been adopted in those sectors. The study also suggested that further studies should be more narrow in the scope and focus on various methods in inventory control and how each of these methods influence supply chain performance in Manufacturing sector. The study recommends that another study should be directed towards validating the results of this study by conducting a similar study in manufacturing firms in Kenya by collecting data from a different area other than Nairobi County.

REFERENCES

Abdulaziz, F. A. Y. (2014). *The Relationship between Supply Chain Fit and Financial Performance of Manufacturing Firms in the UAE.* Unpublished PhD dissertation, Dubai: The British University in Dubai (BUiD).

Akindipe, O. S. (2014). The role of raw material management in production operations. *International Journal of Managing Value and Supply Chains*, *5*(3), 37.

Al-Abdallah, G. M., Abdallah, A. B., & Hamdan, K. B. (2014). The impact of supplier relationship management on competitive performance of manufacturing firms. *International Journal of Business and Management*, *9*(2), 192-202.

Allen, D. W. (1999). Transaction costs. *Encyclopedia of law and economics*. Retrieved from: ecsocman.hse.ru

AlMaryani, M. A. H. & Sadik, H. H. (2012). Strategic management accounting techniques in Romanian Companies: some survey evidence. *Procedia Economics and Finance*, *3*, 387-396.

Al-Matari, E. M., Al-Swidi, A. K., & Fadzil, F. H. B. (2014). The measurements of firm performance's dimensions. *Asian Journal of Finance & Accounting*, *6*(1), 24.

Ambira, C., & Kemoni, H. (2011). Records management and risk management at Kenya Commercial Bank Limited, Nairobi. *SA Journal of Information Management*, *13*(1), 11.

Arabzad, S. M., Razmi, J., & Ghorbani, M. (2011). Classify purchasing items based on risk and profitability attributes; using MCDM and FMEA techniques. *Research Journal of International Studies*, *1*(21), 80-85.

Asfaw, A. M., Argaw, M. D., & Bayissa, L. (2015). The impact of training and development on employee performance and effectiveness: A case study of District Five Administration Office, Bole Sub-City, Addis Ababa, Ethiopia. *Journal of Human Resource and Sustainability Studies*, *3*(04), 188.

Awino, Z. B. (2011). Strategic Management: An Empirical Investigation of Selected Strategy Variables on Firms Performance: A Study of Supply Chain Management in Large Private Manufacturing Firms in Kenya. *Journal Business Administration and Management (BAM), 1*(1), 09-18,

Babbie, E. R. (2013). *The basics of social research*. New Jersey:Cengage learning.

Baggio, R., & Klobas, J. (2017). *Quantitative methods in tourism: A handbook*. Channel view publications.

Baguley, T. (2012*). Serious stats: A guide to advanced statistics for the behavioral sciences.* New York: Palgrave Macmillan.

Baily, P. (2005). *Purchasing principles and management*. New Delhi: Pearson Education.

Baker, K. R., & Trietsch, D. (2013). *Principles of sequencing and scheduling*. New York: John Wiley & Sons.

Ballou, R. H. (2007). *Business logistics/supply chain management: planning, organizing, and controlling the supply chain*. New Delhi: Pearson Education India.

Barak, B. (2009). Age identity: A cross-cultural global approach. *International Journal of Behavioral Development*, *33*(1), 2-11.

Barnes, R. W., Grove, J. W., & Burns, N. H. (2003). Experimental assessment of factors affecting transfer length. *Structural Journal*, *100*(6), 740-748.

Barsemoi, H., Mwangagi, P., & Asienyo, B. O. (2014). Factors influencing procurement performance in private sector in Kenya. *International Journal of Innovation and Applied Studies*, *9*(2), 632.

Bartmann, D., & Bach, M. F. (2012). *Inventory control: models and methods* (Vol. 388). New York: Springer Science & Business Media.

Bayraktar, E., Demirbag, M., Koh, S. L., Tatoglu, E., & Zaim, H. (2009). A causal analysis of the impact of information systems and supply chain management practices on operational performance: evidence from manufacturing SMEs in Turkey. *International Journal of Production Economics*, *122*(1), 133-149.

Bernard, H. R. (2017). *Research methods in anthropology: Qualitative and quantitative approaches*. Calfornia: Rowman & Littlefield.

Bhushan, N., & Rai, K. (2007). *Strategic decision making: applying the analytic hierarchy process*. New York: Springer Science & Business Media.

Bi, G., Zhou, J., & Cai, Z. (2014). The Impact of Employee Competence on Organizational Agility: the Mediating Role of IT Alignment. *In PACIS*, *190*.

Bickel, B. (2010). Absolute and statistical universals. *The Cambridge encyclopedia of the language sciences*, 77-79.

Bin Syed, S. J. A. N., Mohamad, N. N. S., Rahman, N. A. A., & Suhaimi, R. D. S. R. (2016). A Study on Relationship between Inventory Management and Company Performance: A Case Study of Textile Chain Store. *Journal of Advanced Management Science*, *4*(4).

Bititci, U. S., Carrie, A. S., & McDevitt, L. (1997). Integrated performance measurement systems: a development guide. *International journal of operations & production management*, *17*(5), 522-534.

Blome, C., & Schoenherr, T. (2011). Supply chain risk management in financial crises:A multiple case-study approach. *International journal of production economics*, *134*(1), 43-57.

Blumberg, B., Cooper, D. R., & Schindler, P. (2011). Business Research Models.

Boyd, L., & Gupta, M. (2004). Constraints management: what is the theory? *International Journal of Operations & Production Management*, *24*(4), 350-371.

Boyer, K. K., & Lewis, M. W. (2002). Competitive priorities: investigating the need for trade-offs in operations strategy. *Production and operations management*, *11*(1), 9-20.

Brace, N., Kemp, R., & Snelgar, R. (2012). *SPSS for Psychologists: A Guide To Data Analysis,* (revised and expanded).London: Palgrave

Bryman, A., & Cramer, D. (2005). *Quantitative data analysis with SPSS 12 and 13: a guide for social scientists*.London: Psychology Press.

Bucki, R., & Suchanek, P. (2012). The Method of Logistic Optimization in E-commerce. *J. UCS*, *18*(10), 1238-1258.

Caniels, M. C., & Gelderman, C. J. (2005). Purchasing strategies in the Kraljic matrix—A power and dependence perspective. *Journal of Purchasing and Supply Management*, *11*(2), 141-155.

Caniëls, M. C., & Gelderman, C. J. (2007). Power and interdependence in buyer supplier relationships: A purchasing portfolio approach. *Industrial Marketing Management*, *36*(2), 219-229.

Carr, A. S., & Pearson, J. N. (2002). The impact of purchasing and supplier involvement on strategic purchasing and its impact on firm's performance. *International Journal of Operations & Production Management*, *22*(9), 1032-1053.

Ceniga, P., & Šukalová, V. (2014). Application of the Theory of Constraints in Supply Chain. *Applied Mechanics & Materials, 708*.

Chandra, C., & Grabis, J. (2007). *Supply chain configuration*. New York: Springer Science+ Business Media, LLC.

Chemjor, R. K. (2015). *Supplier evaluation criteria and procurement performance in parastatals in Kenya*. Nairobi: University of Nairobi.

Chen, I. J., & Paulraj, A. (2004). Understanding supply chain management: critical research and a theoretical framework. *International journal of production research*, *42*(1), 131-163.

Choon Tan, K., Lyman, S. B., & Wisner, J. D. (2002). Supply chain management: a strategic perspective. *International Journal of Operations & Production Management*, *22*(6), 614-631.

Chopra, S., & Meindl, P. (2016). *Supply chain management: Strategy, planning, and operation.* Essex, NE:Pearson.

Choy, L. T. (2014). The strengths and weaknesses of research methodology: Comparison and complimentary between qualitative and quantitative approaches. *IOSR Journal of Humanities and Social Science*, *19*(4), 99-104.

Christopher, M. (2016). *Logistics and supply chain management*. UK: Pearson.

Claycomb, C., Dröge, C., & Germain, R. (1999). The effect of just-in-time with customers on organizational design and performance. *The International Journal of Logistics Management*, *10*(1), 37-58.

Clifford Defee, C., Williams, B., Randall, W. S., & Thomas, R. (2010). An inventory of theory in logistics and SCM research. *The International Journal of Logistics Management*, *21*(3), 404-489.

Coase, R. H. (1937). The nature of the firm. *economica*, *4*(16), 386-405.

Cohen, P., West, S. G., & Aiken, L. S. (2014). *Applied multiple regression/correlation analysis for the behavioral sciences*. London: Psychology Press.

Connaway, L. S., & Powell, R. R. (2010). *Basic research methods for librarians*. ABC-CLIO.

Cooper, D. R., & Schindler, P. S. (2006). Business research methods: Empirical investigation. *Journal of service research, 1*(2), 108-28.

Cooper, D. R., & Schindler, P. S. (2011). Qualitative research. *Business research methods*, *4*(1), 160-182.

Cooper, J., & Schindler, M. (2008). *Perfect Sample Size in Research*. New Jersey: Wiley and sons.

Cousins, P. D. (2007). Strategic supply and the management of relationships. *Food Supply Chain Management*, *127*.

Cox III, J., & Schleier, J. (2010). *Theory of Constraints Handbook*. New York: McGraw-Hill.

Coyle, J. J., Gibson, B. J., Langley, C. J., & Novack, R. A. (2013). *Managing supply chains: A logistics approach*. London: South-Western Cengage Learning.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. New York: Sage publications.

Cummings, T. G., & Worley, C. G. (2014). *Organization development and change*. New York: Cengage learning.

Daniell, M. (2004). *Strategy: A step-by-step approach to development and presentation of world class business strategy*. New York: Springer.

David, F. G., Patrick, W. S., Phillip, C. F., & Kent, D. S. (2010). *Business Statistics.* New Jersey: Pearson publishers.

Dean, W. G., & Faff, R. W. (2008). Evidence of feedback trading with Markov switching regimes. *Review of Quantitative Finance and Accounting*, *30*(2), 133-151.

Dehning, B., Richardson, V. J., & Zmud, R. W. (2007). The financial performance effects of IT-based supply chain management systems in manufacturing firms. *Journal of Operations Management*, *25*(4), 806-824.

Dong, Y., & Xu, K. (2012). A supply chain model of vendor managed inventory. *Transportation research part E: logistics and transportation review*, *38*(2), 75-95.

Dzupire, N. C., & Nkansah-Gyekye, Y. (2014). A multi-stage supply chain network optimization using genetic algorithms. *arXiv preprint arXiv:1408.0614*.

Ehrlenspiel, K., Kiewert, A., Lindemann, U., & Hundal, M. S. (2007). *Cost-efficient design* (Vol. 544). Berlin: Springer.

Ellram, L. M. (2002). *Strategic cost management in the supply chain: A purchasing and supply management perspective* (pp. 16-18). Tempe, AZ: CAPS Research.

Ellram, L. M., & Cooper, M. C. (2014). Supply chain management: It's all about the journey, not the destination. *Journal of Supply Chain Management*, *50*(1), 8-20.

Ellram, L. M., Tate, W. L., & Billington, C. (2008). Offshore outsourcing of professional services: A transaction cost economics perspective. *Journal of Operations Management*, *26*(2), 148-163.

Ember, C. R. (2009). *Cross-cultural research methods*. Rowman Altamira: Wiley.

Eneje, C., Nweze, A., & Udeh, A. (2012). Effect of efficient inventory management on profitability: evidence from selected brewery firms in Nigeria. *International Journal of current Research*, *4*(1), 350-354.

Eriksson, P., & Kovalainen, A. (2008). Qualitative research evaluation. *Qualitative methods in business research*.

Erondu, E. A. (2002). The concept and application of managerial competence in developed and developing economies: A two country analysis. *Journal of African business*, *3*(2), 59-84.

Falini, B., Pileri, S., Zinzani, P. L., Carbone, A., Zagonel, V., Wolf-Peeters, C., ... & Lazzarino, M. (1999). ALK+ lymphoma: clinico-pathological findings and outcome. *Blood*, *93*(8), 2697-2706

Fama, E. F., & French, K. R. (2012). Size, value, and momentum in international stock returns. *Journal of financial economics*, *105*(3), 457-472.

Fawcett, S. E., Ogden, J. A., Magnan, G. M., & Bixby Cooper, M. (2006). Organizational commitment and governance for supply chain success. *International Journal of Physical Distribution & Logistics Management*, *36*(1), 22-35.

Felder, R. M., & Spurlin, J. (2016). Applications, reliability and validity of the index of learning styles. *International journal of engineering education*, *21*(1), 103-112.

Fenson, C., Edin, P., & Holmer, E. (2008). How purchasing practitioners use the Kraljic matrix. *Cerca con Google*.

Field, A. (2005). *Discovering statistics using SPSS* . Thousand Oaks, CA: Pearson.

Field, J. M., & Meile, L. C. (2008). Supplier relations and supply chain performance in financial services processes. *International Journal of Operations & Production Management*, *28*(2), 185-206.

Flynn, B. B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: A contingency and configuration approach. *Journal of operations management*, *28*(1), 58-71.

Forbes, L. H., & Ahmed, S. M. (2010). *Modern construction: lean project delivery and integrated practices*. New York: CRC press.

Fowler, A. (2000). Introduction beyond partnership: getting real about NGO relationships in the aid system. *IDS bulletin*, *31*(3), 1-13.

Franco-Santos, M., Lucianetti, L., & Bourne, M. (2012). Contemporary performance measurement systems: A review of their consequences and a framework for research. *Management accounting research*, *23*(2), 79-119.

Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC medical research methodology*, *13*(1), 117.

Gall, M. D., Gall, J. P., & Borg, W. R. (2007). Collecting research data with questionnaires and interviews. *Educational research: An introduction*, 227-261.

Gelderman, C. J. (2003). *A portfolio approach to the development of differentiated purchasing strategies*. Eindhoven: Technische Universiteit Eindhoven.

Gelderman, C. J., & Laeven, H. T. (2005). *Competition or cooperation? Alternative purchasing strategies for leverage products-an empirical study*. Netherlands: University of the Netherlands

Gelderman, C. J., & Semeijn, J. (2006). Managing the global supply base through purchasing portfolio management. *Journal of Purchasing and Supply Management*, *12*(4), 209-217.

Gelderman, C. J., & Van Weele, A. J. (2003). Handling measurement issues and strategic directions in Kraljic's purchasing portfolio model. *Journal of purchasing and supply management*, *9*(5), 207-216.

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for non-statisticians. *International journal of endocrinology and metabolism*, *10*(2), 486.

Gichuru, M., Iravo, M., & Arani, W. (2015). Collaborative Supply Chain Practices on Performance of Food and Beverages Companies: A Case Study of Del Monte Kenya Ltd. *International Journal of Academic Research in Business and Social Sciences*, *5*(11), 17-31.

Gold, S., Seuring, S., & Beske, P. (2010). Sustainable supply chain management and inter-organizational resources: a literature review. *Corporate social responsibility and environmental management*, *17*(4), 230-245.

Goldratt, E. M., & Goldratt, R. (2004). *TOC insights into finance and measurements*. New York: Goldratt's Marketing Group.

Goldstein, H. (2011). *Multilevel statistical models* (Vol. 922).New York: John Wiley & Sons.

Green Jr, K. W., Whitten, D., & Inman, R. A. (2008). The impact of logistics performance on organizational performance in a supply chain context. *Supply Chain Management: An International Journal*, *13*(4), 317-327.

Greene, W. H. (2003). *Econometric analysis*. New Delhi: Pearson Education India.

Grönroos, C. (2004). The relationship marketing process: communication, interaction, dialogue, value. *Journal of business & industrial marketing*, *19*(2), 99-113.

Gujarati, D. (2003). *Basic Econometrics*. (4th ed.). Singapura: McGraw-Hill.

Gupta, M. C., & Boyd, L. H. (2008). Theory of constraints: a theory for operations management. *International Journal of Operations & Production Management*, *28*(10), 991-1012.

Haron, M., & Arul Chellakumar, J. A. (2012). Efficiency performance of manufacturing companies in Kenya: Evaluation and policies. *International Journal of Management and Business Research*, *2*(3), 233-242.

Henning, E., Van Rensburg, W., & Smit, B. (2004). *Finding your way in qualitative research* (pp. 19-22). Pretoria: Van Schaik.

Hofmann, E., & Kotzab, H. (2010). A supply chain-oriented approach of working capital management. *Journal of business Logistics*, *31*(2), 305-330.

Huan, S. H., Sheoran, S. K., & Wang, G. (2004). A review and analysis of supply chain operations reference (SCOR) model. *Supply Chain Management: An International Journal*, *9*(1), 23-29.

Hugos, M. H. (2011). *Essentials of supply chain management* (Vol. 62). New York: John Wiley & Sons.

Ince, H., Imamoglu, S. Z., Keskin, H., Akgun, A., & Efe, M. N. (2013). The impact of ERP systems and supply chain management practices on firm performance: case of Turkish companies. *Procedia-Social and Behavioral Sciences*, *99*, 1124-1133.

Income, A. A. F. A. (2010). Kenya's Vision 2030. Retrieved from: semanticscholar.org

Iser, A. R., Bedingfield, A. L., & Wells, J. R. (2015). Inventory and Supply Chain Control and Tracking Methods and Systems. *U.S. Patent Application*, *14*, 262-931.

Jankowicz, A. D. (2005). *Business research projects*. New York: Cengage Learning EMEA.

Jiménez-Jiménez, D., & Sanz-Valle, R. (2011). Innovation, organizational learning, and performance. *Journal of business research*, *64*(4), 408-417.

Johnson, P. F., & Leenders, M. R. (2003). Gaining and losing pieces of the supply chain. *Journal of Supply Chain Management*, *39*(4), 27-39.

Johnston, D. A., McCutcheon, D. M., Stuart, F. I., & Kerwood, H. (2004). Effects of supplier trust on performance of cooperative supplier relationships. *Journal of operations Management*, *22*(1), 23-38.

Jüttner, U., Christopher, M., & Baker, S. (2007). Demand chain management-integrating marketing and supply chain management. *Industrial marketing management*, *36*(3), 377-392.

Kairu, K. M. (2015). Role of strategic inventory management on performance of manufacturing firms in Kenya: A case of Diversey Eastern and Central Africa Limited. *International Academic Journal of Procurement and Supply Chain Management*, *1*(4), 22-44.

Kamau, I. N. (2013). *Buyer-supplier relationships and organizational performance among manufacturing firms in Nairobi, Kenya,* Unpublished PhD dissertation, Nairobi: University of Nairobi.

Kanda, A., & Deshmukh, S. G. (2008). Supply chain coordination: perspectives, empirical studies and research directions. *International journal of production Economics*, *115*(2), 316-335.

Kandie, K. (2014, October 23). Sustained Investments in Electricity Needed to Power the Economy. The Star, Thursday, October 23, 2014 - 10:00

Kembel, S. W., Jones, E., Kline, J., Northcutt, D., Stenson, J., Womack, A. M., ... & Green, J. L. (2012). Architectural design influences the diversity and structure of the built environment microbiome. *The ISME journal*, *6*(8), 1469.

Kihara, A. S. N. (2017). *Influence of Strategic Contingency Factors on Performance of Large Manufacturing Firms in Kenya.* Unpublished PhD Thesis, Juja: JKUAT.

Kimaiyo, K. K., & Ochiri, G. (2014). Role of Inventory Management on Performance of Manufacturing Firms in Kenya–A case of new Kenya Cooperative Creameries. *European Journal of Business Management*, *2*(1), 336-341.

Kimani, M. W. (2013). *Lean Supply Chain Management in Manufacturing Firms in Kenya*, Unpublished PhD dissertation, Nairobi: University of Nairobi..

Kimantiria, D. K. (2014). *Supply chain management practices and competitiveness in the national government of Kenya: A case study of Ruiru Sub-County*. Unpublished MBA Project, Nairobi: University of Nairobi.

Kinyanjui, M. W. (2016). *Inventory Management Practices and Performance of World Food Programme Partners in Kenya,* Unpublished PhD dissertation, Nairobi: University of Nairobi.

Kiplagat, P. H. I. L. I. P. (2010). *The Impact of Strategic Procurement in Communications Commission of Kenya.* Unpublished MBA Project, Nairobi: University of Nairobi.

Kitheka, S. S. (2012). *Inventory management automation and the performance of supermarkets in western Kenya,* Unpublished PhD Thesis, Juja: JKUAT.

Klassen, R. D., & Vereecke, A. (2012). Social issues in supply chains: Capabilities link responsibility, risk (opportunity), and performance. *International Journal of production economics*, *140*(1), 103-115.

Kline, P. (2014). *An easy guide to factor analysis.* London: Routledge.

KNBS (2012), *Leading Economic Indicators*. Nairobi: Kenya National Bureau of Statistics.

Kock, N., & Lynn, G. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. *Journal of the Association for Information Systems, 13*(7).

Kommenic, B., Tomic, D., & Tomic, R. (2013). Intangible assets and business performance. *The Journal of American Business Review*, *1*(2), 165-172.

Kosgei, R. C., & Gitau, R. (2016). Effect of supplier relationship management on organizational performance: A case study of Kenya Airways Limited. *International Academic Journal of Procurement and Supply Chain Management*, *2*(2), 134-148.

Kothari, C. R. (2017). *Research Methodology methods and techniques*, (second edition). New Delhi: New age International.

Koufopoulos, D., Zoumbos, V., Argyropoulou, M., & Motwani, J. (2008). Top management team and corporate performance: a study of Greek firms. *Team Performance Management: An International Journal*, *14*(7/8), 340-363.

Koumanakos, D. P. (2008). The effect of inventory management on firm performance. *International journal of productivity and performance management*, *57*(5), 355-369.

KPMG (2014). Manufacturing in Africa, Sector Report. Retrieved from: kpmg.com/Africa

KPMG (2014).*The UK Automotive Industry and the EU, report for the Society for Motor Manufacturers and Traders*. London: KPMG.

Kraljic, P. (1983). Purchasing must become supply management. *Harvard business review*, *61*(5), 109-117.

Kroes, J. R., & Ghosh, S. (2010). Outsourcing congruence with competitive priorities: Impact on supply chain and firm performance. *Journal of operations management*, *28*(2), 124-143.

Kvale, S. (2003). The psychoanalytic interview as inspiration for qualitative research. *Qualitative research in psychology: Expanding perspectives in methodology and design*, 275-297.

La Porta, L. D. S., & Silanes, F. L. Shleifer & Vishny (2016), Investor Protection and Corporate Governance. *Journal of financial economics*, *58*(3), 27.

Lalkaka, R. (2006). *Technology business incubation: A toolkit on innovation in engineering, science and technology* (Vol. 255). UK: UNESCO.

Ledesma, R. D., & Valero-Mora, P. (2007). Determining the number of factors to retain in EFA: An easy-to-use computer program for carrying out parallel analysis. *Practical assessment, research & evaluation*, *12*(2), 1-11.

Lee, H. L. (2002). Aligning supply chain strategies with product uncertainties. *California management review*, *44*(3), 105-119.

Leitão, P. (2009). Agent-based distributed manufacturing control: A state-of-the-art survey. *Engineering Applications of Artificial Intelligence*, *22*(7), 979-991.

Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., & Rao, S. S. (2006). The impact of supply chain management practices on competitive advantage and organizational performance. *Omega*, *34*(2), 107-124.

Li, S., Rao, S. S., Ragu-Nathan, T. S., & Ragu-Nathan, B. (2015). Development and validation of a measurement instrument for studying supply chain management practices. *Journal of operations management*, *23*(6), 618-641.

Low, L. (2012). *Abu Dhabi's vision 2030: an ongoing journey of economic development*. World Scientific. United Arab Emirates: Abu Dhabi's.

Lwiki, T., Ojera, P. B., Mugend, N., & Wachira, V. (2013). The impact of inventory management practices on financial performance of sugar manufacturing

firms in Kenya. *International Journal of Business, Humanities and Technology*, *3*(5), 75-85.

Lysons, K., & Farrington, B. (2006). *Purchasing and supply chain management*. New Delhi: Pearson Education.

Magd, H. A. (2008). ISO 9001: 2000 in the Egyptian manufacturing sector: perceptions and perspectives. *International Journal of Quality & Reliability Management*, *25*(2), 173-200.

Magutu, P. O. (2013). *Supply chain strategies, technology, and performance of large-scale manufacturing firms in Kenya.* Unpublished PhD thesis, Nairobi: University of Nairobi.

Markusen, A. (2017). Sticky places in slippery space: a typology of industrial districts. In *Economy* (pp. 177-197). London: Routledge.

Martinelli, D. P. (2001). Systems hierarchies and management. *Systems Research and Behavioral Science*, *18*(1), 69-81.

Mason, O., & Verwoerd, M. (2007). Graph theory and networks in biology. *IET systems biology*, *1*(2), 89-119.

Mayaka, M. A. (2015). *The Role of Entrepreneurship in Community-Based Tourism,* Unpublished PhD dissertation, Australia: Monash University.

Mbwesa, J. K. (2006). *Introduction to management Research: A students handbook*. Nairobi: Jomo Kenyatta Foundation.

McGrath, R. G. (2013). *The end of competitive advantage: How to keep your strategy moving as fast as your business*. Harvard: Harvard Business Review Press.

Miles, M. B., Huberman, A. M., Huberman, M. A., & Huberman, M. (1994). *Qualitative data analysis: An expanded sourcebook*. London: sage.

Milnes, M. (2016). Supply chain automation. *MHD Supply Chain Solutions*, *46*(2), 34.

Mogikoyo, L. K., Magutu, P. O., & Dolo, A. B. (2017). The Link between Supplier Evaluation Attributes and Supply Chain Performance of Government Owned Entities: Perspectives from Commercial State Corporations in Kenya. *Noble International Journal of Economics and Financial Research*, *2*(1), 1-20.

Mohamad, M. Y. H., Saleh, T. A. & Fares, J. S. (2011). The effect of Corporate Governance on the Performance of Jordanian Industrial Companies: An Empirical Study on Amman Stock Exchange. *International Journal of Humanities and Social Science*, *1*(4).

Monczka, R. M., Handfield, R. B., Giunipero, L. C., & Patterson, J. L. (2015). *Purchasing and supply chain management*. London: Cengage Learning.

Mose, J. M., Njihia, J. M., & Magutu, P. O. (2013). The critical success factors and challenges in e-procurement adoption among large scale manufacturing firms in Nairobi, Kenya. *European Scientific Journal, ESJ*, *9*(13).

Moutinho, L., & Hutcheson, G. (2010). Statistical Modelling for Business and Management. *Computing*, *78*(73), 1-00.

Mugenda, A. G. (2008). *Social science research: Theory and principles*. Nairobi: Acts Press

Mugenda, O., & Mugenda, A. (2008). *Research methods: Quantitative and qualitative approaches*. (2nd *Rev. Ed.*). Nairobi: Acts Press

Muhayimana, V. (2015). Inventory Management Techniques and Its Contribution on Better Management of Manufacturing Firms in RWANDA Case Study: SULFO RWANDA Ltd. *European Journal of Academic Essays*, *2*(6), 49-58.

Mulure, L. A. (2013). *Effect of Supply Chain Finance on Small and Medium Manufacturing Enterprises Performance: A Case of Nairobi County*. Unpublished MBA Project, Nairobi: University of Nairobi.

Munyao, R. M., Omulo, V. O., Mwithiga, M. W., & Chepkulei, B. (2015). 'Role of Inventory Management Practices On Performance of Production Department. A Case of Manufacturing Firms. *Journal of Business and Management*, *17*(4), 41-50.

Murray, J. (2013). Likert data: what to use, parametric or non-parametric?. *International Journal of Business and Social Science*, *4*(11).

Musau, G. (2015). Inventory optimization: a factor affecting e-procurement performance of State Parastatals in Kenya. *Journal of Business and Management*, *17*(4), 41-50.

Mutindi, U. J. M., Namusonge, G. S., & Obwogi, J. (2013). *Effects of strategic management drivers on organizational performance: A survey of the hotel industry in Kenyan coast.* Mombasa: Technical University of Mombasa.

Mwangangi, P. W. (2016). *Influence of logistics management on performance of manufacturing firms in Kenya*, Unpublished PhD dissertation, Juja: Jkaut.

Mwangi, L. (2016). *The effect of inventory management on firm profitability and operating cash flows of Kenya Breweries Limited, beer distribution firms in Nairobi county* Unpublished PhD dissertation, Nairobi: University of Nairobi.

Mwikali, R., & Kavale, S. (2012). Factors affecting the selection of optimal suppliers in procurement management. *International Journal of humanities and social science*, *2*(14), 189-193.

Mwirigi, F. M. (2013). *Role of Supply Chain Relationships in the Growth of Small Firms in Kenya* Unpublished PhD dissertation, Nairobi: University of Nairobi.

Mzoughi, N., Bahri, N., & Ghachem, M. S. (2008). Impact of supply chain management and ERP on organizational performance and competitive advantage: Case of Tunisian companies. *Journal of Global Information Technology Management*, *11*(3), 24-46.

Nair, A., Jayaram, J., & Das, A. (2015). Strategic purchasing participation, supplier selection, supplier evaluation and purchasing performance. *International Journal of Production Research*, *53*(20), 6263-6278.

Navarro Sada, A., & Maldonado, A. (2007). *Research Methods in Education*. -by Louis Cohen, Lawrence Manion and Keith Morrison. *British Journal of Educational Studies*, *55*(4), 469-470.

Nderitu, K. M., & Ngugi, K. (2014). Effects of green procurement practices on an organization performance in manufacturing industry: Case study of East African Breweries Limited. *European Journal of Business Management*, *2*(1), 341-352.

Nedzinskas, Š., Pundzienė, A., Buožiūtė-Rafanavičienė, S., & Pilkienė, M. (2013). The impact of dynamic capabilities on SME performance in a volatile environment as moderated by organizational inertia. *Baltic Journal of Management*, *8*(4), 376-396.

Neely, A., Gregory, M., & Platts, K. (1995). Performance measurement system design: a literature review and research agenda. *International journal of operations & production management*, *15*(4), 80-116.

Ngumi, F. N. (2015). *Inventory Management Practices and Productivity of Manufacturing Firms in Nairobi, Kenya,* Unpublished PhD dissertation, Nairobi: University of Nairobi.

Ngunyi, I. W. (2014). *Procurement Practices and the Performance of Parastatals in Kenya.* Unpublished MBA Research Project, Nairobi: University of Nairobi.

Nguyen, P., Thanh, T., & Tran, Q. M. (2011). *A Research On Consumers' AttitudesTowards Marketing: The case of Vietnam*. Unpublished MBA thesis, Sweden: Umea University.

Nishat Faisal, M., Banwet, D. K., & Shankar, R. (2006). Supply chain risk mitigation: modeling the enablers. *Business Process Management Journal*, *12*(4), 535-552.

Nollet, J., & Beaulieu, M. (2005). Should an organisation join a purchasing group?. *Supply Chain Management: An International Journal*, *10*(1), 11-17.

Noreen, E., Smith, D., & Mackey, J. T. (1995). *Theory of Constraints and Its Implications for Management Accounting: A Report on the Actual Implementation of the Theory of Constraints*. MA: North River Press.

Nyabiage, J., & Kapchanga, K. (2014). Thousands of jobs on the line as tens of firms shut down local units. The Standard Digital, Sunday, October 12th.

Nyaoga, R. B., Magutu, P. O., & Aduba, J. (2015). Is there a Link between Supply Chain Strategies and Firm Performance? Evidence from Large-Scale Manufacturing Firms in Kenya. *JOSCM: Journal of Operations and Supply Chain Management*, *8*(2), 1.

Odhiambo, V. A. (2015). Supplier Selection Practices and Procurement Performance in Nairobi City County.

Odhiambo, W., & Kamau, P. (2003). *Public Procurement: Lessons from Kenya, Tanzania* (No. 208). and Uganda. Working Paper.

Ogbo, A. I., & Ukpere, W. I. (2014). The impact of effective inventory control management on organisational performance: A study of 7up bottling

company nile mile enugu, nigeria. *Mediterranean Journal of Social Sciences*, *5*(10), 109.

Okello, J. O., & Were, S. (2014). Influence of supply chain management practices on performance of the Nairobi Securities Exchange's listed, food manufacturing companies in Nairobi. *International Journal of Social Sciences and Entrepreneurship*, *1*(11), 107-128.

Oketch, C. S. (2014). *Supply chain performance and performance of manufacturing pharmaceutical firms in Kenya*, Unpublished PhD dissertation, Nairobi: University of Nairobi.

Ondiek, G. O., & Odera, O. (2012). Assessment of materials management in Kenyan manufacturing firms. *Journal of business studies quarterly*, *3*(3), 40.

Onyango, O. J., Onyango, M. B., Kiruri, S. N., & Karanja, S. N. (2015). Effect of strategic supplier relationship management on internal operational performance of manufacturing firms: A case of East African Breweries Limited, Kenya. *International Journal of Economics, Finance and Management Sciences*, *3*(2), 115-124.

Orege, E. (2016). *The Effects of Capital Structure on Profitability of Manufacturing and Allied Companies Listed In Kenya Capital Market,* Unpublished PhD dissertation, Nairobi: United States International University-Africa.

Orodho, J. A. (2009). Elements of education and social science research methods. *Nairobi/Maseno*, 126-133.

Osei, A. J., & Ackah, O. (2015). Employee's competency and organizational performance in the pharmaceutical industry. *International Journal of Economics, Commerce and Management United Kingdom*, *3*(3), 67-72.

Osei, R. D., Ackah, C., Domfe, G., & Danquah, M. (2015). Political settlements, the deals environment and economic growth: The case of Ghana. *Effective*

States and Inclusive Development (ESID) Working Paper series, No. 53 36 Pages Posted: 27 Nov 2015

Ostroff, C., & Bowen, D. E. (2016). Reflections on the 2014 decade award: Is there strength in the construct of HR system strength?. *Academy of Management Review*, *41*(2), 196-214.

Oyuke, J. (2012). How Bad Debts led a bank to close doors. *Business Journal Retrieved November*, *18*.

Pallant, J., & Manual, S. S. (2010). *A step by step guide to data analysis using SPSS*. Berkshire UK: McGraw-Hill Education.

Papazoglou, M. P., & Heuvel, W. J. (2007). Service oriented architectures: approaches, technologies and research issues. *The VLDB Journal—The International Journal on Very Large Data Bases*, *16*(3), 389-415.

Parahoo, K. (1999). Research utilization and attitudes towards research among psychiatric nurses in Northern Ireland. *Journal of Psychiatric and Mental Health Nursing*, *6*(2), 125-135.

Perumal, T. (2009). *The Influence of Purchasing Strategies On Manufacturing Performance with The Moderating Effect of Purchasing Strategic Integration* Unpublished PhD dissertation, Britain:USM.

Pfeffer, J., & Salancik, G. R. (2003). *The external control of organizations: A resource dependence perspective*. Stanford: Stanford University Press.

Pierskalla, W. P. (2005). Supply chain management of blood banks. In *Operations research and health care* (pp. 103-145). US: Springer.

Polit, D. F., & Beck, C. T. (2006). The content validity index: are you sure you know what's being reported? Critique and recommendations. *Research in nursing & health*, *29*(5), 489-497.

Ponterotto, J. G. (2005). Qualitative research in counseling psychology: A primer on research paradigms and philosophy of science. *Journal of counseling psychology*, *52*(2), 126.

Prasad, B. D. (2008). Content analysis. *Research methods for social work*, *5*, 1-20.

Prasanna, T. S., & Swarnalatha, C. (2018). Increasing Organizational Commitment of Employees: By Correlation of Goal Setting, Employee Engagement and Optimism in the Organization. *IJAME*, *6*.

Qrunfleh, S., & Tarafdar, M. (2014). Supply chain information systems strategy: Impacts on supply chain performance and firm performance. *International Journal of Production Economics*, *147*, 340-350.

Randall, W. S., & Theodore Farris, M. (2009). Supply chain financing: using cash-to-cash variables to strengthen the supply chain. *International Journal of Physical Distribution & Logistics Management*, *39*(8), 669-689.

Rao Tummala, V. M., Phillips, C. L., & Johnson, M. (2006). Assessing supply chain management success factors: a case study. *Supply Chain Management: An International Journal*, *11*(2), 179-192.

Raymond, J. (2008). Benchmarking in public procurement. *Benchmarking: An International Journal*, *15*(6), 782-793.

Republic of Kenya, (2014). Economic Review report. Retrieved from: http://kenya.um.dk/en/about-kenya-new/economy-new.

Runkle, D. E., DeFusco, R. A., Anson, M. J. P., Pinto, J. E., & McLeavey, D. W. (2013).*Quantitative investment analysis*, Hoboken, N.J: Wiley.

Rushton, A., Croucher, P., & Baker, P. (2014). *The handbook of logistics and distribution management: Understanding the supply chain*. New Jersey: Kogan Page Publishers.

Ryan, G., Emmerling, R. J., & Spencer, L. M. (2009). Distinguishing high-performing European executives: The role of emotional, social and cognitive competencies. *Journal of Management Development*, *28*(9), 859-875.

Salazar, R. M. (2012). *The effect of supply chain management processes on competitive advantage and organizational performance* (No. AFIT-LSCM-ENS-12-16). Air Force Inst of Tech Wright-Patterson Afb Oh Graduate School of Engineering and Management.

Samuel, I. I. (2014). An empirical study on the effect of buyersupplier partnership on better service delivery within nongovernmental organizations: a case of world vision international. *European Journal of Business and Social Sciences*, *3*(2), 44-58.

Samuel, I. S., & Ondiek, O. (2014). *Inventory management automation and the performance of supermarkets in western Kenya.* Unpublished Master's Project.Nairobi: University of Nairobi.

Sathyamoorthi, C. R., Mapharing, M., & Selinkie, P. (2018). The Impact of Working Capital Management on Profitability: Evidence from the Listed Retail Stores in Botswana. *Applied Finance and Accounting*, *4*(1), 82-94.

Saunders, M., Lewis, P., & Thornhill, A. (2003). Selecting samples. *Research methods for business students*, *3*.

Saunders, M., Lewis, P., & Thornhill, A. (2009). Understanding research philosophies and approaches. *Research methods for business students*, *4*, 106-135.

Schiele, H. (2006). How to distinguish innovative suppliers? Identifying innovative suppliers as new task for purchasing. *Industrial Marketing Management*, *35*(8), 925-935.

Schwabe, T. (2013). *Transaction cost economics in supply chain management* Bachelor's thesis,Netherlands: University of Twente.

Sekaran, U. (2006). *Research methods for business: A skill building approach*. New York: John Wiley & Sons.

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. New York: John Wiley & Sons.

Seppälä, T. (2014). *Three perspectives on buyer-supplier relationships: a relationship assessment model for investigating buyer-supplier relationships in inter-organizational, inter-functional and intra-functional perspectives*. Denmark: Turku school of Economics and Business administration.

Shang, K. C., & Marlow, P. B. (2007). The effects of logistics competency on performance. *Journal of international logistics and Trade, 5*(2), 45-66.

Shenoy, M. & Madan, P. (2000). *Statistical Methods in Business and Social and Post Graduate Students.* London: Palgrave Macmillan.

Sikuku, D. A. V. I. D. (2014). *Effect of Enterprise Resource Planning systems on financial performance of sugar companies in Kenya.* Unpublished MSc thesis, Kakamega: Masinde Muliro University of Science and Technology

Simam, R. C., & Rotich, D. C. (2009, September). Textbook selection and approval in Kenya: Financial impact on the publisher. In *Textbooks and educational media: Local, National and Transnational identities in textbooks and educational media: 10th International Conference. Santiago de Compostela, Spain* (pp. 482-489).

Simchi-Levi, D., Kaminsky, P., Simchi-Levi, E., & Shankar, R. (2008). *Designing and managing the supply chain: concepts, strategies and case studies*. New Delhi:Tata McGraw-Hill Education.

Sinha, M. S. (2010). *Supply Chain Automation*, Unpublished PhD dissertation, Mumbai: University of Mumbai.

Sobhani, M., Malarvizhi, C. A., Al-Mamun, A., & Jeyashree, S. (2013). Strategic procurement and financial performance of Iranian manufacturing companies. *Asian Social Science*, *10*(1), 250.

Sproull, B. (2012). *The ultimate improvement cycle: maximizing profits through the integration of lean, six sigma, and the theory of constraints*. New York: CRC Press.

Staudt, F. H., Alpan, G., Di Mascolo, M., & Rodriguez, C. M. T. (2015). Warehouse performance measurement: a literature review. *International Journal of Production Research*, *53*(18), 5524-5544.

Steele, J. H. (2004). Regime shifts in the ocean: reconciling observations and theory. *Progress in Oceanography*, *60*(2), 135-141.

Stubbs, E. (2011). *The value of business analytics: Identifying the path to profitability* (Vol. 43). New York: John Wiley & Sons.

Suda, C. (2002). Gender Disparities in the Kenyan Labour Market. *Nordic journal of African studies*, *11*(3), 21-21.

Sundram, V. P. K., Ibrahim, A. R., & Govindaraju, V. G. R. (2011). Supply chain management practices in the electronics industry in Malaysia: Consequences for supply chain performance. *Benchmarking: An International Journal*, *18*(6), 834-855.

Sundtoft Hald, K., & Ellegaard, C. (2011). Supplier evaluation processes: the shaping and reshaping of supplier performance. *International Journal of Operations & Production Management*, *31*(8), 888-910.

Sweeney, E. (2013). *The people dimension in logistics and supply chain management–its role and importance*. Milan: McGraw-Hill.

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (Vol. 5). Boston, MA: Pearson.

Tang, C. S. (2006). Perspectives in supply chain risk management. *International Journal of production economics*, *103*(2), 451-488.

Thawiwinyu, K., & Laptaned, U. (2009). The impact of strategic sourcing and E-procurement on supply chain performance management. *China-USA Business Review*, *8*(8), 8-25.

Theeranuphattana, A., & Tang, J. C. (2007). A conceptual model of performance measurement for supply chains: alternative considerations. *Journal of Manufacturing Technology Management*, *19*(1), 125-148.

Trietsch, D. (2005). Why a critical path by any other name would smell less sweet. *Project Management Journal*, *36*(1), 27-36.

Trkman, P., & McCormack, K. (2009). Supply chain risk in turbulent environments—A conceptual model for managing supply chain network risk. *International Journal of Production Economics*, *119*(2), 247-258.

Tunga, M. O. (2013). *Investigating the Impact of Employees Involvement in Decision Making on Employee Productivity in the Manufacturing Sector in Kenya: A Case of Tata Chemicals Magadi,* Unpublished MSc thesis, Tanzania: The Open University of Tanzania.

Umble, M., Umble, E., & Murakami, S. (2006). Implementing theory of constraints in a traditional Japanese manufacturing environment: the case of Hitachi Tool Engineering. *International Journal of Production Research*, *44*(10), 1863-1880.

Valmohammadi, C. (2011). The impact of TQM implementation on the organizational performance of Iranian manufacturing SMEs. *The TQM Journal*, *23*(5), 496-509.

Van Der Aalst, W. M. (2013). Business process management: a comprehensive survey. *ISRN Software Engineering*, *2013*, 37.

Van Weele, A. J., & Van Raaij, E. M. (2014). The future of purchasing and supply management research: About relevance and rigor. *Journal of Supply Chain Management*, *50*(1), 56-72.

Váncza, J., Monostori, L., Lutters, D., Kumara, S. R., Tseng, M., Valckenaers, P., & Van Brussel, H. (2011). Cooperative and responsive manufacturing enterprises. *CIRP annals*, *60*(2), 797-820.

Váncza, J., Monostori, L., Lutters, D., Kumara, S. R., Tseng, M., Valckenaers, P., & Van Brussel, H. (2011). Cooperative and responsive manufacturing enterprises. *CIRP Annals-Manufacturing Technology*, *60*(2), 797-820.

Veinott Jr, A. F. (2002). Lectures in Supply-Chain Optimization. *Course Notes for MS&E*.

Veinott, E. S. (2002). *The effect of understanding and anticipated regret on decision readiness* (Doctoral dissertation, ProQuest Information & Learning), *The Sciences and Engineering*, *63*(2-B), 1063..

Vernon, R. (2017). *International investment and international trade in the product cycle.* In *International Business* (pp. 99-116). London: Routledge.

Vickery, S. K., Jayaram, J., Droge, C., & Calantone, R. (2003). The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships. *Journal of operations management*, *21*(5), 523-539.

Vintila, G., & Gherghina, S. C. (2012). An Empirical Examination of the Relationship between Corporate Governance Ratings and Listed Companies' Performance. *International Journal of Business and Management*, *7*(22), 46.

Wachira, R. W. (2013). *Supplier relationship management and supply chain performance in alcoholic beverage industry in Kenya*, Unpublished PhD dissertation, Nairobi:University of Nairobi.

Waggoner, D. B. Neely, A. D. & Kennerley, M. P. (2009). The forces that shape organisational performance measurement systems: An interdisciplinary review. *International Journal of Production Economics, 60*, 53-60.

Wagner, S. M., Grosse-Ruyken, P. T., & Erhun, F. (2012). The link between supply chain fit and financial performance of the firm. *Journal of Operations Management*, *30*(4), 340-353.

Wahdan, M. A., & Emam, M. A.(2017). The Impact of Supply Chain Management on Financial Performance and Responsibility Accounting: Agribusiness Case from Egypt. *Accounting and Finance Research, 6*(2).

Walter, A., Müller, T. A., Helfert, G., & Ritter, T. (2003). Functions of industrial supplier relationships and their impact on relationship quality. *Industrial Marketing Management*, *32*(2), 159-169.

Ward, K. (2012). *Strategic management accounting*. Routledge, Oxford: Butterworth-Heinemann.

Wickramasinghe, V., & De Zoyza, N. (2009). A comparative analysis of managerial competency needs across areas of functional specialization. *Journal of management development*, *28*(4), 344-360.

Williamson, O. E. (1979). Transaction-cost economics: the governance of contractual relations. *The journal of Law and Economics*, *22*(2), 233-261.

Williamson, O. E. (2008). Outsourcing: Transaction cost economics and supply chain management. *Journal of supply chain management*, *44*(2), 5-16.

Wisner, J. D., Tan, K. C., & Leong, G. K. (2014). *Principles of supply chain management: A balanced approach*. London: Cengage Learning.

Womack, J. P., & Jones, D. T. (2010). *Lean thinking: banish waste and create wealth in your corporation*. New Jersey: Simon and Schuster.

World Bank (2014). *Anchoring High Growth: Can Manufacturing contribute more?*. Geneva: World Bank

World Bank, W. B. (2014). *Building integrated markets within the East African Community: EAC opportunities in public-private partnership approaches to the region's infrastructure needs*. Geneva: The World Bank.

Zailani, S., Jeyaraman, K., Vengadasan, G., & Premkumar, R. (2012). Sustainable supply chain management (SSCM) in Malaysia: A survey. *International Journal of Production Economics*, *140*(1), 330-340.

Zhang, Y., & Wildemuth, B. M. (2009). Qualitative analysis of content. *Applications of social research methods to questions in information and library science*, *308*, 319.

Zhu, Q., Sarkis, J., & Lai, K. H. (2013). Institutional-based antecedents and performance outcomes of internal and external green supply chain management practices. *Journal of Purchasing and Supply Management*, *19*(2), 106-117.

Zhu, Q., Sarkis, J., Cordeiro, J. J., & Lai, K. H. (2013). Firm-level correlates of emergent green supply chain management practices in the Chinese context. *Omega*, *36*(4), 577-591.

Zikmund, W. G. (2010). *Business Research Methods*, London: Thompson South Western Publication.

Zinbarg, R. E., Revelle, W., Yovel, I., & Li, W. (2005). Cronbach's α, Revelle's β, and McDonald's ω H: Their relations with each other and two alternative conceptualizations of reliability. *psychometrika*, *70*(1), 123-133.

APPENDICES

Appendix I: Letter of Introduction

Mwangi Nancy Waithira

Jomo Kenyatta University of Agriculture and Technology,

Department of Procurement and logistics

P.O BOX 62000,

NAIROBI.

Dear Sir/Madam,

RE: Research Data on Influence of Supply Chain Optimization on Performance of Manufacturing Firms in Kenya"

I am a student pursuing a Doctorate of Philosophy degree in Supply chain management at Jomo Kenyatta University of Agriculture and Technology. I am required to undertake a research thesis as partial fulfilment for the award of the degree. My research topic is as stated above. I am kindly requesting for your assistance in making my research a success.

The purpose of this letter is therefore to request you to fill the attached questionnaire. I give you the assurance that all the data collected will be treated with utmost confidentiality and will be used for the purposes of this research only.

I look forward for a good response. Thanks in advance.

Yours Sincerely

Nancy Waithira Mwangi

Appendix II: Questionnaire

SECTION A: Demographic Data

Please tick ☐ as appropriate.

1. Kindly indicate your gender

   a) Male ☐
   b) Female ☐

2. Please indicate the highest level of education you have ever attained

   ☐
   a) Secondary level
   b) Polytechnic / College level ☐
   c) University level ☐
   d) Post graduate level ☐

3. How many years have you worked in your current position?

   ☐
   e) Less than 2 years
   f) 3 to 5 years ☐
   g) Over 5 years ☐

SECTION B: SUPPLY CHAIN OPTIMIZATION

This section aims at examining the extent to which manufacturing firms in Kenya have adopted supply chain optimization in the supply chain management. The study operationalizes supply chain optimization using inventory control, supplier management, and procurement cost optimization and supply chain automation.

1) INVENTORY CONTROL

a) Kindly rate the following costs rated to inventory management in regard to your company.

Inventory management Cost	Low	Moderate	High
Materials cost			
Fixed operational costs			
Carrying costs			
Logistics costs			
Redistribution costs			
Additional miscellaneous inventory costs			

b) This section intends to measure inventory control and to establish how it affects performance of manufacturing companies in Kenya. Kindly use the scale 5= strongly agree; 4=Agree; 3=Neutral; 2=Disagree; 1=strongly disagree. Honest response will be highly appreciated.

No	Information	5	4	3	2	1
1	Our company only stores the necessary inventory					
2	The total amount of inventory stored by our company is manageable and cost effective					
3	Our company invest a lot of financial resources in holding its stock					
4	Cost of holding stock is sometimes unbearable to the company					
5	Management of the our company sets optimized re-order and safety stock levels for inventory					
6	Our company has a fixed annual inventory budget					

c) In what other ways does inventory control impact on the performance of manufacturing firms in Kenya

_____

_____

_____

_____

_____

2. SUPPLIER MANAGEMENT

a. This section intends to measure supplier management and to establish how it affects performance of manufacturing companies in Kenya. Kindly use the scale 5= strongly agree; 4=Agree; 3=Neutral; 2=Disagree; 1=strongly disagree. Honest response will be highly appreciated.

No	Information	5	4	3	2	1
1	Our company usually conduct frequent supplier appraisal					
2	Our company conduct risk analysis for all our suppliers					
3	Our suppliers respond quickly to the demand of the company					
4	Our company work closely with all the supplier to demonstrate our worthiness as their customers					
5	Our company has a trimmed number of suppliers that can easily be management					
6	Our company has a good communication channels with all the suppliers					
7	Our company's manageable administrative cost for supplier management					

b. Explain ways in which your company manages its suppliers

_____

_____

_____

c. In what other ways does supplier management impact on the performance of manufacturing firms in Kenya

_____

_____

_____

_____

3. PROCUREMENT COST OPTIMIZATION

a) Kindly indicate the approximate number of supplier your company has.

i. Less than 50 ☐
ii. 50-100 ☐
iii. 101-200 ☐
iv. Over 200 ☐

b) Kindly indicate the rate of increase in the company's procurement costs for the last five years.

i. Less than 20 ☐
ii. 20-50 ☐
iii. 50-100 ☐
iv. Over 100 ☐

c) This section intends to measure procurement cost optimization and to establish how it affects performance of manufacturing companies in Kenya. Kindly use the scale 5= strongly agree; 4=Agree; 3=Neutral; 2=Disagree; 1=strongly disagree. Honest response will be highly appreciated.

No	Information	5	4	3	2	1
1	Our company trimmed the number of supplier to reduce cost associated with procurement					
2	Our company does business with suppliers that are able to offer a variety of stocks					
3	We have low cases of contract cancellation with our suppliers					
4	Consolidation of suppliers helps our company to cuts procurement cost					
5	Our company has adopted strategic cost management models which has significantly reduced procurement cost					
6	The company conducts early budgeting and planning for all procurement activities to management the procurement costs.					

d. Explain other ways your company has adopted to optimize its procurement costs

_____

_____

_____

e. In what other ways does procurement cost optimization impacts the firm performance

_____

_____

_____

_____

4. SUPPLY CHAIN AUTOMATION

This section intends to measure supply chain automation and to establish how it affects performance of manufacturing companies in Kenya. Kindly use the scale 5= strongly agree; 4=Agree; 3=Neutral; 2=Disagree; 1=strongly disagree. Honest response will be highly appreciated.

No	Information	5	4	3	2	1
1	Our company has adopted the use of IT supported process in supply chain management					
2	Our company has an integrated planning and execution systems					
3	All our procurement activities are done online					
4	E-procurement had led to reduction of procurement costs for our company					
5	The use of IT supported process in supply chain management simplified the procurement process for our company					

a. Explain ways your company has adopted in automating its supply chain management

_____

_____

_____

b. How has supply chain automation impacted on the firm performance for your company

_____

_____

_____

_____

5. STAFF COMPETENCE

This section intends to measure staff competence and to establish how staff competence moderates the relationship between supply chain optimization and performance of manufacturing companies in Kenya. Kindly use the scale 5= strongly agree; 4=Agree; 3=Neutral; 2=Disagree; 1=strongly disagree. Honest response will be highly appreciated.

No	Information	5	4	3	2	1
1	Our company has highly skilled procurement staff					
2	Employees in the supply chain management in our company have high academic qualification					
3	Employees in the procurement department have vast previous experience in supply chain performance					
4	Our company only hires professional supplier chain managers					
5	Our supply chain management staff are equip to handle technological change in the supply chain management					
6	Employees in the supply chain management in our company are flexible depending on the company's demand					

SECTION C: PERFORMANCE OF MANUFACTURING FIRMS

This section intends to measure performance of manufacturing companies in Kenya. Kindly use the scale **5**= strongly agree; **4**=Agree; **3**=Neutral; **2**=Disagree; **1**=strongly disagree. Honest response will be highly appreciated.

No	Information	5	4	3	2	1
1	In the last annual reports our company recorded an increase in return on equity					
2	In the last annual reports our company recorded an increase in return on Return on Asset					
3	In the last annual reports our company recorded an increase in sales growth on Asset					
4	In the last annual reports our company recorded an increase in profit margins on Asset					

SECTION D: SECONDARY DATA COLLECTION SHEET

d) Kindly indicate the following costs related to inventory management in regard to your company.

Year	**Materials cost**	**Fixed operational costs**	**Carrying costs**	**Logistics costs**	**Redistribution costs**	**Additional miscellaneous inventory costs**
2012						
2013						
2014						
2015						
2016						

e) Kindly indicate the following in relation to supplier management in regard to your company.

Year	**Supplier appraisal**	**Supplier Risk Analysis**	**Supplier Responsiveness**
2012			
2013			
2014			
2015			
2016			

f)

g) Kindly indicate the following in relation to procurement cost optimization in regard to your company.

Year	Strategic sourcing	Consolidation of suppliers	Improvement contract
2012			
2013			
2014			
2015			
2016			

h) Kindly indicate the following in relation to automation in regard to your company.

Year	**IT-supported processes**	**Integrated Planning and Execution Systems**	**E-procurement**
2012			
2013			
2014			
2015			
2016			

i) Kindly indicate the following in regard to your company.

Year	**ROE**	**ROA**	**Total Sales**	**Profit Margin**
2012				
2013				
2014				
2015				
2016				

Appendix III: List of Manufacturing Firms in Kenya

A.I Records (Kenya) Ltd	Modulec Engineering	Kenwestfal Works Ltd
	Systems Ltd	
Amedo Centre Kenya Ltd	Mustek East Africa	Kenya Power & Lighting Co.
		Ltd
AssaAbloy East Africa Ltd	Nationwide Electrical	Kenya Scale Co. Ltd/ Avery
	Industries	Kenya Ltd
Aucma Digital Technology	Nationwide Electrical	Kenya Shell Ltd
Africa Ltd	Industries Ltd	
Avery (East Africa) Ltd	Optimum Lubricants Ltd	Libya Oil Kenya Limited
Baumann Engineering Limited	PCTL Automation Ltd	Power Technics Ltd
Centurion Systems Limited	Pentagon Agencies	Reliable Electricals Engineers
		Ltd
Digitech East Africa Limited	Power Engineering	Sanyo Armo (Kenya) Ltd
	International Ltd	
Manufacturers & Suppliers (K)	Eveready East Africa	Socabelec East Africa
Ltd	Limited	
Marshall Fowler (Engineers) Ltd	Frigorex East Africa Ltd	Sollatek Electronics (Kenya)
		Limited
Mecer East Africa Ltd	Holman Brothers (E.A.)	Specialised Power Systems Ltd
	Ltd	
Metlex Industries Ltd	IberaAfrica Power (EA)	Synergy-Pro
	Ltd	
Metsec Ltd	International Energy	Tea Vac Machinery Limited
	Technik Ltd	
East African Cables Ltd	Kenwest Cables Ltd	Virtual City Ltd
Chemical Sector		
Anffi Kenya Ltd	Maroo Polymers Ltd	Imaging Solutions (K) Ltd
Basco Product (K) Ltd	Match Masters Ltd	Interconsumer Products Ltd
Bayer East Africa Ltd	United Chemical Industries	Odex Chemicals Ltd
	Ltd	
Continental Products Ltd	Oasis Ltd	Osho Chemicals Industries Ltd
Cooper K- Brands Ltd	Rumorth EA Ltd	PolyChem East Africa Ltd
Cooper Kenya Limited	Rumorth East Africa Ltd	Procter & Gamble East

		Africa
		Ltd
Beiersdorf East Africa td	Sadolin Paints (E.A.) Ltd	PZ Cussons Ltd
Blue Ring Products Ltd	Sara Lee Kenya Limited	Rayal Trading Co. Ltd
BOC Kenya Limited	Saroc Ltd	Reckitt Benckiser (E.A) Ltd
Buyline Industries Limited	Super Foam Ltd	Revolution Stores Co. Ltd
Carbacid (CO2) Limited	Crown Berger Kenya Ltd	Soilex Chemical Ltd
Chemicals & Solvents E.A. Ltd	Crown Gases Ltd	Strategic Industries Limited
Chemicals and Solvents E.A. Ltd	Decase Chemical (Ltd)	SupaBrite Ltd
Coates Brothers (E.A.) Limited	Deluxe Inks Ltd	Unilever Kenya Ltd
Coil Products (K) Limited	Desbro Kenya Limited	Murphy Chemical E.A Ltd
Colgate Palmolive (E.A) Ltd	E. Africa Heavy Chemicals	Syngenta East Africa Ltd
	(1999) Ltd	
Johnson Diversity East Africa	Elex Products Ltd	Synresins Ltd
Limited		
Kel Chemicals Limited	European Perfumes &	Tri-Clover Industries (K) Ltd
	Cosmetics Ltd	
Kemia International Ltd	Galaxy Paints & Coating	Twiga Chemical Industries
	Co. Ltd	Limited
Ken Nat Ink & Chemical Ltd	Grand Paints Ltd	Vitafoam Products Limited
Magadi Soda Company Ltd	Henkel Kenya Ltd	
	Food Sector	
Africa Spirits Ltd	Annum Trading Company	Premier Flour Mills Ltd
	Limited	
Agriner Agricultural	Aquamist Ltd	Premier Food Industries
Development Limited		Limited
Belfast Millers Ltd	Brookside Dairy Ltd	Proctor & Allan (E.A.) Ltd
Bidco Oil Refineries Ltd	Candy Kenya Ltd	Promasidor (Kenya) Ltd
Bio Foods Products Limited	Capwelll Industries Ltd	Trufoods Ltd
Breakfast Cereal Company(K)	Carlton Products (EA) Ltd	UDV Kenya Ltd
Ltd		
British American Tobacco	Chirag Kenya Limited	Unga Group Ltd
Kenya Ltd		
Broadway Bakery Ltd	E & A Industries Ltd	Usafi Services Ltd
C. Czarnikow Sugar (EA) Ltd	Kakuzi Ltd	Uzuri foods Ltd
Cadbury Kenya Ltd	Erdemann Co. (K) Ltd	ValuePak Foods Ltd
Centrofood Industries Ltd	Excel Chemical Ltd	W.E. Tilley (Muthaiga) Ltd

Coca cola East Africa Ltd	Kenya Wine Agency	Kevian Kenya Ltd
	Limited	
Confec Industries (E.A) Ltd	Highlands Canner Ltd	Koba Waters Ltd
Corn Products Kenya Ltd	Super Bakery Ltd	Kwality Candies & Sweets Ltd
Crown Foods Ltd	Sunny Processor Ltd	Lari Dairies Alliance Ltd
Cut Tobacco (K) Ltd	Spin Knit Dairy Ltd	London Distillers (K) Ltd
Deepa Industries Ltd	Highlands Mineral Water	Mafuko Industries Ltd
	Co. Ltd	
Del Monte Kenya Ltd	Homeoil	Manji Food Industries Ltd
East African Breweries Ltd	Insta Products (EPZ) Ltd	Melvin Marsh International
East African Sea Food Ltd	Jambo Biscuits (K) Ltd	Kenya Tea Development
		Agency
Eastern Produce Kenya Ltd	Jetlak Foods Ltd	Mini Bakeries (Nbi) Ltd
Farmers Choice Ltd	Karirana Estate Ltd	Miritini Kenya Ltd
Frigoken Ltd	Kenafric Industries Limited	Mount Kenya Bottlers Ltd
Giloil Company Limited	Kenblest Limited	Nairobi Bottlers Ltd
Glacier Products Ltd	Kenya Breweries Ltd	Nairobi Flour Mills Ltd
Global Allied Industries 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
Gonas Best Ltd	Nicola Farms Ltd	Re-Suns Spices Limited
Hail & Cotton Distillers Ltd	Palmhouse Dairies Ltd	Smash Industries Ltd
Al-Mahra Industries Ltd	Patco Industries Limited	Softa Bottling Co. Ltd
Alliance One Tobacco Kenya	Pearl Industries Ltd	Spice World Ltd
Ltd		
Alpha Fine Foods Ltd	Pembe Flour Mills Ltd	Wrigley Company (E.A.) Ltd
Alpine Coolers 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	Sumaria Industries Ltd	Kamba Manufacturing (1986)
		Ltd
Kenpoly Manufacturers Ltd	Super Manufacturers Ltd	Keci Rubber Industries
Kentainers Ltd	Techpak Industries Ltd	Nairobi Plastics Industries
King Plastic Industries Ltd	TreadsettersTyres Ltd	Nav Plastics Limited
KingwayTyres&Automart Ltd	Uni-Plastcis Ltd	Ombi Rubber
L.G. Harris & Co. Ltd	Wonderpac Industries 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	Alankar Industries Ltd	Rubber Products Ltd
Packaging Industries Ltd	Dune Packaging Ltd	Safepak Limited

Plastics & Rubber Industries Ltd	Elgitread (Kenya) Ltd	Sameer Africa Ltd
Polyblend Limited	Elgon Kenya Ltd	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	Springbox Kenya Ltd
Building sector		
Central Glass Industries Ltd	Kenbro Industries Ltd	Manson Hart Kenya Ltd
KarsanMurji& Company	Kenya Builders & Concrete	Mombasa Cement Ltd
Limited	Ltd	
Paper Sector		
Ajit Clothing Factory Ltd	Paper House of Kenya Ltd	General Printers Limited
Associated Papers & Stationery	Paperbags Limited	Graphics & Allied Ltd
Ltd		
Autolitho Ltd	Primex Printers Ltd	Guaca Stationers Ltd
Bag and Envelope Converters	Print Exchange Ltd	Icons Printers Ltd
Ltd		
Bags & Balers Manufacturers	Printpak Multi Packaging	Interlabels Africa Ltd
(K) Ltd	Ltd	
Brand Printers	Printwell Industries Ltd	Jomo Kenyatta Foundation
Business Forms & Systems Ltd	Prudential Printers Ltd	Kartasi Industries Ltd
Carton Manufacturers Ltd	Punchlines Ltd	Kenafric Diaries
		Manufacturers Ltd
Cempack Ltd	Conventual Franciscan	Kitabu Industries Ltd
	Friers-Kolbe Press	
Chandaria Industries Limited	Creative Print House	Kul Graphics Ltd
Colour Labels Ltd	D.L. Patel Press (Kenya)	Label Converters
	Limited	
Colour Packaging Ltd	Dodhia Packaging Limited	Modern Lithographic (K) Ltd
Colour Print Ltd	East Africa Packaging	Pan African Paper Mills (EA)
	Industries Ltd	Limited
Kenya Stationers Ltd	Elite Offset Ltd	Ramco Printing Works Ltd
Kim-Fay East Africa Ltd	Ellams Products Ltd	Regal Press Kenya Ltd
Paper Converters (Kenya) Ltd	English Press Limited	SIG CombiblocObeikanKenya
	Textile Sector	
Africa Apparels EPZ Ltd	Kenya Trading EPZ Ltd	Spinners & Spinners Ltd
FulchandManek& Bros Ltd	Kikoy Co. Ltd	Storm Apparel Manufacturers
		Co. Ltd

Image Apparels Ltd	Le-Stud Limited	Straightline Enterprises Ltd
Alltex EPZ Ltd	Metro Impex Ltd	Sunflag Textile & Knitwear
		Mills Ltd
Alpha Knits Limited	Midco Textiles (EA) Ltd	Tarpo Industries Limited
Apex Appaels (EPZ) Ltd	Mirage Fashionwear EPZ	Teita Estate Ltd
	Ltd	
Baraka Apparels (EPZ) Ltd	MRC Nairobi (EPZ) Ltd	Thika Cloth Mills Ltd
Bhupco Textile Mills Limited	Ngecha Industries Ltd	United Aryan (EPZ) Ltd
Blue Plus Limited	Premier Knitwear Ltd	UpanWasana (EPZ) Ltd
Bogani Industries Ltd	ProtexKenya (EPZ) Ltd	Vaja Manufacturers Limited
Brother Shirts Factory Ltd	Riziki Manufacturers Ltd	Yoohan Kenya EPZ Company
		Ltd
Embalishments Ltd	Rolex Garments EPZ Ltd	YU-UN Kenya EPZ Company
		Ltd
J.A.R Kenya (EPZ) Ltd	Silver Star Manufacturers	
	Ltd	
Timber Sector		
Economic Housing Group Ltd	Transpaper Kenya Ltd	Wood Makers Kenya Ltd
Eldema (Kenya) Limited	Twiga Stationers &	Woodtex Kenya Ltd
	Printers Ltd	
Fine Wood Works Ltd	Uchumi Quick Suppliers	United Bags Manufacturers
	Ltd	Ltd
Furniture International Limited	Rosewood Office Systems	Statpack IndustriesLtd
	Ltd	
Hwan Sung Industries (K) Ltd	Shah Timber Mart Ltd	Taws Limited
Kenya Wood Ltd	Shamco Industries Ltd	Tetra Pak Ltd
Newline Ltd	Slumberland Kenya	
	Limited	
PG Bison Ltd	Timsales Ltd	
Motor Vehicle Assembly and Accessories		
Auto Ancillaries Ltd	General Motor East Africa	Megh Cushion industries Ltd
	Limited	
VarsaniBrakelining Ltd	Impala Glass Industries Ltd	Mutsimoto Motor Company
		Ltd
Bhachu Industries Ltd	Kenya Grange Vehicle	Pipe Manufacturers Ltd
	Industries Ltd	
Chui Auto Spring Industries Ltd	Kenya Vehicle	Sohansons Ltd
	Manufacturers Limited	
Toyota East Africa Ltd	Labh Singh Harnam Singh	Theevan Enterprises Ltd

	Ltd	
Unifilters Kenya Ltd	Mann Manufacturing Co.	
	Ltd	
Metal and Allied		
Allied Metal Services Ltd	Morris & Co. Limited	KhetshiDharamshi& Co. Ltd
Alloy Street Castings Ltd	Nails & Steel Products Ltd	Nampak Kenya Ltd
Apex Street Ltd Rolling Mill	Orbit Engineering Ltd	Napro Industries Limited
Division		
ASL Ltd	Rolmil Kenya Ltd	Specialized Engineer Co. (EA)
		Ltd
ASP Company Ltd	Sandvik Kenya Ltd	Steel Structures Limited
East Africa Foundry Works (K)	Sheffield Steel Systems Ltd	Steelmakers Ltd
Ltd		
Elite Tools Ltd	Booth Extrusions Limited	Steelwool (Africa) Ltd
Friendship Container	City Engineering Works	Tononoka Steel Ltd
Manufacturers	Ltd	
General Aluminum Fabricators	Crystal Industries Ltd	Welding Alloys Ltd
Ltd		
Gopitech (Kenya) Ltd	Davis &Shirtliff Ltd	Wire Products Limited
Heavy Engineering Ltd	Devki Steel Mills Ltd	Viking Industries Ltd
Insteel Limited	East Africa Spectre	Warren Enterprises Ltd
	Limited	
Metal Crown Limited	Kens Metal Industries Ltd	
Pharmaceutical and Medical Equipment		
Alpha Medical Manufacturers	Madivet Products Ltd	KAM Industries Ltd
Ltd		
Beta Healthcare International	Novelty Manufacturing Ltd	KAM Pharmacy Limited
Limited		
Biodeal Laboratories Ltd	Oss. Chemie (K)	Pharmaceutical Manufacturing
		Co.
Bulks Medical Ltd	Dawa Limited	Regals Pharmaceuticals
Cosmos Limited	Elys Chemical Industries	Universal Corporation Limited
Laboratory & Allied Limited	Gesto Pharmaceutical Ltd	Pharm Access Africa Ltd
Manhar Brothers (K) Ltd	GlaxoSmithkline Kenya	
	Ltd	
Leather Products and Footwear		
Alpharama Ltd	C & P Shoe Industries Ltd	East Africa Tanners (K) Ltd

Bata Shoe Co. (K) Ltd	CP Shoes	Leather Industries of Kenya
		Limited
New Market Leather Factory Ltd	Dogbones Ltd	