

**LEAN SUPPLY CHAIN MANAGEMENT PRACTICES AND ORGANIZATIONAL
PERFORMANCE OF LARGE SCALE MANUFACTURING FIRMS IN KENYA**

BY

Mutua Musyoka

D61/72492/2014

**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTERS OF
BUSINESS ADMINISTRATION, SCHOOL OF BUSINESS**

UNIVERSITY OF NAIROBI

NOVEMBER, 2015

DECLARATION

I declare that this Research Project is my original work and it has never been presented to the University of Nairobi or any other university for any degree or any other academic award.

Signature.....

Date.....

Name: MUTUA MUSYOKA

Registration Number: D61/72492/2014

This research Project has been submitted with my approval as the university supervisor.

Signed

Date

Mr. Ernest O .Akelo

Department of Management Science.

School of Business.

University of Nairobi.

ACKNOWLEDGEMENT

First I give thanks to the Almighty God for the gift of life and for giving me the skills, tenacity, resilience and the will to be able to complete this project. I have relied on you Mighty God for your guidance, strength, protection and resources to accomplish this project.

My sincere gratitude goes to my project supervisors, Mr. Ernest Akelo and Dr Peterson Obara Magutu for their guidance, support and patience throughout my research work and for their astute comments, criticism and insights, which kept me focused on the project. They were always available and ready to assist.

To all those from manufacturing companies in Nairobi who made time out of their busy schedules to respond to my interview questions. The study would not have been possible without your cooperation.

I also register my sincere appreciation to my Mother, Pastor Muli, Family members for selfless support, my friends and my MBA colleagues.

To my Employer and colleagues at my workplace place; „Thank you for giving me the chance to pursue my studies and accommodating my tight schedule“. hence contributing towards completion of the project.

DEDICATION

I wish to dedicate this work to my daughter Anita and my family for their unwavering support and tireless sacrifices of their precious family time throughout the entire degree program.

To my Mother and Pastor Muli, my grandparents for their inspiration and steadfast prayers and encouragement toward completion of my studies have indeed been answered.

ABSTRACT

The lean supply chain practices have been revolutionized, leading to a number of success stories from various companies. These companies join a growing number of businesses in a myriad of industries that have revamped their operations to be leaner and more efficient, all to a variety of benefits and to overcome the critical barriers in the lean supply chain practices every party involved in the supply chain are under pressure to reduce and balance their costs, time and inventories in order to continue to be profitable while still meeting their customers' demands. The best way for them to achieve this is to implement lean supply chain management (Borac, Milovanovic & Andjelkovic, 2010).

The objective of the study was to explore lean supply chain management practices in the manufacturing sector in Kenya. The study adopted a survey study design and targeted large scale manufacturing companies in Kenya. A questionnaire was used as the research instrument and data was collected and analyzed.

Large scale Manufacturing firms in Kenya that were surveyed have exhibited some evidence of adoption of lean supply chain practices. The study shows that the main reasons for adoption for these practices were to reduce cost, profitability and long term survival of the firm. The study recommends that as much as the survey provided information on lean supply chain practices among manufacturing firms in Kenya, the management of the of these firms needs to invest more on skill and knowledge acquisition on the management of the lean supply chain.

They also need to bench mark themselves with world class organization practicing lean supply. The organization should also try improving the relationship they have with their suppliers. As well as adoption of flexible lean supply chain practices, this will help to cope with the constant changing business environment.

TABLE OF CONTENTS

DECLARATION.....	ii
ACKNOWLEDGEMENT.....	iii
DEDICATION.....	iv
ABSTRACT.....	v
LIST OF TABLE.....	vii
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background of the Study.....	1
1.1.1 Lean Supply Chain Management Practices	2
1.1.2 Organizational Performance	3
1.1.3 Large scale manufacturing firms in Kenya.....	4
1.2 Statement of the Problem	5
1.3 Objectives of the Study	8
1.4 Value of the Study.....	8
CHAPTER TWO: LITERATURE REVIEW.....	9
2.1 Introduction	10
2.2 Overview of Lean Concept	10
2.3 Component of Lean Supply Chain Management Practices.....	11
2.3.1 Lean supplier’s practices	12
2.3.2 Lean procurement practices.....	12
2.3.3 Lean warehousing practices.....	13
2.3.4 Lean transportation practices.....	13
2.3.5 Lean customers practices.....	13
2.3.6 Lean manufacturing practices.....	14
2.3.7 Lean Transformation Practices	14
2.4 Effects of Lean Supply Chain Management Practices	14
2.4.1 Waste Elimination	15
2.4.2 Workplace and System Organization	15
2.4.3 Problem Search and Solving.....	15
2.4.4 Strong and Effective Relationship.....	16
2.4.5 Production of Exact Customer Need Only When Needed	16

2.4.6 Just-In- Time (JIT).....	17
2.5 Challenges in Adoption of Lean Supply Chain Management Practices	17
2.6 Effect of Lean Supply Chain Management Practices on Organizational Performance	18
2.7 Conceptual Framework	21
CHAPTER THREE: RESEARCH METHODOLOGY	22
3.1 Introduction	22
3.2 Research Design.....	22
3.3 Target Population	22
3.4 Sampling Design	24
3.5 Data Collection Instruments.....	26
3.6 Data Analysis Techniques.....	26
Introduction	27
4.2 Data collection and Population studied.....	27
4.3 General information	27
4.4 Lean supply chain management practices.....	29
4.5 Effects of lean supply chain management practices on organizational performance	33
4.6 Challenges of supply chain management practices.....	35
4.7 Pearson Correlation Analysis	37
4.8 Regression Analysis	38
CHAPTER FIVE: SUMMARY , CONCLUSION AND RECOMMENDATION	43
5.1 Introduction	43
5.2 Summary of the Findings	43
5.2.1 Adoption of lean supply chain management practices	44
5.2.2 Effect of lean supply chain management practices on organizational performance	44
5.2.3 Challenges faced in adopting lean supply chain practices	45
5.3 Conclusion.....	45
5.4 Recommendations	46
5.5 Implications of the study on policy, Theory and practice	47
5.6 Limitations of the Study.....	47
5.7 Areas of further Research.....	48
REFERENCES.....	49

APPENDICES	54
Appendix I: Introduction Letter	54
Appendix I: Questionnaire	55

LIST OF TABLES

Table 3.1: Sampling schedule	18
Table 4.1: Lean supply chain management practices.....	22
Table 4.2: Effect of lean supply chain management practices.....	26
Table 4.3: Challenges of lean supply chain practices.	28
Table 4.4: Pearson correlation coefficients matrix.....	29
Table 4.5: Regression model summary.....	31
Table 4.6: Analysis of variance.	32

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The adoption of innovative management practices, such as supply chain management and lean thinking, from a manufacturing context is based on continuous processes and relationships. Competing successfully in any business environment today requires companies to become much more involved in how their suppliers and customers do business. As global competition increases, making products and services that customers want to buy means that businesses must pay close attention to where materials come from, how their suppliers' products and services are designed and assembled, how finished products are transported and stored and what customers or end-product users are really asking for (Stehn, 2008).

Supply Chain Management is a set of synchronized decisions and activities utilized to efficiently integrate suppliers, manufacturers, warehouses, transporters, retailers, and customers so that the right product or service is distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying customer service level requirements (Jaskanwal, Deep & Rajdeep, 2013).

Lean is a philosophy that seeks to shorten the time between the customer order and the shipment to the customer by eliminating waste. Lean supply chain is not exclusively for those companies who manufacture products, but by business who want to streamline their processes by eliminating waste and non-value adding activities. Companies have a number of areas in their supply chain where waste can be identified, such as time, cost or inventory (Myerson, 2012).

1.1.1 Lean Supply Chain Management Practices

Lean supply chain Management practices has been defined as a set of activities undertaken by an organization to promote effective management of its supply chain, Li (2010) proposed SCM practices as a multi-dimensional construct that includes both upstream and downstream sides of the supply chain.

The main tool that is used by organizations to adapt to changes is the Lean management philosophy. It has been defined as a systematic approach to enhancing value to the customer by identifying and eliminating waste of time, effort and materials through continuous improvement, by following the product at the pull of the customer, in pursuit of perfection (Lassale, 2005).

Lean has become a strategic method for gaining competitive advantage and even for survival, for manufacturers, retailers and wholesalers. According to Lassalle (2005), the best practices in lean supply chain management include: demand management that involves providing products and services when requested by the customer, cost and waste reduction, Process standardization which enables continuous flow, industry standardization, and cultural change and cross enterprise collaboration.

Buzby (2008) defines lean as a systematic approach to identifying and eliminating waste (non-value added activities) through continuous improvement by following the product at the pull of the customer in pursuit of perfection. Simply lean means to create more value for customers with fewer resources, that is, maximizing customer value while minimizing waste. Womack & Jones (1990) argue that lean can be applied not only in manufacturing context, but also in every other organizational level.

Holweg (2007) explains lean as the previous name of just-in-time manufacturing. According to Peterson (2009), Just-in-time (JIT) is a philosophy of manufacturing based on planned elimination of all waste. It encompasses successful execution of all operations activities required to produce a final product from design engineering to delivery.

Lean supply chain management practice is an approach where relationship with suppliers is managed based on long-term perspective so as to eliminate waste and add value. It is based on Japanese manufacturing concept pioneered by Toyota. Toyota production system is generally recognized as the best model of lean operations (Leenders 2006).

1.1.2 Organizational Performance

Organizational performance refers to how well an organization meets its financial goals and market criteria (Li, Rao, Ragu-Nathan & Ragu-Nathan, 2005). Organizational performance is how well an organization achieves its market oriented goals as well as the financial goals.

In general, organizational performance can be measured from both financial and non-financial criteria (Demirbag, Koh, Tatoglu & Zaim, 2006). The measures of financial goals include profit, return on investment, sales growth, business performance, and organization effectiveness (Venkatraman & Ramanujam, 1986). On the other hand, the measures of non-financial criteria are innovation performance and market share (Demirbag et al. 2006), quality improvement, innovativeness and resource planning (York & Miree, 2004).

Organizational performance is also being studied from the perspective of SCM organizational performance which includes increased sales, organization-wide coordination and supply chain integration (Koh et al., 2007; Petrovic-Lazarevic, Sohal & Baihaiqi, 2007). Operational and

organizational performance dimensions may also include innovation and R&D performance (Prajogo & Sohal, 2003; Singh & Smith, 2004).

Many empirical studies have examined the relationship between supply chain management (SCM) and organizational performance (Lee, Lee & Schniederjans, 2011; Zacharia, Nix & Lusch, 2009; Chong, Chan, Ooi & Sim, 2010; Wong & Wong, 2011). The relevant items adapted to measure organizational performance includes higher sales, higher accuracy in costing, and improved coordination between departments, improved coordination with suppliers, and improved coordination with customers (Koh 2007).

Any organizational initiative, including supply chain management should ultimately lead to enhanced organizational performance (Li 2006).The lean supply chain leads to People involvement: hence engaging every employee to root out waste, eliminate problems and make improvements, Short lead time resulting to continuous flow of people, materials, equipment and process to ensure that customers receive defect-free products that are pulled through the supply chain at the right place, at the right time in the right quantity.

1.1.3 Large scale manufacturing firms in Kenya

The large scale manufacturing is very important sector in Kenya as it makes a substantial contribution to the country's economic development. The sector is one of the key economic pillar in the vision 2030 geared to make the nation a middle level income country by the year 2030.Kenya has a large manufacturing firm serving both the local market and exports to the East African region and the rest of the world. The sector is expected to play a key role in the growth of the Kenyan economy. It is dominated by subsidiaries of multinationals. Kenya's manufacturing sector is among the key productive sectors identified for economic growth and

development because of its immense potential for wealth, employment creation and poverty alleviation.

According to KAM there are 700 registered manufacturing firms in Kenya of which 80% of the 700 members are based on Nairobi while the rest are spread across other cities within the country, these are classified as large, medium and small scale manufacturing firms according to annual average turnovers made. The KAM defines large scale manufacturers as those firms with turnover in excess of two hundred and fifty million Kenya shillings, while medium scale those firm turnover between twenty million and two hundred and fifty million. , small scale firm have turnover between ten million and twenty million Kenya shillings (KNBS, 2014).

Manufacturing is one of the key sectors expected to deliver the economic growth rate per annum for Kenya, by increasing and sustaining its contribution to Gross Domestic Product (GDP). The sector will also support the country's social development agenda through creation of jobs, generation of foreign exchange, and attracting local and foreign investment.

1.2 Statement of the Problem

In the manufacturing process, there is much waste that can affect the profits of the business. In recent years, there has been considerable interest in lean philosophy by researchers especially in the manufacturing sector. For instance, Agus & Hajinoor (2012) sought to examine the relationship of lean production of SCM to product quality improvement and business performance in the Malaysian manufacturing industry. The findings show that there is a strong association between lean production, product quality performance and business performance

The diffusion of lean has also generated considerable interest among researchers who were focusing on the implications of lean on operations management (Cooney, 2002), competitive

advantage (Lewis, 2000). A purchasing department can take on both the active and effective role of applying the lean procurement principles as much as possible to improve efficiency, competitiveness and ensure organization's profitability (Larson, 2008)

Study carried out by Jones, (2010) focused entirely on the application of lean and agile processes in supply chain management. In his study that looked at carpet and electronic manufacturing companies, he identified that by using lean and agile systems, it is essential to remove system-induced uncertainty. However, this study does not explain the effect of adopting lean supply chain in the performance of organizations. Lean excellence is a coordinated response to today's highly competitive environment (Williams, 2008). As the success of lean has become more widely known, it is being adopted by many industries and is spreading into many other areas of the value chain.

Locally Wanjihia (2011) did a study in the manufacturing sector. He examined innovation management in this sector and found that more investment need to put in innovation .According to Wanjiku (2013) in her study lean supply chain management in manufacturing firms in Kenya she come to conclusion that Lean supply chain practices are evident among the manufacturing firms in Kenya, but the study didn't link the lean supply chain management in manufacturing companies to organizational performance.

Kabuga (2010) in her study lean procurement methodologies used by large scale manufacturing firms in Nairobi, she examined the methodologies used in implementing lean procurement by large scale firms in Nairobi. she conclude that It will be necessary to carry out a study featuring other areas outside Nairobi in order to find out if there are any similarities and differences in the findings of this study.

Achieng (2012) in her thesis on lean supply chain management practices at public universities in Kenya explored the application of lean SCM practices where she identified that human resource practices among Public Universities have not been fully linked to lean supply chain management practices due to inappropriate policies of Public Universities. This study however, limits itself to the application of lean SCM practices and not the impact of using lean SCM on organizations performance.

Study carried out by Omondi (2008) focused entirely on the application of lean thinking to business process management case study of Kenya revenue authority; in his study he explored application of lean thinking to improve service delivery and tax collection. The study was limited to small scale data hence he suggested for further study in a large scale data to be able to have general conclusion on application on lean SCM on organizations performance.

While many researchers have studied lean in manufacturing industry, agile and lean supply chain management practices. However, little information exists that discuss the impact of lean supply chain on organization performance hence, the need to carry out this study. Therefore the study will seek to answer the questions: To what extent is lean supply chain management practiced in manufacturing companies in Kenya and what is the impact of lean supply chain management on organizational performance? What challenges do manufacturing companies in Kenya face in implementation of lean supply chain management?

1.3 Objectives of the Study

The general objective in this study is to determine the impact of lean supply chain management on organizational performance. Specific objectives include;

- i. To determine the lean supply chain management practices used by large scale manufacturing firms in Kenya.
- ii. To establish challenges faced in implementation of lean supply chain management practices in large scale manufacturing firms in Kenya.
- iii. To establish the effect of lean supply chain management practices on the performance of large scale manufacturing firms in Kenya.

1.4 Value of the Study

This study will be useful to the manufacturing industries as it will help them to know how to apply lean supply chain management in their processes which will lead to organizational performance. It will also bring into their awareness of the challenges that they are to meet and plan how to mitigate them.

The government will get to benefit in this study by recommending lean supply chain management to government agencies and recommend the use of such systems to help in achieving the vision 2030.

Managers of different companies will use this study to adopt ways of reducing cost and eliminate non-value adding activities to improve on their supply chain so as to improve on overall organizational performance.

Researchers will use this study for reference on future research problems. The study adds to the existing knowledge on lean supply chain management. Therefore researchers can use it to base their argument and increase their knowledge on how lean supply chains work

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter includes a review of the various studies that have been conducted by various researchers and the extent to which lean supply chain is practiced, its impact on organizational performance as well as challenges in its adoption. This chapter also provides the research gaps identified and the relationship between lean supply chain and organizational performance. These reviews are used to develop conceptual frame work.

2.2 Overview of Lean Concept

Lean manufacturing, lean enterprise or lean production often simply lean, is production practice that considers the expenditure of resources for no any other goal other than the creation of value for the end customer and to reduce defective products, and thus a target for waste elimination. Working from the perspective of the customer who consumes a product or service value is defined as any action or process that a customer would be willing to pay for.

Lean principles are derived from the Japanese manufacturing industry. The term was coined by Krafcik in his 1988 article, *Triumph of the lean production system* (Holweg 2007). For many, lean is a set of tools that assist in the identification and steady elimination of waste. As waste is eliminated; quality improves while production and cycle time and cost are reduced.

Simply, lean means to create more value for customers with fewer resources, in other words, the fundamental ideas is to maximize customer value while minimizing waste. The eight types of waste highlighted in TPS that include waste from overproduction, waiting, conveyance, over processing, excess inventory, unnecessary movement, defects and unused employee creativity, and overproduction (Liker, 2004). Wu and Wee (2009) concludes that the term lean means a

series of activities or solutions to eliminate waste, reduce non-value added (NVA) operations, and improve the value added (VA). This VA and NVA concept were derived mainly from Toyota Production System (TPS).

A lean organization understands customer value and focuses its key processes to continuously increase it. The ultimate goal is to provide perfect value to the customer through a perfect value creation process that has zero waste. To make lean a success, the level of thinking need to be changed in order to focus on management from optimizing separate technologies, assets, and vertical departments to optimizing the flow of products and services through entire value streams that flow horizontally across technologies, assets, and departments to customers (Lean Enterprise Institute, 2009). Eliminating waste along entire value streams, instead of isolated points, creates processes that need less human effort, less space, less capital, and less time to make products and services at far less costs and with much fewer defects, compared to traditional business systems.

2.3 Component of Lean Supply Chain Management Practices

Lean Supply chain practices involves a set of organizations directly linked by upstream and downstream flows of products, services, finances and information that collaboratively work to reduce cost and waste by efficiently and effectively pulling what is needed to meet the needs of the individual customer. Lean supply chain management comprises various elements that are integrated for efficiency and effectiveness of the organization. Both elements should be present for any lean enterprise firm in the modern context. Competitive firms need to understand and measure the extent to which each element adds value in the supply chain (Kallrath & Maindl, 2006). Components of lean supply chain include; lean suppliers, lean procurement, lean

manufacturing, lean warehousing, lean transportation, lean customers and lean transformation practices.

2.3.1 Lean supplier's practices

Suppliers using lean are able to respond to changes, according to Lambert, (2012). Their prices are generally lower due to the efficiencies of lean processes, and their quality has improved to the point that incoming inspection at the next link is not needed. Lean suppliers deliver on time and their culture is one of continuous improvement (Jusko & Jill 2007). To develop lean suppliers, organizations should include suppliers in their value stream. They should encourage suppliers to make the lean transformation and involve them in lean activities. This will help them fix problems and share savings. In turn, they can help their suppliers and set continually declining price targets and increasing quality goals (Halldorsson, Kotzab, Mikkol, & Skjoett-Larsen, 2007). Some lean procurement processes are e-procurement and automated procurement

2.3.2 Lean procurement practices

It involves e-procurement and automated procurement. E-procurement conducts transactions, strategic sourcing, bidding, and reverses auctions using Web-based 12 applications (Kallrath & Maindl, 2006). Automated procurement uses software that removes the human element from multiple procurement functions and integrates with financials (Harland, 2012). The key to lean procurement is visibility. Suppliers must be able to "see" into their customers' operations and customers must be able to "see" into their suppliers' operations. Lean procurement practices help to achieve the following: Remove the obstacles to the free flow of information to a supply chain; Create real-time visibility into inventory in motion; change supply chain from —push to —pull consumption based replenishment models.

2.3.3 Lean warehousing practices

It means eliminating non-value added steps and waste in product storage processes (Lambert, 2012). Typical warehousing functions are; receiving, storing, replenishment, picking, packing and shipping (Harland, 2012).

2.3.4 Lean transportation practices

According to (Cooper, 2000) lean transport include; core carrier programs, improved transportation administrative processes and automated functions, optimized mode selection and pooling orders, combined multi-stop truckloads, cross docking, right sizing equipment, import/export transportation processes and inbound transportation and backhauls. According to Lander and liker (2007), an important feature of TPS or lean system is its applicability to any industrial, any services and any context. The claim of the universality of lean, although criticized, is based on the idea that the whole principle behind TPS is comprehensive, very simple and even common sense. The sound relation between transportation and JIT system stems from two things, the pivot role of transportation function in the manufacturing chain and JIT requirement regarding time, flow and delivery.

2.3.5 Lean customers practices

This involves establishing effective partnerships with customers always seeking methods of continuous improvement in the total supply chain to reduce costs. Lean customers expect value from the products they purchase and provide value to the consumers who they interact with (FAO, 2007). Lean approach encourages a rapid response to the customers ever changing demands with focus on mass customizations rather than mass production. Lean systems make the work flow more efficient, productive, and flexible to changes in requirements (Simone & Kleiner, 2004).

2.3.6 Lean manufacturing practices

The practice focuses either on conceptual philosophy or practical manufacturing techniques and characteristics (Abdulmalek, 2006).the latter provides the basis of lean manufacturing practices. The concept can only be employed upon acknowledgement of the lean principles such as: value, value stream, flow, pull, perfection and respect of the people which are practiced to achieve elimination of waste (Papadopoulou & Ozbaryrak, 2005).The practices can only apply be employed upon acknowledgement of the lean principles such as; value, value stream, flow, pull, perfection and respect for people which are practiced to achieve elimination of waste (huang 2012)

2.3.7 Lean Transformation Practices

According to (Huang, 2012) lean transformation is an integrated activity in SCM designed to achieve high volume flexible transformation using minimum inventories of raw materials. It's based on the premise that nothing will be produced until is needed. The practices is derived from the need to increase product flow velocity through the elimination of all non-value added activates(Mackel and Nair,2010).Its implement throughout the manufacturing chain with the signal moving backward from the customer all the way backward from the customer all the way back to the most basic raw materials(jamberkar,2008).

2.4 Effects of Lean Supply Chain Management Practices

Lean principles are implemented through some practices which are activities undertaken to bring about improvements in organization, the lean practices are supported by set of tools and techniques (Dean & Owen, 1998).The identified lean practices are: sourcing of customer need information, value stream analysis (VSA), end customers focus, waste elimination, workplace organization, strong and effective relationship, production of exact customer needs only when needed, problem search and problem solving (Wee and Wu, 2009).

2.4.1 Waste Elimination

The main aim of lean supply chain management is identification and elimination of waste from the whole value chain and supply chain management (Cudney and Elrod, 2011). Most of the activities on the implementation of lean revolve around waste elimination. Shah and Ward (2007) suggests that waste can be eliminated by analysis and optimization of transportation method and machining process, adoption of appropriate and improved technology, and proper organization of facilities within the system.

2.4.2 Workplace and System Organization

Workplace organization is proper arrangement of machines, tools and other facilities in the workplace in order to ensure easy and quick access, occupation of less space and avoid obstructions to workflow or material flow. An unorganized workplace or system results in mistakes and delays, while workplace organization which helps to ensure production flow is an important activity towards process improvement (Julien and Tjahjono, 2009). Workplace organization is a simple, but powerful practice in the implementation of lean. It helps to avoid different kinds of wastes in a system, like waste due to waiting, unnecessary transportation and movements.

2.4.3 Problem Search and Solving

Continuous search for problems and proffering solutions to the problems are practices in lean, without boundaries and time limit. The lean approach performs in the exposure of problems within a system, so always in search for problems. Efforts to identify major causes of problems and their solutions in lean approach involves collection of information on overall equipment effectiveness (OEE), working time and process of operations, cycle time and first time through (FTT) from current state map (Julien and Tjahjono, 2009). Therefore, through the use of lean in

the supply chain then organizations can be able to identify problems before they happen and prevent them or control their occurrence.

2.4.4 Strong and Effective Relationship

Emphasis on strong and effective relationships among the players in the value creation activities is one of the major distinguishing factors of lean approach (New and Ramsay, 1997). With strong and effective relationships in a system, various activities can be easily aligned and coordinated. Also, delays, distortions and other adverse effects of arms' length relationship could be avoided.

This kind of relationship requires that players are involved, in long-term contract, and sharing information system that links them together (New and Ramsay, 1997), this will ensure waste and cost incurred due to delayed supply chain practices are totally eliminated in the supply chain.

2.4.5 Production of Exact Customer Need Only When Needed

This lean practice distinguishes lean approach of management from traditional way of management. Core idea of lean approach requires that only the kind of units needed by the customers should be produced at the time of need in the right quantity, as this helps to avoid unnecessary inventories (Shah and Ward, 2007). By avoiding the push demand strategy and adopting the demand pull strategy ensures that we produce as per customer demand and at time of requirement so by using this practice in supply chain management waste from producing products from push demand like cost of storing these products in warehouses will be eliminated.

2.4.6 Just-In- Time (JIT)

JIT is a technique in a flow process where the needed parts, components or materials are delivered to the point of need only at the time of need and only the amount needed is delivered (Plenert, 2010). It is a technique in lean which ensures that materials and components are not stocked on the shop floor or other storage areas when they are not required. JIT which advocates for zero inventories is based on pull production, top management and employee involvement, uninterrupted flow, elimination of wastes, supplier relations, and total quality control (Pheng and Chuan, 2001).

2.5 Challenges in Adoption of Lean Supply Chain Management Practices

Building and managing a lean supply chain poses a challenge owing to the highly interconnected nature of the activities in the supply chain. Reviewing the literature regarding lean evolution it seems that many shortcomings of lean come up. Hines (2004) established some challenges which include that are common in adoption and implementation of lean supply chain management.

Lack of contingency is a factor connected with the major focus of lean implementation on the shop floor processes and neglecting the other important factors in the external environment, like creating tiers with the suppliers. The fear of losing a customer forces the manufacturer to keep higher safety stock with build-to-forecast approach and the inventory is waiting to be sold, which progressively increase the costs.

Managers encounter many impediments for improving productivity in their firms and supply chains. Most difficult to overcome is organizational resistance to change and finding the proper means of dealing with it (Mefford 2009). The lean approach requires changes not only in the organizational practices but in the philosophy of management that guides it. The transition from

decision making to being a coach for the employees is the lesson that firms need to master in their attempt to adopt lean approach.

A challenging job for the managers in all of the studied companies in the research of Czabke (2008) turns out to be the effective communication of the vision and plan for lean implementation to the workforce. People are resistant to changes on their working place even if the management is dedicated enough efforts in training programs and explaining the values of the new practice.

Cost and profit allocation in many organizations is challenges in adopting and implementing lean supply chain management. The lean supply chain threatens to blur the frontiers between companies, due to its increased levels of integration and cooperation (Ross, 2010). Globalization of supply chains is still a challenge threatening lean supply chain management. The globalization trend is somehow at odds with lean principles. Womack and Jones (1996) contend that for true lean manufacturing the manufacturing facilities would need to be located closer to the customers and keep transportation links relatively reduced.

2.6 Effect of Lean Supply Chain Management Practices on Organizational Performance

Enterprises that embed lean techniques into core business processes and institutionalized them into their own and their supply chain cultures can expect significant benefits. According to an Ross survey on Lean SCM practices, all organizations undertaking a lean SCM initiative exceeded expectations relating to reductions in inventory, assets, and product development costs, while increasing product quality, channel flexibility, and customer service.

Achieving such results requires companies to grow a culture of lean both inside and outside organizational boundaries, devise methods to quantify existing and new improvement projects,

gain deeper commitment and collaboration of channel partners, and apply information technologies that enable synchronization and visibility of channel network demand planning and demand-pull mechanisms, optimization of channel inventory, and the most appropriate usage of outsourcing for warehousing, transportation and logistics (Ross, 2010).

The objective of lean supply chain management is to eliminate wastes, the non-value-added activities, existing in the flow of the overall value stream in the supply chain. Through lean logistics approaches and information technology, lean supply chain management has a series of impact all geared towards organization improvement in terms of performance, According to Jung (2007) lean supply chain management leads to decreased inventory level, shorten lead time, lower costs, deliver stable quality and achieve higher customer satisfaction.

Elimination of waste is one of the key aims of manufacturing companies. In a broad sense, waste can be found from all aspects of business activities. It can take the form of time, inventory, redundant processes and defects. Coordinated supply chain processes ultimately lead to such an improvement according to Lu (2011). When costs are reduced, assuming the output of supply chain remains the same the supply chain efficiency improves and cost to serve reduces.

Inventory planning is a key priority for Lean Supply Chain Management. Inventories are specifically used to synchronize product flows and to mitigate the effect of demand and supply variability. This approach increases added value contributed by operations and results in more stable capacity utilization as well as in reduced average levels of inventory across the supply chain. However, to follow the guiding lean principle of avoiding waste, excessive stock must be eliminated wherever it occurs.

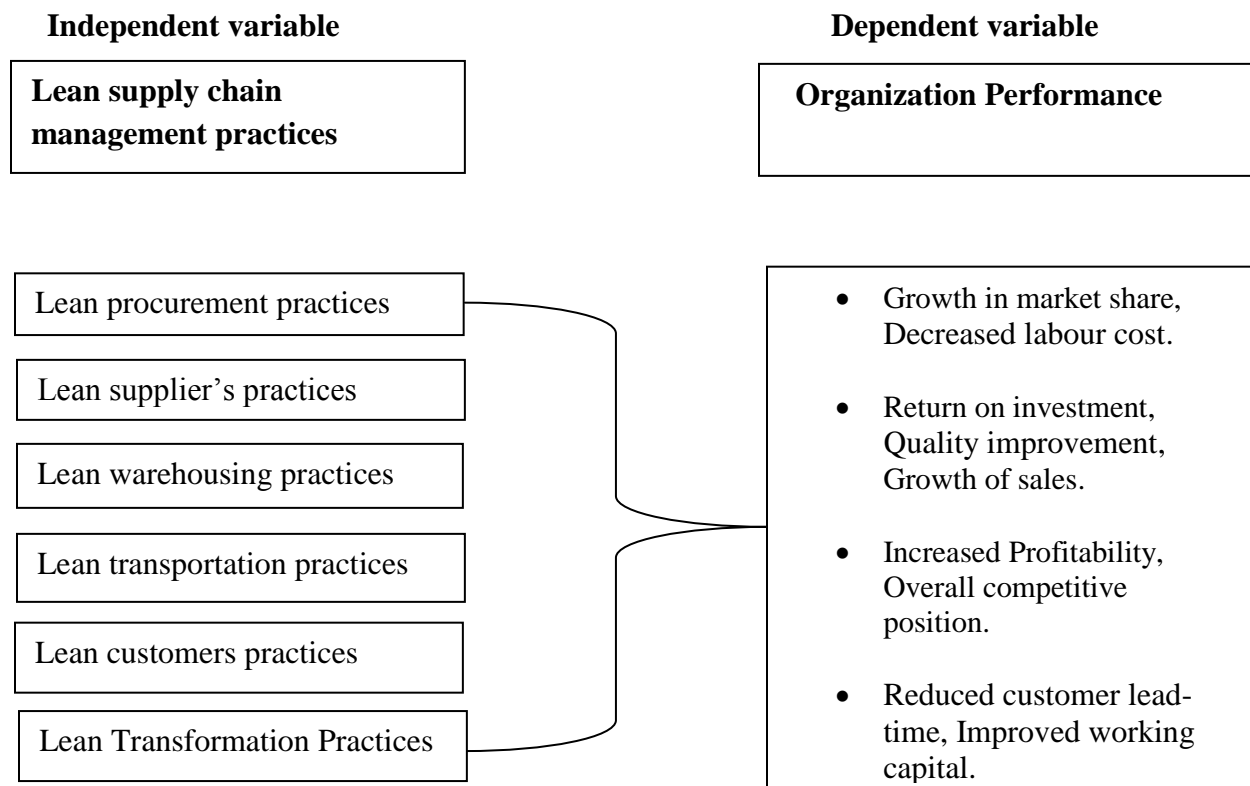
Proper articulation of lean supply chain management and manufacturing process leads to increased sales performance (Plenert, 2010). Plenert gives a scenario of Staples Inc. in US that is ran a supply chain transformation initiative called summit, which strongly focuses on transforming both culture and process. Over a period of three years the company was able to reduce inventory turns from 4.9 to 5.6 by applying lean initiatives to their supply chain process. In addition, sales increased by 11 percent.

By pursuing the six lean competencies namely; Lean improvement tools, demand management, lean supply chain management implementation, cross-enterprise collaboration, lean supply chain technologies and process standardization, companies realize three success factors namely waste reduction, stream of value to customers and continuous improvement. According to Ross (2010), application of the suite of lean tools enables cross-channel businesses to effectively pursue waste reduction at all supply chain levels.

2.7 Conceptual Framework

A conceptual framework, according to Orodho (2009) is a diagrammatic representation of interrelation between study variables. In the context of this proposal study, the anticipated interrelationship is depicted in figure 2.1.

Figure 2.1: Conceptual Framework



Source: Own compilation (2015)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology that was applied in conducting the study. It discusses the research design, target population, sampling design and sample size, data collection procedures and instrument, determination of reliability and validity as well as data analysis techniques.

3.2 Research Design

This study adopted a descriptive research design to examine the impact of lean supply chain practise on organizations performance. A survey research design is a way of collecting information or administering questionnaires to a sample of individuals (Orodho, 2003). Since this study covered several large scale manufacturing firms in Kenya, a survey design was best suited. According to Chandra (2004) surveys are relatively inexpensive. Surveys are useful in describing the characteristics of a large population and no other method of observation can provide this general capability. Surveys provide flexibility at creation phase in deciding how decisions were administered. It also enables to generalize the findings to a larger population.

3.3 Target Population

The study targeted the large scale manufacturing firms in Kenya. From the Firms the study will target production, procurement and logistics departments. According to Kenya Association of Manufacturers directory (2013) large scale manufacturing firms have more than 100 employee, medium firm have from 51 to 100 employee, small firm have employee from 11 to 50 and micro enterprises are those will 10 or fewer employee. Following the above criterion 655 firms will be categorised as large scale manufacturing firms (KAM, 2013). Although categorization of

manufacturing firm is according to size on number of employees, the sales turnover, capital employed and capacity utilization has also been used to categorise large scale manufacturing firms.

3.4 Sampling Design

Stratified random sampling method was applied to come up with the sample size, since the population in different large scale manufacturing firms does not represent a homogeneous group, the method was generally applied in order to obtain a representative sample. This according to Kothari (2004) was to ensure that each manufacturing subsector is represented. According to Mugenda and Mugenda (2003) at least 10 percent of the target population is generally considered acceptable method of selecting samples in case of heterogeneous population. Ten percent of total population (10 percent of 655) was approximately sixty six firms which were sufficient samples for the total population of large scale manufacturing firms in Kenya.

The study adopted Cooper and Schindler (2006) formula to identify sample size .Taking a non-zero probability of selection of 0.101 the sample size will be $0.101 = (\text{sample size})/655$ which gives a sample size of 66 respondents. This implies that the study will involve 66 large scales manufacturing firms that will be selected through stratified sampling as per KAM (2013). Table 3.1 shows the sampling schedule

Table 3.1: Sampling schedule

Sector	No. of Firms	Percentage in Sector	Sample
Building & Mining	19	2.9	2
Chemical & Allied	86	13.1	9
Energy & Electronics	47	7.2	5
Food & Beverages	168	25.6	17
Leather & Footwear	9	1.4	1
Metal & Allied	64	9.8	6
Motor & Accessories	28	4.3	3
Pharmaceutical	29	4.4	3
Paper & Paperboard	42	6.4	4
Plastics & Rubber	60	9.2	6
Fresh Produce	15	2.3	1
Textile & Apparels	63	9.6	6
Timber & Furniture	25	3.8	3
TOTAL	655	100	66

3.5 Data Collection Instruments

Data was collected using a structured questionnaire. The rationale behind the use of questionnaires is that they provide a high degree of data standardization and adoption of generalized information amongst any population. The questionnaire was structured into four sections. Section A contained background information of the respondents; sections B, C and D contained questions based on the research objectives. Likert scale of 1-5 will be used in formulation of the structured questions in sections B-D. The target respondents will be production, procurement and logistics managers.

3.6 Data Analysis

The research was both qualitative and quantitative in nature. Data was analyzed quantitatively for the numerical data obtained from the field while content analysis was employed for qualitative data. Section A on background information, section B on extent of using Lean Supply Chain management and section D on challenges of lean supply chain management will be analyzed using descriptive statistics. Linear Regression analysis was used to analyze section C of the questionnaire on the impact of lean supply chain management practices on large scale manufacturing firms. This was done using Statistical Package for Social Sciences (SPSS).The following regression model was used to establish the effect on organizational performance:

$$Y=a+b_1X_1+b_2X_2.....b_6X_6+e$$

Where Y represent organizational performance; a is the constant; X1 is lean suppliers practices; X2 is lean customer practices; X3 is lean warehousing practices; X4 is lean procurement practices; X5 is lean transportation practices; X6 is lean Transformation Practices .b1 to b5 are coefficients of the respective independent variables; e is the error term.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter provides a summary of the data analysis, results of the study and the discussion of the results of the study. The results were presented on the lean supply chain management practices and organizational performance of large scale manufacturing firms in Kenya. The study was based on the following specific objectives: To determine the lean supply chain management practices used by large scale manufacturing firms in Kenya; establish challenges faced in implementation of lean supply chain management practices and effect of lean supply chain management practices on the performance of large scale manufacturing firms in Kenya.

4.2 Data collection and Population studied

The study was conducted using questionnaires to the large scale manufacturing firms in Kenya. The study targeted a sample size of 66 respondents from which 50 filled in and returned the questionnaires making a response rate of 76%. This response rate was satisfactory to make conclusions for the study. According to Mugenda and Mugenda (1999), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. Based on the assertion, the response rate was considered to be excellent.

4.3 General information

The study sought to establish the information on the respondents employed in the study with length of period of work at the company, products the company deals with, current level in the organization, and gender of the respondents. The respondents were asked to fill how many years they have worked for the firm. According to the study 54% of all respondents reported to have worked for 6 to 10 years, 10% had worked for a period of 0 to 5 years, and the remaining 36%

had worked for more than 10 years. According to the findings it shows majority of response had worked for more than 5 years hence they had enough experience to be able to response to the questionnaire.

This is the product of the company culture of attracting and retaining the best and hence the extensive experience resource, internal capabilities the organization enjoy in building its competitiveness as reflected in its supply chain.

The respondents were asked to fill the number of employees in the organization. This information is useful in determining the size of the organization by the number of employees in the organization, 2% of the respondents indicated their company has less than 100 employees, 14% indicated between 101 and 200 employees, 50% indicated between 201 and 300 employees, while 34% indicated their companies had more than 300 employees, from these finding it was establish majority of the firm had more than 100 employee hence qualified has large scale manufacturing firm as per the Kenya Association of Manufacturers (2013)

The study requested the respondent to indicate their gender, from the findings it was established that, 56% of the respondents were female and 44% of the respondent indicated they were male. This presupposes that generally, the margin between males and females is minimal. This implied that there was equal representation of the male and female employees in manufacturing companies.

The respondents were also asked to indicate the type of the products the organization deals with, 6% of the respondents indicated their company deals with building construction and mining, 16% indicated energy, electrical and electronics, 30% indicated food, beverage and tobacco, 2% indicated leather products and footwear, 10% was equally shared among those respondents

who indicated metal and allied, motor vehicle assembly and accessories and paper and paperboard, and the remaining 6%, 8% and 2% of the respondents indicated their companies deals with timber, products and furniture, textile and apparels and pharmaceutical and medical equipment respectively. From the finding it was establish majority of the firms deals with food ,beverages and tobacco according to the percentages and the remaining balance cut across other products hence resulted to fair study been done.

The study also requested for the respondent to indicate their current level in the organization, 10% of the respondents were logistic manager, 50% were procurement manager, and 2% was shared among those who said they were procurement officer, operation manager and technical manager while 34% were production manager in their organizations. This implied majority of the respondents as per the percentage were procurement managers compared to other specialization.

4.4 Lean supply chain management practices

The study sought to determine the lean supply chain management practices that are indulged in their organization. In these regard respondents were asked to indicate the extent to which they think their firms indulged in the order of importance on a five point Likert scale where 1 represents to a very great extent and 5 no extent at all. The results are as depicted in Table 4.1.

Table 4.1: Lean supply chain management practices

	Mean	Std.deviation
Lean Transportation practices		
Firm has ensured there are effective transportation system	1.56	.58
Firm has budget to ensure control for transportation process	1.82	.69
Production is pulled by the shipment of finished goods	2.08	.90
Lean procurement practices		
Firm has sound replenishment models to pull consumption	2.08	.83
The firm gives suppliers feedback on quality and delivery	1.76	.62
Lean Transformation practices		
Firm use automatic monitoring devices	1.56	.76
Firm use modern machines on its process to reduce cost	1.52	.68
Firm has updated inventory that ensure flow of product	1.60	.67
Lean suppliers practices		
There is close collaboration with supplier	1.54	.58
Supplier are directly involved in the new product development	1.92	.97
Firm has integrated its system with the suppliers	1.66	.87
Lean customer practices		
Customer needs are established	1.40	.61
Only what will satisfy the customer is delivered	1.28	.54
Lean warehousing practices		
Firm efficiently utilizes its space and machine	1.18	.44
Firm stores what is needed and required by the firm	1.24	.52

Source: Research data, (2015)

The findings after the analysis in Table 4.1 above show that the lean supply chain management practices include utilization of space and machine efficiently ($M=1.18$, $SD=.44$), the firm stores what is needed and required by the firm ($M=1.24$, $SD=.52$), customer needs are established ($M=1.4$, $SD=.61$) and only what will satisfy the customer is delivered ($M=1.28$, $SD=.54$). This indicates the firm reduces the holding costs and the reputation of the firm is improved through satisfaction.

The respondents concur with the literature, according to Simone and Kleiner (2004), lean approach encourages a rapid response to the customers ever changing demands with focus on mass customizations rather than mass production. Lean systems make the work flow more efficient, productive, and flexible to changes in requirements hence reduction in costs.

The findings after analysis show that there is close collaboration with suppliers to a very great extent ($M=1.54$, $SD=.97$), integrating system with the suppliers ($M=1.66$, $SD=.87$) and suppliers are directly involved in the new product development ($M= 1.92$, $SD=.97$) is respectively practiced by the manufacturing firms. This shows that collaboration with suppliers and involving them in product development decisions reduces the costs of the product and improves the quality of the products hence this attracts the customers and increases the organizational performance.

The respondents concur with the literature, according to Halldorsson, Kotzab, Mikkol and Skjoett-Larsen (2007). To develop lean suppliers, organizations should include suppliers in their value stream. They should encourage suppliers to make the lean transformation and involve them in lean activities. This will help them fix problems and share savings. In turn, they can help their suppliers and set continually declining price targets and increasing quality goals

Also according to Lambert (2012), suppliers using lean are able to respond to changes, their prices are generally lower due to the efficiencies of lean processes, and their quality has improved to the point that incoming inspection at the next link is not needed.

The findings after analysis shows that there is use of automatic monitoring devices (M=1.56, SD=.76), use of modern machines on its process to reduce cost (M=1.52, SD=.68) and firm has updated inventory that ensure flow of product (M=1.60, SD=.68). This indicates that the firm ensures free flow of information hence ensures goods are delivered to customer on time.

The respondents agree with the literature, according to Harland (2012), the key to lean procurement is visibility. Suppliers must be able to "see" into their customers' operations and customers must be able to "see" into their suppliers' operations.

Lean procurement practices help to achieve the following: Remove the obstacles to the free flow of information to a supply chain; Create real-time visibility into inventory in motion; change supply chain from —push to —pull consumption based replenishment models.

4.5 Effects of lean supply chain management practices on organizational performance

The study sekeed to determine the impact of the implementation of lean supply chain management practices on organizational performance on a scale of 1 to 5 (where 1 indicate to a very great extent and 5 to no extent at all).Results were as in the table below.

Table 4.2: Effects of lean supply chain management practices on organizational performance.

	Mean	Std. deviation
Minimized waste in manufacturing process	1.72	.86
Reduced inventory level	1.64	.83
Quality improvement	1.62	.88
Increased profitability	1.52	.81
Reduced manufacturing cycle time	1.74	.78
Reduced bottlenecks in the company	1.92	.99
Increased performance	1.62	.83
Decreased labour costs	1.66	.94
Enhanced relationship between the company and customers	1.76	.94
Increased capacity utilization	1.92	.92
Synchronized manufacturing process with lean supply chains	2.34	1.14
Increased response to customers	1.76	.87
Increased space saving	1.56	.99
Reduced customer lead time	1.82	.96
Improved working capital	1.80	.88
Lower warranties to customers	2.08	1.03
Predictable throughput times	2.00	1.05
Increased utilization of machine and space	1.62	.88

Source: Research data, (2015)

The findings after analysis in Table 4.2 above shows that the improved performance is reflected mainly through minimized waste in manufacturing process, reduced inventory level, quality improvement, increased profitability, reduced manufacturing cycle time, reduced bottlenecks in the company, increased performance, decreased labour costs, enhanced relationship between the company and customers, increased capacity utilization, increased space saving, increased response to customers, reduced customer lead time, increased utilization of machine and space and improved working capital.

The respondents agree with the literature as the practices adopted improve the performance of the manufacturing firms. According to Lu (2011) elimination of waste is one of the key aims of manufacturing companies. In a broad sense, waste can be found from all aspects of business activities. It can take the form of time, inventory, redundant processes and defects.

Coordinated supply chain processes ultimately lead to such an improvement through operational efficiency hence leading to reduced cost to serve.

According to Jung (2007) lean supply chain management practices leads to decreased inventory level, shorten lead time, lower costs, deliver stable quality and achieve higher customer satisfaction hence impact on overall performance.

The large scale manufacturing firms, just like any other organization that practices sound lean supply chain management practices as was reflected in the literature review, has grown and sustained its competitive edge, no wonder their market leadership position in the country.

4.6 Challenges of supply chain management practices

In examining the possible challenges the manufacturing companies' experiences when adopting and implementing the lean supply chain practices, the respondents were asked to indicate some possible limitation on a scale of 1 to 5, where, (1) strongly disagreed (2) disagreed (3) neutral (4) agreed where (5) strongly agreed.

Table 4.3: Challenges of lean supply chain management practices

	Mean	Std. deviation
Lack of employee training and motivation	4.46	.73
Limited resources	4.14	.95
Lack of top management commitment	4.48	.76
Negative attitude from employees	4.52	.74
Lack of clear benefits from lean supply chain management	4.34	.77
Resistance to change	4.06	1.0
Cost and profit allocation	3.58	1.14
Misunderstanding of lean	3.76	.98
Conflicts with other initiatives of the company	4.64	1.54
Lack of broad organization involvement	3.96	.97
Lack of supply chain integration	4.36	.85
Demand volatility	4.50	.76
Limited control and monitoring to suppliers delivery time	4.52	.71
Lack of proper capacity planning	4.62	.67
Lack of effective communication	4.72	.61

Source: Research data, (2015)

The respondents agreed with literature in that management and staff resist (M=4.06, SD=0.1) to adopt the change, due to fear of change connected to difficulties of interpretation, the complexity involved, and the underlying business logic with its clear focus on financial aspects, all contribute to the inertia in reaching adoption of lean supply chain according to Abbasi and Nilsson (2012). The respondents indicated that top management support is a challenge as they do not participate and share necessary information to implement the lean supply chain management practices.

The respondents strongly agreed that limited resource (M=4.14, SD=.95) and lack of employee training and motivation (M=4.46, SD=.73) is a challenge as it hinders the implementation of lean supply chain practices. The respondents also strongly agreed that lack of clear benefits from lean supply chain management (M=4.34, SD=.77) indicates that the implementation of the lean SCM practices will fail. According to David (2005), nothing could be more detrimental to implementation and to organizational success than for resources to be allocated in ways not consistent with priorities indicated by approved objectives. In the absence of skills, appropriate ethics are not applied and hence become a challenge in applying the SCM practices (Farrington *et al.*, 2012).

The respondents also strongly agreed that negative attitude from employees (M=4.52, SD=.74) is a challenge. The respondents agreed with the literature, according to Duran (1987) deficiencies in the original planning cause a process to run at a high level of chronic waste and this leads to unsuccessful implementation. Lack of proper capacity planning (M=4.62, SD=.76) also is a strong challenge. The findings after analysis strongly agreed that lack of effective communication (M=4.72, SD=.61) and demand volatility (M=4.50, SD=.76) leads to inefficiency in implementation of lean supply chain management practices.

4.7 Pearson Correlation Analysis

To establish the degree of association between organizational performance of large scale manufacturing firms and lean supply chain management practices, the study used Karl Pearson coefficient of correlation. As cited in Wong and Hiew (2005), the correlation coefficient value (r) range from 0.10 to 0.29 is considered weak, from 0.30 to 0.49 is considered medium and from 0.50 to 1.0 is considered strong.

However, according to Field (2005), correlation coefficient should not go beyond 0.8 to avoid multi co-linearity. The results show that organisation performance correlates positively with, lean warehousing practices ($r=0.713$), lean transformation practices ($r=0.719$), lean transportation practices ($r=0.679$), lean purchasing practices ($r=0.674$), lean customer practices ($r=0.533$), lean supply chain practices ($r=0.627$).

All the bivariate correlations are significant $p \leq 0.01$ (sig, 0.000). The correlation coefficients on the main diagonal are always 1.0, because each variable has a perfect positive linear relationship with itself.

Table 4.4: Pearson Correlation Coefficients Matrix

Pearson Correlation	Organization Performance	LPP	LSP	LWP	LTP	LCP	LTRP
Organization Performance	1.000	.674	.627	.713	.679	.533	.719
LPP	.674	1.000	.725	.456	.743	.561	.541
LSP	.627	.725	1.000	.632	.478	.700	.534
LWP	.713	.456	.632	1.000	.484	.618	.632
LTP	.679	.743	.478	.484	1.000	.444	.517
LCP	.533	.561	.700	.618	.444	1.000	.566
LTRP	.719	.541	.534	.632	.517	.746	1.000

Source: Research data, (2015)

4.8 Regression Analysis

The regression analysis is concerned with the distribution of the average value of one random variable as the other variables which need not be random are allowed to take different values. A multivariate regression model was applied. The regression model specifically connects the average values of y for various values of the x-variables. A regression equation is in no way a mathematical linking two variables but serves as a pointer to questions to be answered. Basically, the regression analysis is used in two distinct ways; (1) as a means of considering data taking into account any other relevant variables by adjustment of the random variable; and (2) to generate mathematical forms to be used to predict the random variable from the other (independent) variables.

The regression model was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \epsilon$$

Where:

Y = Organizational Performance

β_0 = Constant Term

β_1 = Beta coefficients

X_1 = Lean suppliers practices

X_2 = Lean customer practices

X_3 = Lean warehousing practices

X_4 = Lean procurement practices

X_5 = Lean transportation practices

X_6 = Lean Transformation Practices

ϵ = error term

Table 4.5: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.930 ^a	.864	.858	.239	.864	47.341	15	52	.000	2.011

a. Predictors: (Constant), Lean suppliers practices, Lean customer practices, Lean warehousing practices, Lean procurement practices, Lean transportation practices, Lean Transformation Practices

b. Dependent Variable: Organizational Performance

Source: Research data, (2015)

From the analysis in the table above $R^2=0.864$, i.e. 86.4% variation in the performance of large scale manufacturing firms is explained by predictors in the model. However 13.6% variation unexplained in performance of large scale manufacturing firms is due to other factors not in the regression model. From this test result the model is a good model and can be used for estimation purposes.

From the findings shown in the table above there was a strong positive relationship between the study variables as shown by $R=0.930$, i.e. 93% this indicates that there is a significant relationship between the predictor variables and organizational performance

Table 4.6: Analysis of variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.892	5	2.649	46.474	.023 ^a
	Residual	2.498	30	.057		
	Total	18.390	36			

a. Predictors: (Constant), Lean suppliers practices, Lean customer practices, Lean warehousing practices, Lean procurement practices, Lean transportation practices, Lean Transformation Practices

b. Dependent Variable: Operational Performance

Source: Research data, (2015)

Based on the analysis on the table above the relationship predicted under the regression model is statistically significant at $p \leq 0.001$ (sig, 0.000), i.e. ($0.023 < 0.05$). The critical F test statistic $\alpha = 0.05$ with df (degrees of freedom) in the numerator is $k-1=6-1=5$ and with df in the denominator $n-k=36-6=30$ is 2.01. The model is significant since $46.474 > 2.01$ and hence is reliable and adequate and can be suitable prediction model for explaining lean supply chain management practices and organization performance.

Table 4.6: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Co-linearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1(Constant)	.181	.416		.192	.847	-.743	.885		
Ls p	.469	.100	.383	4.69	.033	.378	.116	.243	1.431
L c p	.140	.014	.157	.002	.015	.243	.321	.333	.321
Lwp	.309	.086	.317	.027	.013	.168	.513	.438	.456
L pp	.350	.110	.159	.039	.029	.521	.212	.311	2.136
Ltp	.241	.113	.331	.027	.035	.432	.467	.156	4.123
LTrP	.254	.224	.267	.057	.041	.149	.344	.563	.121

a. Dependent Variable: Organizational Performance

Source: Research data, (2015)

From the table 4.6, the variable had no multicollinearity since the variance inflation factors (VIF) were less than 10. The established multiple linear regression equation becomes:

$$Y = .181 + .469 X_1 + .140 X_2 + .309 X_3 + .350 X_4 + .241 X_5 + .254 X_6$$

Where the p-value of a regression are less than 0.05 then the regression coefficient is termed significant and the corresponding predictor is a good predictor and can be used in the model. All the regression coefficients in the model are significant since their p-values are less than 0.05.

Generally the larger the t-values the more significant the regression coefficient. From the t-values in the table 4.6 there are no marked changes in the t values for the regression coefficients and hence these values are in agreement with p values.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

Examining lean supply chain management practices as defined by Lenders; (2006) as an approach where relationship with suppliers is managed based on long-term perspective so as to eliminate waste and add value. This chapter provides a summary of findings, challenges faced in the implementation of lean supply chain practices, impacts of implementing lean supply chain on organizational performance, adoption of lean supply chain management practices, conclusion, recommendations, implications of the study on policy, theory and practice, limitation of the study, and suggestion for further research.

5.2 Summary of the Findings

The study findings revealed clearly that manufacturing firms adopts specific lean supply chain management practices that are aligned to its corporate strategy in running its value chain function and these lean supply chain practices have significantly contributed to the performance and hence creating competitive edge in the very manufacturing industry by focusing on operational effectiveness and efficiency.

The findings concur with the literature review on other similar studies of other organizations. At this age of very uncertain, sporadic business environment and stiff competition coupled with a very knowledgeable customer, manufacturing firms are turning inward, tapping as much value from their core competencies to establish a sustainable competitive edge through operational effectiveness and efficiency to improve the organizational performance.

5.2.1 Adoption of lean supply chain management practices

Manufacturing firms adopt various lean supply chains to improve their performance and hence creating competitive advantage. The firm uses automatic monitoring devices and modern machines on its process to reduce cost. It's based on the premise that nothing will be produced until is needed. The practices is derived from the need to increase product flow velocity through the elimination of all non-value added activates.

Its implement throughout the manufacturing supply chain with the signal moving backward from the customer all the way back to the most basic raw materials. This creates competitive advantage and hence overall organizational performance is improved.

The firm stores what is needed and required by the firm and has updated inventory that ensure flow of product to avoid overstocking hence helping the company to reinvest in the profitable projects, Supplier are directly involved in the new product development, close collaboration with supplier and the firm has resulted to integrating its system with the suppliers. These increase the interaction between the supplier and customer hence improved performance. Having a diverse supplier network ensures products are produced on time and delivered to customer on time as this reduces the chances of customer to switch to other competitors in the market.

5.2.2 Effect of lean supply chain management practices on organizational performance

The adoption of various lean supply chain practices have impacted positively on the organizational performance and consequently on building its operational efficiency and effectiveness. Lean supply chain practices provides a very fertile ground of creating competitiveness and hence the move by some manufacturing firms to reposition this lean supply chain practices to value chain to enhance customer satisfaction. Increased customer satisfaction

is enhanced through timely deliveries; increased response to customers and enhanced relationship between the company and customers hence improved performance.

5.2.3 Challenges faced in adopting lean supply chain practices

As leaders world over are realizing the value in adopting the lean supply chain practices and now viewing supply chain as strategic imperative, they grapple with serious adoption challenges. In this study, the respondent's sites top management and staff resistance to adopt the change due fear of change connected to difficulties of interpretation, and the complexity involved. Employees become comfortable with the way the business is run. They know the expectations and their role within the company. When a major change disrupts their familiarity, some employees become upset. They don't want to relearn their jobs or change the way they do things.

Lack of support from top management leads to unnecessary frustrations in work place. Also, it will cause delay in operations and ineffective decisions in the supply chain; Skills and knowledge is necessary and essential strategic resource in order for a company to retain sustainable competitive advantage. As knowledge is created and disseminated throughout the company, it has the potential to contribute to the company's value by enhancing its capability to respond to new and unusual situation. Lack of knowledge in managing and implementing lean supply chain practices, is a major challenge to the success of implementing and practicing management in the manufacturing industry.

5.3 Conclusion

Based on the findings of the study and the forgoing discussions, it is clear that there exists very strong lean supply chain s practices and strategies that have contributed to good performance

within the operation and supply chain and conversely impacting on the manufacturing firms overall performance and its competitive strength in the challenging business environment.

From the study findings the study concludes that the adoption of lean supply chain practices improves the organizational performance.

The improved performance is reflected through minimized waste in manufacturing process, reduced manufacturing cycle time, improved working capital, reduced customer lead time, increased space saving and increased response to customers. This shows that lean supply chain was well customized process to suit the manufacturing firms change needs as companies had very well defined lean supply chain practices and strategies. These practices would give the company the higher success rate to the change process hence competitive advantage and improved organizational performance.

From the findings, the study concludes that lean supply chain practices being adopted by manufacturing firms face various challenges which hindered the effectiveness of the implementation and adoption process. The main challenges included; Staff resistance, Lack of support from top management, limited resources, negative attitude from employees and lack of proper capacity planning. Therefore, the manufacturing firms face diverse challenges that slow down the lean supply chain practices adoption process.

5.4 Recommendations

Lean supply chain need to be embraced to help the management team appreciates the direct impact of these initiatives. Adoption of flexible lean supply chain practices through appropriate research will help efficiently and effectively meet the business diverse yet drastic changing needs as well as address challenges arising from a dynamic global business environment. Management

should embrace both qualitative and quantitative aspects in their decision making and more sustainable lean supply chain management strategies integration across the group will yield synergies.

5.5 Implications of the study on Policy, Theory and Practice

The lean supply chain is a heavy matter as evident from the study, clearly reflecting how they marry with corporate strategy to yield improved performance and hence creating competitive advantage. To achieve effective adoption of the various lean supply chain practices, it requires clear policies to be formulated, implemented and monitored to ensure they remain relevant to the business.

The theory as captured at the literature review stage is such that organization that adopt sound lean supply chain practices outperform those that do not and indeed the gap keep widening as such companies continue to innovatively implore fresh supply chain practices targeting further and faster creation of value given immense competition and pressure from the stake holders such that sustainability of those that do not embrace such best supply chain strategies is at stake.

The outcome of this study on manufacturing firms clearly supports this theory. With the globalization and stiff competition, there is not much time left to slow copying companies, proactively and innovatively investing in appropriate lean supply chain practices should be the core calling of top management if the manufacturing firms are to grow.

5.6 Limitations of the Study

The study was faced by several limitations. Firstly, the study was also limited in scope as it only covered large scale manufacturing firms hence the results for the study may suffer from sampling bias, therefore it lead to the narrow understanding of the population.

Secondly, a resource constraint was a major challenge. Due to financial constraints, the study was under-powered, and thus, did not reach statistical significance.

Thirdly, there was limited access to information. There was lack of response from some of the targeted respondents. Others failed to return the questionnaires claiming that they had no time to fill them, while others argued that it was against the company's policy to disclose any information relating to their company making support from their company a challenge.

5.7 Areas of further Research

The study sought to explore the lean supply chain management practices and organizational performance of large scale manufacturing firms in Kenya. The study recommends that an in-depth study should be accrued out on factors influencing adoption of lean supply chain management practices in Kenya.

Since this study explored the lean supply chain management practices and organizational performance of large scale manufacturing firms in Kenya, the study recommends that; similar studies should be done in other sectors of the Kenyan economy for comparison purposes and to allow for generalization of findings on the lean supply chain in Kenya.

REFERENCES

- Achieng, J. K. (2012). *Lean supply chain management practices at public universities in Kenya*. Nairobi: University of Nairobi.
- Adler, P. S, Cole, R. E. (1993). Designed for Learning: A Tale of Two Plants. *Sloan Management Review*, 34(3), 85-94.
- Agarwal, A. and Shankar, R. (2002). Analyzing alternatives for improvement in supply chain performance. *Work Study*, 51(1), 32-37.
- Anand, G. & Kodali R. (2008). 'A conceptual framework for lean supply chain and its implementation. *Value Chain Management*, 2(3), 313.
- Berggren, C. (1995). *The Fate of the Branch Plants - Performance Versus Power' in Sandberg*. Avebury.
- Cigolini, R., Cozzi, M., Perona, M. (2004). A new framework for supply chain management Conceptual model and empirical test. *International Journal of Operations & Production Management*, 24(1), 7-41.
- Cooney, R. (2002). 'Is "lean" a universal production system?: Batch production in the automotive industry. *International Journal of Operations & amp; Production Management*, 22(10), 1130-1147.
- Cox, A., & Chicksand, D. (2005). The Limits of Lean Management Thinkin. *European Management Journal*, 23(6), 648-662.
- Czabke, J., Hansen, E.N. & Doolen, T.L. (2008). A multisite field study of lean thinking in US and German secondary wood products manufacturers. *Forest Products Journal*, 58(9), 77-85.
- Field, A. (2005): *Discovering Statistics Using SPSS*, 2nd ed., Sage, London

- Gati-Wechsler, A. M., & Torres, A. S. (2008). The influence of lean concepts on the product innovation process of a Brazilian shoe manufacturer. *Portland International Conference on Management of Engineering & Technology* (p. 1137). PICMET.
- Harland, C. (1996). Supply network strategies – the case of health supplies”,. *European Journal of Purchasing and Supply Management*, 2(4), 183-92.
- Hines, P., Holweg, M. Rich, N. (2004). Learning to evolve A review of contemporary lean thinking. *International Journal of Operations & Production Management*, 24(10), 58.
- Hines, P., Holweg, M., & Rich, N. (2004). Learning to evolve: A review of contemporary lean thinking. *International Journal of Operations & Production Management*, 24(10), 994-1011.
- Hiew, J.F. (2005), *Multivariate Data Analysis: A Global Perspective*, Pearson Education Inc., NJ.
- Holweg, M. (2007). The genealogy of lean production. *Journal of Operations Management*, 25(2), 420-437.
- Jones. (2006). The Emergence of an Academic Discipline? *Supply Chain Management Theory and Practice*, 26(7), 34.
- Jones, R. M. (2010). Lean, agile or leagile? Matching your supply chain to the marketplace. *International Journal of Production Research*, 5-7.
- Julien, D. M. & Tjahjono, B. (2009). Lean thinking implementation at a safari park. *Business Process Management Journal*, 15(3), 321–335.
- Karlsson, C. & Norr, C. (1994). Total effectiveness in a just-in-time system. *International Journal of Operations & Production Management*, 14(3), 46–65.
- Karlsson, C. and Åhlström, P. (1996). Assessing changes towards lean production. *International Journal of Operations & Production Management*, 16, 24-41.
- Kracik, J.F. (1998). Triumph of the Lean production System. *Sloan Management*, 30(1), 41-42.

- Lamming, R. (1996). Squaring lean supply with supply chain management. *International Journal of Operations & Production Management*, 16(2), 183–196.
- Leenders M.R, Johson F., Flynn A. & Fearon H.E. (2006). *Purchasing and Supply management*. New York.
- Levy, D. L. (1997). Lean Production in an International Supply Chain. *SLOAN Management*, 94–102.
- Lewis, M. (2000). Lean production and sustainable competitive advantage. *International Journal of Operations & Production Management*, 9, 60-62.
- Li S. Nathan R., Bhanu & Rao S. (2006). *Omega*. 34(2), 76.
- Liker, J. K. (2004). *The Toyota Way 14 Management Principles from the World Greatest Manufacturer*. New York: Mc Graw Hill.
- Liker, J.K. and Wu, Y.C.,. (2000). Japanese automakers, US suppliers and supply-chain superiority. *Sloan Management*, 42(1), 81-93.
- Mefford, R.N. (2009). Increasing productivity in global firms: The CEO challenge. *Journal of International Management*, 15(3), 262-272.
- Mugenda M.O & Mugenda G. A. (2009). *Research Methods Quantitative and Qualitative Approaches*. Nairobi: ACTS Press.
- Mugenda, O. M.and Mugenda A.O. (2003). *Research methods, qualitative and quantitative approaches* (revised edition ed.). Nairobi: ACTS Press.
- Naylor, Ben J, Naim, M. M. & Berry, D. (1999). 'Leagility: Integrating the lean and agile manufacturing paradigms in the total supply chain - Strategies for Enriching. *International Journal of Production Economics*, 62(1), 107-118.
- New, S., & Ramsay, J. (1997). A critical appraisal of aspects of the lean chain approach. *European Journal of Purchasing & Supply Management*, 3(2), 93–102.

- Orodho, J. A. (2003). *Elements of Education and Social Science Research Methods*. Maseno: Kanezja.
- Omondi, D.O. (2008). Application of lean thinking to business process management .Case study of Kenya Revenue Authority. MBA Project. University of Nairobi.
- Pallant, J. (2005). *SPSS Survival Manual: A Step Guide to Data Analysis Using SPSS. For Windows (Version 12)*. New York (2nded.). Open University Press.
- Pheng, L. S., & Chuan, C. J. (2001). Just-in-time management in precast concrete construction: a survey of the readiness of main contractors in Singapore. *Integrated Manufacturing Systems*, 12(6), 416–429.
- Plenert, G. (2010). *Reinventing Lean: Introducing Lean Management into the Supply Chain*. Burlington USA: Butterworth-Heinemann.
- Plenert, G. (2010). *Reinventing Lean: Introducing Lean Management into the Supply Chain*. Jordan Hill-UK: Butterworth-Heinemann.
- Poppendieck, M. and Poppendieck L. (2002). *Principles of Lean Thinking*. New York: Prentice Hall.
- Radnor, Z.J. & Boaden, R. (2004). Developing an understanding of corporate anorexia. *International Journal of Operations & Production Management*, 24(3), 424-440.
- Repenning, N.P. & Sterman, J.D. (2001). Nobody ever gets credit for fixing problems that never happened: Creating and sustaining process improvement. *California management review*, 43(4), pp. 64.
- Ross, D. F. (2010). *Introduction to Supply Chain Management Technologies*. Roca Raton: CRC Press.
- Schouteten, R., & Benders, J. (2004). Lean Production Assessed by Karasek’s Job Demand-Job Control Model. *Economic and Industrial Democracy*, 25(3), 347-373.

- Taylor, D.H. (2006). Strategic considerations in the development of lean agri-food supply chains: a case study of the UK pork sector', Supply Chain Management. *International Journal of Supply Chain*, 11(3), 271–280.
- Waring, J. J. & Bishop, S. (2010). Lean Healthcare: Rhetoric, Ritual and Resistance. *Journal of Social Science & Medicine*, 71, 1332-1340.
- Kabuga, M .W (2012) .Lean Procurement Methodologies used by Large Scale Manufacturing Firm in Nairobi, Kenya.MBA project .University of Nairobi
- Kimani, M.W. (2013). Lean Supply Chain Management in Manufacturing Firms in Kenya. MBA Project. University of Nairobi
- Wee, H.M.and Wu, S. (2009). Lean supply chain and its effect on product cost and quality: a case study on Ford Motor Company", Supply Chain Management. *An International Journal of Supply Chain*, 14(5), 335–341.
- Wisner J.D, L. G. (2006). *Principles of Supply Chain Management*.
- Womack J.P. and Jones, D.T. (1994). From lean production to the lean enterprise. *Harvard Business Review*, 93–103.
- Womack, J., & Jones, D. T. (1996). *Lean Thinking: Banish Waste and Create Wealth for Your Corporation*,. New York: Simon and Schuster.
- Womack, J.P and Jones, D.T. (1996). *Lean Thinking, Simon and Schuster*. New York: Rawson Associates.
- Womack, J.P. & Jones, D.T. (1990). *The Machine that Changed the World*. New York: Rawson Associates.

APPENDICES

Appendix I: Introduction Letter

Mutua Musyoka,
Mba Student,
School of business, University of Nairobi,
P.o box 30197
Nairobi

To Whom It May Concern:

Re: Permission To Carry Out a Research In Your Firm

I am a Post graduate student at the university on Nairobi and in partial fulfilment of a Master's in Business Administration Degree; I intend to carry out a research on large scale manufacturing firms in Kenya. The topic of the research is Lean supply chain management practices used by large Scale manufacturing firms in Kenya.

Your manufacturing firm has been chosen for the study and choice is based on the strategic importance in the achievement of the objective of the study. I therefore kindly request your approval of collecting data in the organization through the attached questionnaire which i request the heads of Procurement, Logistics and Production to respond.

The research information will be confidential and will only be used for academic purposes.

Thank you in anticipation

Mutua Musyoka,
MBA Student,
University of Nairobi

Appendix I: Questionnaire

Dear Respondent,

This questionnaire is aimed at collecting data on the impact of lean supply chain management practices in large scale manufacturing firms in Kenya. You are kindly requested to fill in the questions depending on the instructions given. The information you provide will be treated with utmost confidentiality and will be used for the purpose of accomplishing academic goals. Do not include your name anywhere in the questionnaire. Note that there are no wrong or right answers.

PART A: BACKGROUND INFORMATION

1. Kindly indicate your Gender
 - a. Male
 - b. Female
2. How long have you been an employee of this company
 - a. 0-5 years
 - b. 6-10 years
 - c. Over 10 years
3. Indicate your current level in the organization.
 - a. Production Manager
 - b. Procurement Manager
 - c. Other (Please Specify).....
4. How many employees do you have?
 - a. Less than 100
 - b. 101-200
 - c. 201-300
 - d. More than 300
5. Which products does your company deal with?
 - a. Beverages
 - b. Gases
 - c. Energy
 - d. Foodstuff
 - e. Fruits

f. Other (Please specify).....

PART B: EXTENT TO WHICH LEAN SUPPLY CHAIN MANAGEMENT IS PRACTISED IN LARGE SCALE MANUFACTURING FIRMS IN KENYA

6. To what extent does your company apply the following components of lean supply chain management practices? Use **Likert scale 1- To a very great extent , 2 – To a great extent , 3- To a moderate extent , 4 – To a small Extent , 5 – Does not affect at all.**

Lean supply chain management components	1	2	3	4	5
a. Lean Transportation practices					
Firm has ensured there are effective transportation system					
Firm has budget to ensure control for transportation process					
Production is pulled by the shipment of finished goods					
b. Lean procurement practices					
Firm has sound replenishment models to pull consumption for its product					
The firm gives suppliers feedback on quality and delivery					
c. Lean Transformation practices					
Firm use automatic monitoring devices on processes					
Firm uses modern machines on its process to reduce cost					
Firm has updated inventory that ensure flow of product					
d. Lean suppliers practices					
There is close collaborations with supplier					
Supplier are directly involved in the new product development					
Firm has integrated its system with the suppliers					
e. Lean customer practices					
Customer needs are established					
Only what will satisfy the customer is delivered					
f. Lean warehousing practices					
Firm efficiently utilises its space and machine					

Firm stores what is needed and required by the firm					
---	--	--	--	--	--

- 7. Any other (Please specify).....
.....
.....
.....
.....

PART C: EFFECT OF LEAN SUPPLY CHAIN MANAGEMENT PRACTISES ON ORGANIZATIONAL PERFORMANCE

8. To what extent has lean supply chain management practices contributed to your firm performance in terms of the following? Use **Likert scale 1- To a very great extent , 2 – To a great extent , 3- To a moderate extent , 4 – To a small Extent , 5 – Does not affect at all.**

Effect of lean supply chain management practices	1	2	3	4	5
a) Minimized waste in manufacturing processes					
b) Reduced inventory level					
c) Quality improvement					
d) Increased profitability					
e) Reduced manufacturing cycle time					
f) Reduced bottlenecks in the company					
g) Increased performance					
h) Decreased labour costs					
i) Enhanced relationship between the company and customers					
j) Increased capacity utilization					
k) Synchronised manufacturing processes with lean supply chains					
l) Increased response to customers					
m) Increased space saving					
n) Reduced customer lead-time					
o) Improved working capital					
p) Lower warranties to customers					
q) Predictable throughput times					
r) Increased utilization of machine and space					

9. Any other (Please specify).....

PART D: CHALLENGES OF SUPPLY CHAIN MANAGEMENT PRACTICES

10. Please indicate the level of agreeing to which the following challenges affect adoption and implementation of lean supply chain management practices in your firm. Kindly indicate by ticking the column that best describes your opinion. **5- Strongly agree (SA), 4- Agree (A) 3- Neutral (N), 2- Disagree (D), 1- Strongly Disagree (SD).**

Challenges	1	2	3	4	5
a) Lack of employee training and motivation					
b) Limited resources					
c) Lack of top management commitment					
d) Negative attitude from employees					
e) Lack of clear benefits from lean supply chain management					
f) Resistance to change					
g) Cost and profit allocation					
h) Misunderstanding of lean					
i) Conflicts with other initiatives of the company					
j) Lack of broad organization involvement					
k) Lack of supply chain integration					
l) Demand volatility					
m) Limited control and monitoring to suppliers delivery time					
n) Lack of proper capacity planning					
o) Lack of effective communication					

11. Any other (Please specify).....

End

Thank you for your cooperation.

