

**THE EFFECT OF LEAN SUPPLY CHAIN MANAGEMENT
COMPONENTS ON OPERATIONAL PERFORMANCE AMONG
TEA FACTORIES IN KENYA**

**PRESENTED BY
MARTIN THURANIRA**

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DECLARATION

This research project is my original work and has never been submitted in any other University or College for the award of degree or diploma or certificate.

Signed.....Date.....

Martin Thurania

Reg. No. D61/68316/2013

This research proposal has been submitted for examination with my approval has the University Supervisor.

Signed.....Date.....

Mr. Job Mwanyota,

Department of Management Science,

School of Business,

University of Nairobi

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DEDICATION

I wish to dedicate this work to my wife Nancy Waithira for her unwavering support and sacrifices of her family time throughout the entire program. I also dedicate this work to my mother, my family, friends and classmates who have always stood by me. May Jehovah God bless them abundantly.

TABLE OF CONTENTS

DECLARATION.....	ii
ACKNOWLEDGEMENT.....	iii
DEDICATION.....	iv
LIST OF TABLES	viii
LIST OF ABBREVIATIONS AND ACCRONYMS	ix
ABSTRACT.....	x
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.1.1 Lean Supply Chain Management	2
1.1.2 Operational Performance	4
1.1.3 Lean Supply Chain Management and Operational Performance	5
1.1.4 Tea Service Sector	5
1.2 Research Problem	7
1.3 Research Objectives.....	10
1.4 Value of the Study	10
CHAPTER TWO: LITERATURE REVIEW.....	12
2.1 Introduction.....	12
2.2 Theoretical Foundation	12
2.2.1 Resource Dependence Theory	12
2.2.2 Transaction Cost Analysis Theory	13
2.2.3 Theory of Constraints	14
2.3 Components of Lean Supply Chain Management	15
2.3.1 Lean Procurement.....	16
2.3.2 Lean Production.....	16
2.3.3 Lean Transportation.....	17
2.3.4 Lean Warehousing	18

2.4 Empirical Review on Lean Supply Chain Management.....	19
2.5 Conceptual Framework.....	20
2.6 Summary of Literature Review.....	21
CHAPTER THREE: RESEARCH METHODOLOGY	23
3.1 Introduction.....	23
3.2 Research Design.....	23
3.3 Population and sampling.....	23
3.4 Data collection	23
3.5 Data Analysis	24
CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION	26
4.1 Introduction.....	26
4.2 Demographic Information.....	26
4.2.1 Respondent Response Rate.....	26
4.2.2 Period in Operation.....	26
4.2.3 Period Worked in the Tea Factory/Company	27
4.2.4 Tons of Tea Processed Annually	28
4.3 Lean Supply Chain Management Components.....	28
4.3.1 Lean Procurement.....	29
4.3.2 Lean Production.....	30
4.3.3 Lean Transportation.....	31
4.3.4 Lean Warehousing	31
4.4 Operational Performance	32
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS	37
5.1 Introduction.....	37
5.2 Summary of Findings.....	37
5.3 Conclusion	38
5.4 Recommendations.....	39

5.5 Limitations of the Study.....	40
5.6 Suggestions for Further Study	40
REFERENCES.....	41
APPENDICES	45
APPENDIX I: QUESTIONNAIRE	45
APPENDIX II: LIST OF KTDA TEA FACTORIES.....	50
APPENDIX III: LEAN SUPPLY CHAIN MANAGEMENT COMPONENTS AND OPERATIONAL PERFORMANCE	52
APPENDIX IV: INTRODUCTION LETTER	54

LIST OF TABLES

Table 4.1: Response Rate.....	26
Table 4.2: Company Operation.....	27
Table 4.3: Period Worked in the Company.....	28
Table 4.4: Tons of Tea Processed.....	28
Table 4.5: Lean Procurement.....	29
Table 4.6: Lean Production.....	30
Table 4.7: Lean Transportation.....	31
Table 4.8: Lean Warehousing.....	32
Table 4.9: Operational Performance.....	33
Table 4.11: ANOVA.....	36
Table 4.12 Dependent and Independent variables coefficients.....	37

LIST OF ABBREVIATIONS AND ACRONYMS

AFFA	:	Agriculture, Fisheries and Food Authority
ATN	:	Alabama Technology Network
EATTA	:	East Africa Tea Trade Association
KTDA	:	Kenya Tea Development Agency
KTGA	:	Kenya Tea Growers Association
LSCM	:	Lean Supply Chain Management
NTZDC	:	Nyayo Tea Zone Development Corporation
RDT	:	Resource Dependence Theory
SC	:	Supply Chain
SCM	:	Supply Chain Management
SPSS	:	Statistical Product and Service Solution

ABSTRACT

This study was seeking to establish the effect of lean supply chain management components on operational performance in the tea factories in Kenya. It also sought to establish the relationship between lean supply chain management and operational performance among tea factories in Kenya. Towards the achievement of the objectives, the research adopted a descriptive research design which involved distribution of questionnaires to various Kenya Tea Development Agency factories. A good response rate of 77.8% was realized. This study also established a regression and correlation analysis between the independent variables and the dependent variable. The findings of the study were that different factories adopt different lean supply chain components depending on their time of introduction to lean supply chain management. The study also established that most of the factories involved lean procurement, lean production as well as lean warehousing. The study concluded that the incorporation of lean supply chain management components in the operations of the organizations be part of the long term strategy of the organizations for them to improve on their operational performance. This study therefore recommends that organizations should consider adopting lean supply chain management components fully as this will be beneficial in the long run compared to the initial costs involved in the implementation of the components.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

According to Naylor, Naim and Berry (1999), leanness refers to developing a value stream in order to reduce waste. For organizations to be competitive in the current global market which is dynamic, they have resulted to adopting lean philosophy (Womack, 1991). Lean suggests use of less or minimum of the resources required to produce a product or perform a service (Hayes & Pisano, 1994). In order to achieve this, leanness eliminates all processes that do not add value to the process (Womack & Jones, 1990). Lean is not a standardized approach and tyhis therefore means that it's a dynamic process of continuous change (Agyekum, Ayarkwa, & Adjei-Kumi, 2013). Lean is an adaptive means of operational performance gains and in supply chain, lean can be practical to operational management.

Many companies are looking for ways that can put them ahead of others due to the increasing global business competition. According to Vonderembse, Huang and Dismakes (2006), organizations are no longer competing on the company orientation. The focus has shifted to supply chain orientation making supply chain improvement essential in order to survive. Paschal, Engstrom and Longstrand (2012), defines lean as a management philosophy that is focused on customer value through elimination of waste and continuous improvement in a system through the application of lean principles, practices and techniques. Lean can be considered as a management philosophy involved in pointing out and eliminating waste in the organizations' product value chain (Shah & Ward, 2007). According to Womack and Jones (1996), lean approach to supply chain management has become very popular since 1997 following the publication of lean thinking.

This study was anchored on the following theories. Resource dependence theory by Godfrey (1998), suggests that organizations rely on the outputs of other organizations to sustain growth and optimize operational performance including other organizations that depend on them (Paloviita & Luoma-aho, 2010). According to Williamson (1975), Transaction Cost Analysis (TCA) theory suggests that organizations are created to improve on their operations as a result of maximizing their profits through reduction of transaction costs and transaction cost economics propose that a firm's ownership decisions focus on minimizing the sum of its transaction and production costs and theory of constraints by Goldratt (1984) which proposes effective management of capacity as well as the capability of the few constraints contained in the organizations by managers if they are to improve their performance.

The tea industry plays a very essential role in the agriculture sector in Kenya and the Kenyan economy at large. In the year 2014, Kenya's tea exports were almost 500 million kilos to 62 different countries out of which 70% was to 5 destinations (Tea Board of Kenya, 2015). The tea industry in Kenya however is facing challenges of various types which includes scarce research, inflated cost of production, unimproved infrastructure, low or lack of value addition and diversification of products, development and extension services and falling tea prices in the global market (Tea Board of Kenya, 2015). The aim of this study was therefore to analyze the effect of lean supply chain management components on operational performance among tea factories in Kenya.

1.1.1 Lean Supply Chain Management

Lean is defined as a management philosophy that aims at identifying waste in organization's value chain and eliminates it (Shah & Ward, 2007). Manrodt and Vitasek (2010) described lean supply chain as a set of organizations with a direct link to both

upstream and downstream flows of the products, services as well as information that work together to reduce waste and cost efficiently in order to meet the customer needs. According to Beamon, (1998) a supply chain can be defined as a network of facilities and activities involved in the development of products, purchasing of raw materials from the members of the supply chain, production of products as well as distribution of the final product to the customers.

According to the research that has been done previously supply chain suggests that costs, flexibility, quality and delivery are the most essential issues in the supply chain (Hajinoor, 2012). According to Stevens, (1993) manufacturers, suppliers, customers and the distributors are the supply chain members. The application of lean is important in non-manufacturing areas (Womack and Jones, 2003). Any resources that are used and do not add value to customer should be a target for elimination or change.

According to Arfmann and Topolansky (2014) in their journal on the value of lean in the service sector, lean is a production practice with an aim of reducing waste in the entire value streams and improve on the value for customers. Anacleto, Rodriguez and Paladini, (2013) suggest that the economic changes especially in the second half of the twentieth century has changed the foundations of industrial competitiveness in the world. Lima and Zawislak, (2003) explains that during this time issues such as quality and product reliability, promptness in meeting the needs of the customers, flexibility and cost, began to be considered as new dimensions of business success. In the processes of manufacturing cars by Toyota, the idea of lean manufacturing was born and developed. However, they are increasingly being applied in routine processes and support functions of various business lines (Cudney & Elrod, 2010).

1.1.2 Operational Performance

The principles of lean supply chain management have been successfully applied in manufacturing with substantial drop of inventory in the supply chain and improve productivity and the quality of products (Anacleto et al., 2013). Cudney and Elrod, (2010) argued that the implementation of lean supply chain in a firm has shown considerable financial results. In order to be the best in the market and be a leader in the globalized economy, organizations need to focus on the establishment of global supply chain (Wee & Wu, 2009). According to Lamming, (1996) for organizations to manage the supply chain, they should consider the value set by the customer and transfer the processes in the supply chain. Lean supply chain management becomes a new opportunity to improve efficiency in this supply chain in order to eliminate or minimize the main waste that occurs between the links.

According to Marilyn and Sarkis, (2005) it is challenging to measure performance because it is difficult to tag performance results to one entity within the chain. They argue that the application of corporate performance measurement both quantitative and qualitative continues to grow. Narasimham and Das, (2001) defines operational performance as strategic dimensions by which organizations choose to compete. When an organization produces and delivers products and services to customers more efficiently the end result will be improvement on its operational performance. (Zhu & Sarkis, 2008)

Lean supply chain management components improved operational performance by cutting down operational cost thereby enabling organizations to offer their products and services at more competitive rates (Qureshi, Dinesh & Pradeep, 2007). Integrating waste reduction concerns into SCM is increasingly becoming very important for a company to

achieve competitive advantage and higher operational performance (Van Hoek, 1999; Rao & Holt, 2005). In literature, there seems to be a general agreement that flexibility, quality, delivery and costs are the essential and most often cited operational performance areas.

1.1.3 Lean Supply Chain Management and Operational Performance

Lean is a dynamic process of continuous change and is not a standardized; one size fits all approach (Agyekum, Ayarkwa, & Adjei-Kumi, 2013). Lean can also be referred to as an adaptive means of operational performance gains. In the process of the supply chain, lean can be useful to operational management. Many organizations are strategizing in the ways that will make them stand out in the increasing global market completion.

Operational performance can be defined as strategic dimensions through which companies choose to compete amongst other companies in the industry. Operational performance relates to the capabilities that companies have in producing and delivering products to the customers efficiently (Zhu & Sarkis, 2008). In literature, the writers universally agree that flexibility, quality, delivery and cost are the essential and most mentioned operational performance areas (Ward, McCreery, Ritzman & Sharma., 1998; Naras Imhan & Jayaram, 1998). Organizations in the tea service sector should integrate lean supply chain management into the process in order to optimize its operational performance.

1.1.4 Tea Service Sector

The tea sector in Kenya was first introduced in 1903 and commercialization of tea started in 1924 and currently Kenya is third in the production of black tea making China and India to be the first and second respectively (Tea Board of Kenya, 2015). In November 1965 an export auction system was introduced through the management of a body called

EATTA. This auction centre is based in Mombasa where most of the tea is warehoused, handled and shipped. The Colombo tea auction in Sri Lanka is the largest in the world followed by Mombasa Tea Auction in Kenya (International Tea Committee report, 2015). Tea productivity contributes approximately 11% of the Gross Domestic Product (GDP) of agriculture sector in Kenya. In the year 2014, the tea exports amounted to about Kshs. 62 billion which contributed to 26% of the total foreign exchange earnings. Approximately 5 million people in Kenya benefit both directly and indirectly through the proceeds earned from the tea industry. The industry is structured into various bodies with the Tea board of Kenya (TBK) being the top. The other key bodies in the industry in Kenya are tea research foundation of Kenya (TRFK), Kenya tea development agency (KTDA), Nyayo tea zones development corporation (NTZDC), East African tea trade association (EATTA) and Kenya tea growers association.

According to the Tea Board of Kenya the worldwide market for hot beverages especially coffee and tea was forecasted to reach US\$69.77 billion in value and 10.57 million tons in volume terms by the year 2015. Tea is considered to be one of the main component of beverage in the world because of its increasing demand (The Gemological Institute of America, 2011). Kenya grows tea as an export revenue crop and sells more than 90% to the third markets (International Tea Committee Report, 2015). Modern tea consumption is rooted in medicinal use and the alleged health benefits. These benefits have played a major role in the attraction of tea to the consumers and specifically the green tea which is gaining acceptance among health conscious consumers (The Confederation of British Industry, 2011). Currently, tea is produced and made available to consumers in six main varieties which are based on the oxidization and fermentation technique applied. These include orthodox, green tea, jasmine, oolong, white and pu'erh tea. Black tea is mainly

produced and exported by Sri Lanka and Kenya while China has focused more on green tea which is majorly consumed by its residents (Food and Agriculture Organization of the United Nations, 2011).

The trade members in tea industry in Kenya independently carry out the marketing of tea because the industry is liberalized. The Mombasa auction is the largest tea auction centre in the world after Colombo in Sri Lanka and therefore most of the tea is sold through it. EATTA is the body that brings together manufacturers, brokers, buyers and packers. The tea industry in Kenya has adopted this lean philosophy in order to remain competitive in the global market which is dynamic. The Producers can also arrange and sell some of their tea directly to the buyers in various parts of the world without compromising the purpose of the auction. The local tea market consumes 5% of the produced tea in Kenya after the 85% is sold through the auction and 10% through private arrangement. The leading export destinations by Kenya are Pakistan, Egypt and the United, Afghanistan and UAE which account for 70% of total exports from Kenya (AFFA, 2014). According to Shah and Ward, 2003, Lean can be used in different supply chains and especially those that eliminate and improve performance. The tea industry in Kenya can embrace the same to ensure that they optimize the operational performance.

1.2 Research Problem

According to Vonderembse, (2006) competition among firms in the industry has shifted from company orientation to supply chain orientation. Many organization are searching for ways that will make them stand out and gain a competitive advantage in the dynamic global market. The way businesses are conducted is impacted by changing customer's needs, product portfolio, evolving marketplace demographics and geographies. For these reasons the need for flexibility has led many organizations that offer services to depend

on national and international contract services or to move service delivery to low-cost countries, making the supply chain long and more complex. Companies have faced challenges of dealing with scope global market place and the supply chain and still maintain speed and flexibility, elimination of time wasted, effort and materials from all point in the supply chain and meet the needs of customer. Firms have leveraged various tools that will help them in addressing these challenges and show improvements across their businesses (Jones, Lang & LaSalle, 2014). According to Borac, Milovanovic and Andjelkovic, (2010) lean can be referred to a strategic method for gaining competitive advantage and as well as for survival to both the manufacturers and the service organizations. Removing waste and value addition are no longer options for companies. The beginning of lean supply chain management relationships is marked when different members of the supply chain work together to identify the needs of the customer, strategize on various ways to reduce waste and produce products of high quality as well as customer service. According to Winsner, Keah and Choon (2009), organizations who have adopted lean supply chain components have scrutinized each of their routings, billed of materials and tools to identify areas of improvement.

Kenya is the largest tea producer in Africa. The tea manufacturing industry is faced with a lot of challenges that affect the implementation of lean supply chain management components. Cost of electricity and wood fuel, that are necessary in production have increased highly due to environmental uncertainty and government legislation which has an impact on the cost of the final product (Gesimba, 2005). Parris (2013) identified the African challenges to processes excellence to be the little economic development level, people not being conscious, low level of innovation as well as resistance by the employees on the implementation of lean supply chain management components.

A number of studies have been undertaken in the area of lean supply chain management. Azman, (2010) did a study on Lean supply chain implementation in Malaysia's electrical and electronics industry: practice and performance. In the study, he identified lean performance as an intermediary for lean supply chain practices in the Malaysian context and also revealed the influence of lean performance factor on lean supply chain practices. Wanjiku, (2013) undertook a study on LSCM in manufacturing firms in Kenya. She found out that adoption of LSCM had a positive relationship in the performance of the manufacturing organizations. Further, the study found out that in order for LSCM to succeed in the manufacturing sector, the management needed to involve the suppliers as well as acquire more skills and knowledge on the management of LSC. Wasonga, (2014) did a study on lean supply chain management practices in service industry in Kenya a case of Kenyatta National Hospital and found out that there was a positive link between lean supply chain practices and improved supply chain management performance. The study recommended integration of lean supply chain processes, creating awareness and motivation to employees in relation to benefits of lean practices and enhancing organizational awareness and involvement to make operations of the hospital efficient and effective. The study also recommended further study to be undertaken in the areas of lean supply chain management and its effects on the operational performance of the organizations.

Hejna and Hosking, (2003) undertook a study on operational efficiencies and proposed various strategies which are critical in gaining operational efficiency. Their research revealed that the expected enhancements in operational performance are mostly achieved in replacement of facilities but that such improvements are not obtained in all cases.

Increase in service volumes are important positive changes that are identified in the service delivery systems.

Having understood crucial role played by the service sector and the bridge offered by lean supply chain management in enabling this sector to achieve competitiveness several questions arise that needed to be answered. For instance: to what extent has lean supply chain management affected the operational performance of firms in Kenya's service sector? What are the main drivers of lean supply chain management in firms in Kenya's service sector? And what challenges are faced by these firms when implementing lean supply chain management?

1.3 Research Objectives

The general objective of the study was to investigate the effect of lean supply chain management components on operational performance in the tea factories in Kenya.

The specific objective was:

- i. To establish the relationship between lean supply chain management and operational performance among tea factories in Kenya.

1.4 Value of the Study

This study will benefit the academicians, the policy makers and the practitioners. The study explored various lean supply chain components used in the service sector. Kenya's vision 2030 has identified agriculture as a key sector that is important in propelling Kenya's economy to a 10% growth rate. The vision targets at adding value to Kenya's farm and livestock products before they are forwarded to both local and international markets. This vision should be rooted in lean supply chain management in order to ensure that operational performance is realized. It is expected to add more knowledge in field of

supply chain management and therefore scholars are to benefit from this study because it forms a base for further research and also provides an understanding of the responses that can be adopted by Tea Service sector firms in Kenya. This study assimilates the various contemporary theories and borrowed from a myriad of intellectuals in order to bring out the critical areas of operational performance in the industry.

The findings will be of help to the practitioners in finding out which lean supply chain management components are essential in improving organizational performance. The study will also be beneficial to the managers especially on decision making to improve on other management strategies in the service sector and help identify the major reasons as to why organizations in this sector should now start embracing lean supply chain management components as a strategy to enhance operational performance.

The study will also be beneficial to the policy makers as it will seek to establish the inadequacy and capability of the tea service sector firms in Kenya. This will help in decision making especially where the goal is to achieve optimum operational performance.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature on the concept of the study. The chapter has looked at lean supply chain management and operational performance. It also discusses the theoretical underpinning of the study as well as the framework linking lean components and operational performance.

2.2 Theoretical Foundation

To be successful, organizations all over the world must possess comparative advantage which is in various forms including low cost of production and differentiated products of which they can choose either to command premium prices. According to Porter (1990), organizations need to provide products of high quality and offer services more efficiently in order to sustain competitive advantage. This section focused on the theoretical underpinnings of the study including the resource dependence theory, transaction cost analysis and theory of constraints.

2.2.1 Resource Dependence Theory

Resource Dependence Theory (RDT) was postulated by Godfrey (1998) and he suggested that member firms in the supply chain should be dependent and cooperate with each other in seeking greater performance gains in the long run as opposed to focusing on short term gains at the expense of other members. In resource dependence theory, firms rely on the resources provided by others firms to sustain growth and competitive advantage, including organizations that depend on them (Paloviita & Luoma-aho, 2010). RDT assumes that firms are not fully autonomous with respect to strategic critical resources for survival. In lean supply chain management, resource allocation and material recovery are key resources in the organization that require supply chain partnership to improve on

performance. Organizations need to control critical resources, for example, human resources, procedures, material sources, standards, as well as distribution networks to implement lean supply chain management components.

Firms that consider implementation of lean supply chain management components should take into account the supply chain members' interdependency, efficiency, effectiveness and the quality of their association that determines success in the implementation. According to Zhu (2010), RDT highlights a very important insight that organizations without the necessary resources to achieve their goals are likely to cultivate relationships with others for acquisition of the resources. This view considers supplier and customer relationship as very important connections for organizations to reduce the dynamics that surround their operating environment. In order to manage the internal and external coordination of lean supply chain management and gain in the outcomes of the performance, there is need for inter-organizational relationship (Zhu & Sarkis, 2007).

2.2.2 Transaction Cost Analysis Theory

The Transaction Cost Analysis Theory identifies organizations as economic hubs using the most efficient instruments for transactions and is useful in analyzing the outsourced decisions that are considered important in operational performance (Williamson, 1981). This theory states that in use of any market various costs will be involved including those that relate to operational costs. According to Williamson, (1985), in the economic system various costs arise whenever a transaction takes place. He defines these costs as transaction costs and groups them into three categories; Enforcement costs to enforce performance, information costs, related to looking for information on the prospective partner, resolve conflicts and negotiate contracts and bargaining costs for negotiating and closing on deals in which all probable instances in future transactions are considered.

Extreme costs may cause transactions to be reassigned to other organizations through outsourcing. According to Williamson (1991), to attain better cooperation between the members of a supply chain, organizations adopt market transactions by governing them through long term contracts. These contracts improve the relationship among member firms of a supply chain.

If a firm decides to outsource any of its services, this will lead to an increase in the transaction costs which could have an effect on its economies of scale (Grover, 1996) because of the need of increased internal management due to increased size of the firm. Through outsourcing an organization increases its external coordination costs which depend on the level of asset specificity. High asset specificity arises where the firm's services and products are modified and not easily substitutable to those of other vendors (Williamson, 1985). On the other hand, more standardized products and services could reflect lower external coordination costs and the vendor may achieve economies of scale and would be a more viable option for outsourcing.

2.2.3 Theory of Constraints

The theory of constraints is a system management philosophy developed by Goldratt in the year 1984. This theory suggests that managers should focus on effectively managing the capacity and capability of the few core constraints contained in the organization if they are to improve the operational performance of the organization. The fundamental notion of the theory of constraints is that constraints establish the limits of performance for any system in the organization.

According to Dettmer (1996), theory of constraints challenges the managers on the need to reconsider some of their essential assumptions that help in achieving their goals and improve the operational performance. This theory focuses on understanding and

managing the constraints that stand between an organizations and the attainment of its goals. Lean supply chain management as a strategy plays a major role in the performance of the organization that implements it and therefore the theory of constraints explains how the constraints that will be identified in the implementation of lean can be handled since theory of constraints acts as a thinking process and helps the managers in coming up with simple solutions to handle some of the most complex hitches (Goldratt, 2011).

According to Goldratt, (1984) the main idea of the Theory of Constraints is that every real system such a profit making enterprise must have at least one constraint. It provides a reliable process that insists on follow through and focuses on the enhancement of strategies in the areas where they will be of great impact on the bottom line and it's all about focus and follows through (William, 1996).

2.3 Components of Lean Supply Chain Management

Lean is a management philosophy that is focused on customer value through elimination of waste and continuous improvement in a system through the application of lean principles, practices and techniques (Paschal, Engstrom & Longstrand 2012). According to Jaskanwal, Deep and Rajdeep, (2013) lean supply chain focuses more on eliminating waste from both internal and external supply chains and this can only be achieved by reducing excessive inventories, replenishment times and unnecessary costs. The traditional approach is to understand the end-to-end process within an organization's value stream. Through this approach, the activities that can be eliminated or increased to gain efficiencies are modified in order to streamline the whole process. According to Eaton, (2013) extending the value stream from a single organization to encompass the whole supply chain gives us the concept of a lean supply chain management. The study focused on lean procurement, lean production, lean transportation and lean warehousing.

2.3.1 Lean Procurement

According to Wilson and Roy, (2009) the lean model is founded on procedures and methodologies it's just in time and total quality management forerunners and lean procurement is conceptualized differently amongst organizations. Wilson and Roy, (2009) argues that lean procurement can be considered as a philosophy, a technique, a work culture, a management concept, a value or a methodology. According to Puschmann and Alt, (2005) to make lean procurement successful members of the supply chain are expected to be reliable as well as show commitment in the whole process

Ellram, (1995) describes lean procurement principles as generally small lot sizes purchased frequently from a few suppliers who deliver the products in exact quantities at an agreed time and place. Under lean procurement suppliers are evaluated and chosen using several factors such as quality, culture, reliability behaviors and price (Ellram, 1995). Waters-Fuller, (1995) explains further that buyers in the lean systems are more flexible when designing specifications of their requirements and information is shared freely among the members. According to Morgan and Hant, (1994) buyers and suppliers relationship is based on the period they have worked together and has shown commitment.

2.3.2 Lean Production

Lean production concept is an alternative to the traditional manufacturing models (Hayes, 1981; Krafjick, 1998). Several benefits have been realized by organizations that have applied lean production practices including but not limited to increased quality time, reduced waste of materials as well as reduced lead times (Lewis, 2000). The principles of lean production are applicable in all the industries across the global market (Womack, 1990).

Lean production is a level of input resources in the system for a given level of output (Lewis, 2000). In order to achieve this, waste has to be eliminated from the system. Lean production emphasizes the need to make productive activities flow directly towards the customer. However, the system allows the customer to pull the product exactly when needed through the operation.

Lean production model show how organizations can achieve performance advantage due to their commitment on improving flow of material and information among all the business functions as well as emphasis on customer pull rather than organization push (Womack & Jones, 1996). Motwani, (2003) defines lean production as an enhancement of mass production which is as a result of producing the right product the first time, efforts to continued improvement, quality in products and processes, minimizing waste as well as flexible production. According to Krafcik, (1998), lean production produces higher levels of quality and productivity and better customer responsiveness.

2.3.3 Lean Transportation

According to Villarrel, Garcia and Rosas, (2009) lean methodology is extended in different areas of supply chain management of the organization. In transportation the concept of lean techniques when applied will yield important benefits for an organization. In most of the transportation networks exists significant waste and unnecessary costs (Mckinnon, 2003). In the recent times, customers are recognizing the value that transportation adds and therefore this is becoming one of the differentiating factors in the global market.

The concept of lean transportation as a component of lean supply chain management has four lean transportation laws which were proposed by Taylor and Martinchenko (2006) to help explain the impact of lean transportation on the operational performance of an organization. These laws include the law of daily event management, the law of transportation waste, the law of transportation performance as well as the law of transportation strategy. Hines and Taylor, (2000) suggested adaptation of a lean methodology for elimination of waste in the transportation process and they proposed a scheme with four general stages including alignment with the company's strategic, identification of waste, structuring strategy options and selection, and then implementation and control.

2.3.4 Lean Warehousing

Lean warehousing is a very important component of LSCM which can be useful to the distribution area to reduce waste, increase the utilization of the available space, improve on productivity and meet the increasing demands of the customer (Ackerman, 2007). According to Ackerman and Bodegraven, (2007) warehouse in any age comes down to only two things: the management of time as well as the management of space. They further added that the warehouse was and still is used to manage the freight costs in this environment and it's also used in concert with advances in the capabilities to deliver and improve on customer service.

Transforming the operations of an organization to a lean warehouse environment does not play a role of just another venture or program. It is a different way of doing business (Visser, 2014). According to Reichart and Holweg (2007) for organizations to maximize the value of lean warehousing they need to adopt lean distribution. Lean distribution

refers to minimizing waste in the entire supply chain while ensuring that the right products are available to the final customer according to their specifications.

2.4 Empirical Review on Lean Supply Chain Management

A number of studies have been undertaken in the area of lean supply chain management. Azman, (2010) did a study on Lean supply chain implementation in Malaysia's electrical and electronics industry: practice and performance. The study identified lean performance as an intermediary for lean supply chain practices in the Malaysian context and revealed the influence of lean performance factor on lean supply chain practices. Hejna and Hosking, (2003) undertook a study on operational efficiencies and proposed various strategies that are considered important in achieving operational efficiency. Their research showed that projected developments in operational efficiency are achieved in replacement of facilities but such improvements does not apply to all the cases and are often attributable to increased service volumes as they are to fundamental changes in the service delivery systems.

In Kenya, research on lean systems has majorly highlighted what lean systems have been adopted in both service and manufacturing industries. A case study of Bamburi Cement Limited by Rono, (2013) looked at lean manufacturing practices in a continuous process industry. He pointed out that few scholars have investigated application of the lean manufacturing tools and techniques to a continuous process industry. His study reveals that lean manufacturing is not well implemented. Wanjiku, (2013) undertook a study on LSCM in manufacturing firms in Kenya. She found out that adoption of LSCM had a positive relationship with the operational performance of the manufacturing organizations. Further, the study found out that in order for LSCM to succeed in the

manufacturing sector, the management needed to involve the suppliers as well as acquire more skills and knowledge on the management of LSC.

Wasonga, (2014) did a study on lean supply chain management practices in service industry in Kenya a case of Kenyatta National Hospital and found out that lean supply chain practices and improved supply chain performance had a positive link between them. The study recommended integration of lean supply chain processes, creating awareness and motivation to employees in relation to benefits of lean practices and enhancing organizational awareness and involvement to make operations of the hospital efficient and effective. The study also recommended further study to be undertaken in the areas of lean supply chain management and its effects on the operational performance in organizations.

2.5 Conceptual Framework

The conceptual framework shows the relationship between LSCM components and operational performance as per figure 2.1.1 below.

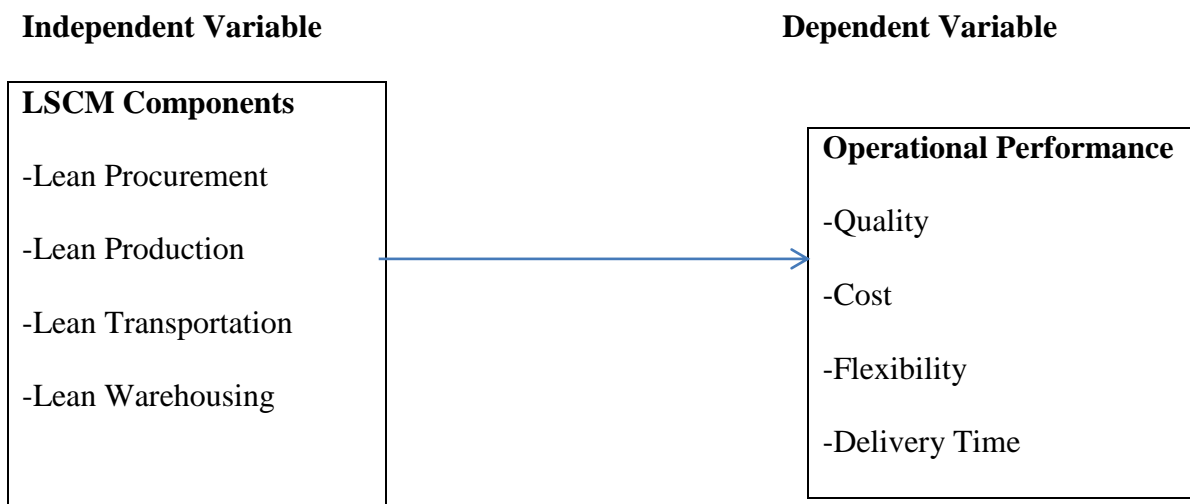


Figure 2.1.1 Conceptual Framework

Source: Author (2016)

The aim of the conceptual framework is to examine and describe the relationship between the independent variable and the dependent variables. Operational performance will be measured in terms of time, cost reduction, quality and ability to adjust to customer requirements.

2.6 Summary of Literature Review

A number of studies have been undertaken in the area of lean supply chain management some of which were done in the area of manufacturing firms by Wanjiku, (2013) where she found out that the adoption of lean supply chain management had a positive relationship to the performance of the manufacturing firms but the organizations needed to involve the suppliers as well as acquire more skills and knowledge on the management of lean supply chain. Wasonga, (2014) did a study on lean supply chain management practices in the service industry a case of Kenyatta National Hospital and recommended that more studies be done in the area of lean supply chain management in the service industry.

Other empirical studies have also been brought to light in order to borrow from the various scholars and industries on how first hand similar challenges can be resolved in the industry as a whole. A case study of Bamburi Cement Limited by Rono, (2013) looked at lean manufacturing practices in a continuous process industry. He pointed out that few scholars have investigated application of the lean manufacturing tools and techniques to a continuous process industry. His study revealed that lean manufacturing is not well implemented. Azman, (2010) did a study on Lean supply chain implementation in Malaysia's electrical and electronics industry: practice and performance. This study identified lean performance as an intermediary for lean supply chain practices in the Malaysian context and revealed the influence of lean performance factor on lean supply

chain practices. This study will look at the influence of lean supply chain management components on the operational performance among tea factories in Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section presents the research methodology that was used to carry out this research. It embodies the research design, population and sampling, data collection instruments and data analysis techniques.

3.2 Research Design

A descriptive cross-sectional survey was adopted in examining and describing the LSCM components and their effects on operational performance. Sekeran and Boujje (2009) assert that a descriptive study is undertaken with an aim of determining and describing the characteristics of the variables of interest in a situation while an exploratory study is undertaken in instances where little is known about a situation at hand. The research was a survey done on the tea service industry in Kenya to ascertain the effects of LSCM to operation performance.

3.3 Population and Sampling

The population for the study was the 54 KTDA factories. The study was census based on this population being relatively small.

3.4 Data Collection

The primary data was collected by the use of a standard questionnaire that was administered through emails as well as drop and pick method. A follow up by email and telephone was used to help rise the response rate. The questionnaire sought data from the Operation Managers or their equivalents of the 54 KTDA factories. This implies that there was one respondent in each factory.

3.5 Data Analysis

The raw data was collected and organized in a systematic manner that enabled analysis. Data analysis is a process that involves reducing accumulated data into convenient size, developing summaries, checking on how the data behaves through patterns and applying statistical analysis methods. Descriptive statistics mainly frequencies, percentages, and mean were used to summarize the responses. Linear regression was also applied to model the relationship between the dependent variable and the independent variables. The results were presented in form of tables and charts for ease of understanding and interpretation.

The regression equation assumed the following form:

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

Where:

Y = Operational performance

β_0 = Constant factor

X_1 = Lean Procurement

β_1 = Coefficient of lean procurement

β_2 = Coefficient of lean production

β_3 = Coefficient of lean Transportation

β_4 = Coefficient of lean warehousing

X_2 = Lean Production

X_3 = Lean Transportation

X_4 = Lean Warehousing

ε = Error term

The data analysis entailed calculating the mean, standard deviation and performing the regression analysis. The descriptive analysis was used to analyze the data that was generated from section B and C of the questionnaire to meet the objective of the study. The regression model was used to link the independent variables to the dependent variable. The mean was calculated from scores that were obtained from the Likert scale data. Standard deviation was calculated to show how lean supply chain management components by tea factories deviate from the calculated mean. Operational performance was measured by calculating actual percentage mean of the data. The results were interpreted and presented using tables to explain the study findings. The Statistical Product and Services Solution (SPSS) software was utilized.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The aim of the study was to determine the effect of lean supply chain management components and the operational performance of the tea factories in Kenya. This chapter unveils an analysis of data collected and discusses the findings on the subject of the study.

4.2 Demographic Information

The respondents provided information about the tea factory as well as themselves.

4.2.1 Respondent Response Rate

The table below shows that out of the targeted 54 respondents, 42 successfully filled the questionnaire. This represents a response rate of 77.8%. This response was good for analysis based on Mugenda and Mugenda (2003) who stipulated a response of 70% and over is excellent for analysis.

Table 4.1 Response Rate

Response	Frequency	percentage
Response	42	77.8
Non Response	12	22.2
Total	54	100

Source: Research Data (2016)

4.2.2 Period in Operation

From Table 4.2 which contains information on the respondents on the period the company has been in operation, the results show that 5 (11.9%) reported that their companies had been in operation for the period under 5 years, 8 (19%) reported that their companies had been in operation for the period ranging 5-15 years, 11 (26.2%) commented that their companies had been operating for the period ranging between 16 – 25 years while 18

(42.9%) responded that their companies had been in operation for over 25 years of operation. This shows that most of the companies had been in operation for over 25 years.

Table 4.2: Company Operation

Period	Frequency	Percentage
Under 5 Years	5	11.9
5 – 15	8	19
16 - 25	11	26.2
Over 25 years	18	42.9
Total	42	100

Source: Research Data (2016)

4.2.3 Period Worked in the Tea Factory/Company

From Table 4.3 which contains information on the respondents' period worked in the tea factory, the results show that 8 (19%) of those who responded had worked for the company for less than 2 years, 18 (42.9%) respondents had worked for a period 2-5 years, 7 (16.7%) had worked for a period between 6-10 years while 9(21.4%) had worked for over 10 years in the tea factory. This means that a majority of the respondents have worked for more than 2 years and therefore could be presumed to have the requisite professional knowhow that could enable them provide relevant information.

Table 4.3: Period Worked in the Company

Period	Frequency	Percentage
Less than 2 years	8	19
2 - 5	18	42.9
6 - 10	7	16.7
Over 10 Years	9	21.4
Total	42	100

Source: Researcher, 2016

4.2.4 Tons of Tea Processed Annually

Table 4.4 contains information on the tons of tea processed by factories, the results show that 5 (11.9%) process 0-5 tons, 3 (7.1%) process between 6 – 10 tons, 4 (9.5%) 11-15 tons while 30 (71.5%) processes over 15 tons.

Table 4.4: Tons of Tea Processed

Tons	Frequency	Percentage
0 - 5	5	11.9
6 - 10	3	7.1
11 - 15	4	9.5
Over 15	30	71.5
Total	42	100

Source: Research Data (2016)

4.3 Lean Supply Chain Management Components

This study aimed at establishing the effect of lean supply chain management components on the operational performance of the tea factories in Kenya. All the respondents agreed

that their factories were using the Lean supply chain Management. In their response 5 (11.9%) said they were considering it currently, 3(7.1%) used it for one year, 5(11.9%) used it for two years, 5(11.9%) for three years while 24(57.2%) for more than four years. The respondents were requested to indicate the extent to which they had been practicing the lean supply chain components. The components included; Lean Procurement, Lean Production, Lean Transportation and Lean Warehousing.

4.3.1 Lean Procurement

In order to calculate the central measure of tendency, mean was calculated and as seen in in the table below, the respondents were agreeing on the lean procurement component adopted by the factories since the mean spread around 2. This shows that the factories were using the lean supply chain components that would positively influence their operational performance.

Table 4.5: Lean Procurement

	Lean Procurement	Mean	Std. Deviation	Skewness
1	The company has included LSCM strategies in its strategic planning process	2.26	0.828	1.080
2	The company has integrated suppliers in the entire supply chain improve customer service	1.91	0.759	0.805
3	The company has mechanisms in place to ensure free flow of information to a supply chain	1.91	0.790	0.806
4	Your company creates real time visibility into inventory in motion	2.43	0.801	1.188
5	Your company has eliminated the lead times for critical materials	2.17	0.794	1.018

Source: Research Data (2016)

The above table indicated that all the variables were positively skewed posing a positive effect of using lean procurement component. Lean supply chain management components in the tea factories have been able to display consistency and stability in operational performance since the strategies have been included in the management planning has shown in the table above.

4.3.2 Lean Production

The mean of the factories that have implemented lean production in the supply chain was 2.21 and a standard deviation of 0.925. All yielded a positive skewness as shown in the table below. This meant that the factories had started realizing the potential benefits and importance of integrating its vision, culture, and strategy with the purpose of serving their customers better.

Table 4.6: Lean Production

	Lean Production	Mean	Std. Deviation	Skewness
1	Your company has implemented lean production in the supply chain	2.21	0.925	1.049
2	There is an increase in product flow through elimination of all non-value added activities in your company	2.36	0.879	1.143
3	There is an integration of vision, culture, and strategy to serve the customers with high quality, low cost and short delivery times in your company	1.90	0.850	0.799
4	Your company has flexible production techniques using minimal inventories of raw materials.	2.62	0.936	1.288

Source: Research Data (2016)

4.3.3 Lean Transportation

On the lean transportation as a component of lean supply chain management, the respondents answered the questions as per the below table of which all the responses have a positive skewness and a strong standard deviation as well.

Table 4.7: Lean Transportation

	Lean Transportation	Mean	Std. Deviation	Skewness
1	The company has a sound transportation system	1.57	0.630	0.461
2	There is a relation between transportation and JIT system in your company	2.21	0.750	1.047
3	The company has a smooth flow of goods and services to the customer	1.48	0.594	0.357

Source: Research Data (2016)

4.3.4 Lean Warehousing

The factories had integrated its systems and they had implemented lean warehousing. There was also support from the management in providing enough resources. The responses were analyzed as per below table.

Table 4.8: Lean Warehousing

	Lean Warehousing	Mean	Std. Deviation	Skewness
1	The company has implemented lean warehousing	2.31	0.869	1.113
2	The management of the company supports lean warehousing by providing enough resources	2.26	0.964	1.082
3	The company has a distribution centre	2.57	1.016	1.265
4	The mechanisms in place have reduced waste and operational cost	2.19	0.773	1.030
5	Your company has integrated its systems and improved its operational performance as a result	1.83	0.824	0.732

Source: Research Data (2016)

4.4 Operational Performance

The study aimed at establishing the extent to which lean supply chain management components had effect to the operational performance to the tea factories. Even though operational performance has not reached its potential, the factories have a lot to do in order to achieve its optimal. However the adoption of lean supply chain management components has helped in reducing the operational cost which is as a result of reducing waste in terms of material, time as well as space in order to ensure that quality products are delivered to the customers in good time. This has contributed positively to the performance of the factories.

Table 4.9 Operational Performance

	The relationship between LSCM components and Operational Performance	Mean	Std. Deviation	Skewness
1	Organizational operational efficiency has improved due to the adoption of the lean supply chain management components by the company	1.88	0.670	0.775
2	LSCM adoption has reduced operational costs	1.95	0.764	0.840
3	Adjustment to customer needs has improved with LSCM components in place	2.35	0.692	1.141
4	The organization has been able to reduce the level of waste since it adopted the LSCM components	2.05	0.795	0.921
5	Suppliers have adhered to supply goods and services of high quality	1.95	0.764	0.840
6	The time of service delivery to customers has improved	1.90	0.617	0.796
7	Order time of the products has reduced	2.12	0.550	0.975
8	Quality of the products has been enhanced	2	0.663	0.880
9	Employees are able to identify good that are of high quality	2	0.698	0.881

Source: Research Data, 2016

Relationship between Operational Performance and LSCM components

A multiple regression model was applied to determine the relationship between the dependent variable which in our case was the operational performance and the independent variables which in our case were lean procurement, lean production, lean transportation and lean warehousing.

Where Y is the operational performance, X₁ is Lean Procurement, X₂ is Lean Production, X₃ is Lean Transportation and X₄ is Lean Warehousing. In order to determine the relationship between lean supply chain management components and operational performance, a regression model was applied. The linear regression model used took the following form:

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

Where: Y is the dependent variable which is operational performance, β_0 is the Y intercept; $\beta_1, \beta_2, \beta_3$ and β_4 and X₁, X₂, X₃ and X₄ are the predictor variables. Where X₁ represents lean procurement, X₂ represents lean production, X₃ represents lean transportation X₄ represents lean warehousing while ε is the error term.

Operational performance was regressed against lean procurement, lean production, lean transportation and lean warehousing yielding the results discussed below.

Table 4.11: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	1.127	4	.282	1.818	.146 ^b
Residual	5.737	37	.155		
Total	6.865	41			

a. Dependent Variable: Operational Performance

b. Predictors: (Constant), Lean Procurement, Lean Production, Lean Transportation, Lean Warehousing

Source: Researcher, 2016

The F-ratio in the tests in the ANOVA table above explains whether the entire regression model is good for the data. The table showed that the independent variables statistically predict the dependent variable significantly, $F(4, 37) = 1.818$.

Table 4.12 Dependent and Independent variables coefficients

Coefficients^a						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	Constant)	1.738	.478		3.639	.001
	Lean Procurement	.087	.114	.116	.766	.449
	Lean Production	.078	.125	.095	.622	.538
	Lean Transportation	-.221	.127	-.267	-1.738	.091
	Lean Warehousing	.140	.086	.247	1.635	.111

a. Dependent Variable: Operational Performance

From the regression model above;

Predicted operational performance (Y) = 1.738(constant + error) + (0.087* Lean Procurement) + (0.078 * Lean Production) – (0.221 * Lean Transportation) + (0.140 * Lean Warehousing)

This is shown from the Coefficients table above. Hence, the following regression model was established:

$$Y = 1.738 + 0.087X_1 + 0.78X_2 - 0.221X_3 + 0.140X_4$$

Where X_1 represents Lean Procurement; X_2 represent Lean Production; X_3 represents Lean Transportation while X_4 presents Lean Warehousing. From our study, Lean Procurement factor was 0.087. The unstandardized coefficient β_1 for lean procurement is equal to 0.087, (see Coefficients table above). This meant that for lean procurement factor adopted, there was a positive/increase of 0.087 on operational performance of the tea factories.

$\beta_3 = -0.221$. For every Lean transportation factor adopted by the tea factories, the performance would decrease by 0.221. This meant that the factory did not have to adopt lean transportation factors. The other coefficients could be interpreted just as the above. From the coefficients table, the statistical significance for each of the independent variable was also tested. The t-value and the corresponding p-value. Lean transportation had a $p < 0.05$ meaning that it was statistically significant to zero. Lean procurement, lean production and lean warehousing had $p > 0.05$ which meant they had a reversed statistical significance different to zero.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary discussion on the effect of lean supply chain management components on the operational performance of the tea factories in Kenya. The general findings of the research are discussed in the conclusion followed by the recommendations, the limitations of the study and the suggestions for further study.

5.2 Summary of Findings

The study targeted a sample of 54 Kenya tea development agency tea factories of which the questionnaires sent to this targeted respondents, 42 responded. Giving a response rate of 77.8%. Based on the number of years the factory had been in operation, 18 factories presenting 42.9% which represented the highest rate had been in operation for over 25 years citing the stability of the industry. The findings further show that 5 (11.9%) reported that their companies had been in operation for the period under 5 years, 8 (19%) reported that their companies had been in operation for the period ranging 5-15 years, 11 (26.2%) commented that their companies had been operating for the period ranging between 16 – 25 years.

Regarding the respondents' period of time they have worked in the tea factories, the majority of the respondents had worked for a period between 2-5 years which had a frequency of 18 according to the findings. The results further show that 8 (19%) of the respondents had worked for the company for less than 2 years, 7 (16.7%) had worked for a period between 6-10 years while 9(21.4%) had worked for over 10 years in the tea factory. This means that a majority of the respondents have worked for more than 2 years

and therefore could be presumed to have the requisite professional knowhow that could enable them provide relevant information.

All the sampled factories had adopted the LSCM components in their operations. All the four components were found to be important on the operational performance of the companies. All the components were positively skewed stating their importance in the operations of the companies.

5.3 Conclusion

The study reveals that operational performance is directly proportional to the lean supply chain management components. This means that indeed companies had adopted lean supply chain management components in their operations and that this had an effect on the operational performance especially lean production, lean procurement and lean warehousing. Most of the companies have been in operation for more than 25 years. In the view of lean supply chain management components, these companies have adopted lean procurement, lean production, lean transportation as well as lean warehouse of which all were positively skewed. Support by management in providing resources of which plays a major role in the implementation of lean supply chain management components is key in ensuring that the companies achieve optimal operational performance.

In order to realize the full benefits of lean supply chain management components, the management needed to make sure that their suppliers were well communicated to and that they adhered to supply goods that were of high quality in order to ensure that quality of the final product has been enhanced and that order time has been reduced to meet the customer needs and hence improve on operational performance.

5.4 Recommendations

The study will be very beneficial to the stakeholders in the tea industry at large as it brings in the importance of lean supply chain management components. After the survey, several recommendations have been suggested. Since tea export plays a major role in the economy of Kenya, all the players within the tea industry should adopt full implementation of lean supply chain management components in order to experience improved operational performance. Implementation of lean supply chain management components in operations of the tea industry is highly recommended. This is because of the benefits that can be realized if fully implemented. The tea factories will benefit out of implementation of lean procurement, lean production, lean transportation as well as lean warehousing by improving service delivered to customers, reducing waste in terms of time hence no delays, improvement in efficiency of services, production of quality products as well as other benefits that come along with the implementation of lean supply chain management components.

The study further recommends on the usage of LSCM components not only to the tea factories but also on all sectors. If done, all the sectors would observe LSCM components that will see the country improve on its economy through reduced cost of production and hence improved operational performance of the sectors. There is need for information sharing on the lean supply chain management components and their importance to the improvement of the operations. Therefore, the government through the ministry of agriculture needs to identify areas of concern on the tea industry and provide enough information in order to ensure that the members in the industry understand the importance of lean supply chain management components and how they can be implemented. The manufacturers as well as the suppliers should collaborate with the government to give this

information to all the stakeholders in order to realize improved performance. The implementation of these recommendations will give value to this study

5.5 Limitations of the Study

Time and financial constraints were limiting factors to this study which made it hard for exhaustive and comprehensive study to be done. The interviewees had tight schedules and could only manage limited time to answer to the questions and provide the required data and hence could have contributed to important information being left out which could make this research better. The study did not include all the lean supply chain management components.

5.6 Suggestions for Further Study

Areas of further studies identified by this study involve the challenges of adopting lean supply chain management components as well as a study to explore more of the lean supply chain management components other than lean production, lean procurement, lean transportation and lean warehousing. A similar study is recommended to be undertaken in a different industry in Kenya or any other country. Studies also related lean supply chain management to other aspects of the economy. A further study is also recommended to find out what other factors contribute to the operational performance of the company.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

You are requested to fill this questionnaire to the best of your knowledge. It will be seeking to obtain information from the heads of operations of the tea factories. This information is intended for academic purposes only and will be treated with confidentiality. Please complete all sections of this document. All questions are interrelated and are equally important for the study.

Part A: Bio data

1. Name of the respondent (optional).....
2. Name of the company.....
3. Gender: Male Female
4. How long has your company been in operation?
 - a) Under 5 years
 - b) 5-15 years
 - c) 16-25 years
 - d) Over 25 years
5. How long have you worked in this company?
 - a) Less than 2 years
 - b) 2-5 years
 - c) 6-10 years
 - d) Over 10 years
6. How many tons of tea do you process annually?
 - a) 0-5

b) 6-10

c) 11-15

d) Over 15

Part B: Lean supply chain management components (LSCM)

7. How long has your organization established LSCM?

a) Considering it currently

b) 1 year.

c) 2 years.

d) 3 years.

e) More than 4 years

8. Please tick appropriately the extent to which your organization has been practicing the following lean supply chain management components. (Use the scale to tick the most appropriate response)

1) Strongly agree 2) Agree 3) Moderate extent 4) Disagree 5) strongly disagree

	Lean Procurement	1	2	3	4	5
1	The company has included LSCM strategies in its strategic planning process					
2	The company has integrated suppliers in the entire supply chain improve customer service					
3	The company has mechanisms in place to ensure free flow of information to a supply chain.					
4	Your company creates real time visibility into inventory in					

	motion.					
5	Your company has eliminated the lead times for critical materials					
	Lean Production	1	2	3	4	5
1	Your company has implemented lean production in the supply chain					
2	There is an increase in product flow through elimination of all non-value added activities in your company					
3	There is an integration of vision, culture, and strategy to serve the customers with high quality, low cost and short delivery times in your company					
4	Your company has flexible production techniques using minimal inventories of raw materials.					
	Lean Transportation	1	2	3	4	5
1	The company has a sound transportation system					
2	There is a relation between transportation and JIT system in your company.					
3	The company has a smooth flow of goods and services to the customer.					
	Lean Warehousing	1	2	3	4	5
1	The company has implemented lean warehousing					
2	The management of the company supports lean warehousing by					

	providing enough resources					
3	The company has a distribution center.					
4	The mechanisms in place have reduced waste and operational cost.					
5	Your company has integrated its systems and improved its operational performance as a result					

Part C: Operational Performance

9. To what extent do you agree with the following statements regarding Lean supply chain Management components in your organization? The scale below will be applicable:

1) Strongly agree 2) Agree 3) Moderate extent 4) Disagree 5) strongly disagree

	The relationship between LSCM Components and Operational Performance	1	2	3	4	5
1	Organizational operational efficiency has improved due to the adoption of the lean supply chain management components by the company					
2	LSCM adoption has reduced operational Costs					
3	Adjustment to customer needs has improved with LSCM components in place					
4	The organization has been able to reduce the level of waste since it adopted the LSCM components					
5	Suppliers have adhered to supply goods and services of high					

	quality					
6	The time of service delivery to customers has improved					
7	Order time of the products has reduced					
8	Quality of the products has been enhanced					
9	Employees are able to identify good that are of high quality					

Thank you for your response.

APPENDIX II: LIST OF KTDA TEA FACTORIES

	KTDA MANAGED TEA FACTORIES
1	Chebut Tea Factory Company Limited
2	Chinga Tea Factory Company Limited
3	Gacharage Tea Factory Company Limited
4	Gachege Tea Factory Company Limited
5	Gathuthi Tea Factory Company Limited
6	Gatunguru Tea Factory Company Limited
7	Giachore Tea Factory Company Limited
8	Githambo Tea Factory Company Limited
9	Githongo Tea Factory Company Limited
10	Gitugi Tea Factory Company Limited
11	Ikumbi Tea Factory Company Limited
12	Imenti Tea Factory Company Limited
13	Iriani Tea Factory Company Limited
14	Kagwe Tea Factory Company Limited
15	Kambaa Tea Factory Company Limited
16	Kangaita Tea Factory Company Limited
17	Kanyenya-ini Tea Factory Company Limited
18	Kapkatet Tea Factory Company Limited
19	Kapkoros Tea Factory Company Limited
20	Kapsara Tea Factory Company Limited
21	Kapset Tea Factory Company Limited
22	Kathangariri Tea Factory Company Limited
23	Kebirigo Tea Factory Company Limited
24	Kiamokama Tea Factory Company Limited
25	Kiegoi Tea Factory Company Limited
26	Kimunye Tea Factory Company Limited
27	Kinoro Tea Factory Company Limited
28	Kionyo Tea Factory Company Limited
29	Kiru Tea Factory Company Limited
30	Litein Tea Factory Company Limited

31	Makomboki Tea Factory Company Limited
32	Mataara Tea Factory Company Limited
33	Michimikuru Tea Factory Company Limited
34	Mogogosiek Tea Factory Company Limited
35	Momul Tea Factory Company Limited
36	Mudete Tea Factory Company Limited
37	Mungania Tea Factory Company Limited
38	Mununga Tea Factory Company Limited
39	Ndimba Tea Factory Company Limited
40	Nduti Tea Factory Company Limited
41	Ngere Tea Factory Company Limited
42	Njunu Tea Factory Company Limited
43	Nyamache Tea Factory Company Limited
44	Nyankoba Tea Factory Company Limited
45	Nyansiongo Tea Factory Company Limited
46	Ogembo Tea Factory Company Limited
47	Ragati Tea Factory Company Limited
48	Rukuriri Tea Factory Company Limited
49	Sanganyi Tea Factory Company Limited
50	Tegat Tea Factory Company Limited
51	Theta Tea Factory Company Limited
52	Thumaita Tea Factory Company Limited
53	Tombe Tea Factory Company Limited
54	Weru Tea Factory Company Limited

APPENDIX III: LEAN SUPPLY CHAIN MANAGEMENT COMPONENTS AND OPERATIONAL PERFORMANCE

Respondent	Y	X ₁	X ₂	X ₃	X ₄
1	2.2	2.0	3.0	1.7	1.6
2	2.3	1.6	2.8	1.0	1.4
3	1.4	1.6	2.8	3.0	2.2
4	1.4	1.4	2.3	1.3	1.6
5	1.8	1.4	1.0	1.7	1.8
6	1.2	1.2	1.5	2.3	1.0
7	1.9	3.0	1.0	1.7	1.2
8	1.8	3.4	1.0	2.3	1.2
9	1.7	2.0	4.0	1.7	2.0
10	1.8	2.4	2.3	1.7	2.0
11	2.0	3.6	2.0	1.7	3.2
12	1.2	2.0	2.8	2.7	3.4
13	3.0	2.0	2.0	2.0	1.8
14	2.7	2.0	2.0	2.0	2.4
15	2.1	1.6	2.3	1.0	1.4
16	2.4	3.4	2.3	1.3	2.4
17	3.1	1.8	2.8	1.3	2.8
18	2.1	1.8	2.3	1.0	3.2
19	1.7	1.8	1.8	1.0	3.0
20	2.1	3.0	4.5	1.7	1.4
21	1.8	1.8	3.0	1.7	3.0
22	2.8	2.0	1.5	1.7	5.0

23	2.0	2.4	1.8	3.0	2.2
24	2.0	2.4	2.3	1.7	2.2
25	2.1	2.4	2.8	1.7	2.4
26	2.0	1.8	2.3	1.3	2.4
27	1.8	2.2	2.5	2.0	2.2
28	1.7	2.0	2.5	1.3	2.2
29	1.9	1.8	2.0	2.3	1.8
30	2.3	2.2	2.3	1.3	2.4
31	2.1	1.6	1.8	1.7	1.8
32	2.2	2.0	2.3	1.0	2.2
33	2.2	1.8	2.3	2.0	2.2
34	1.9	2.0	1.8	1.3	1.8
35	1.4	2.8	2.3	2.0	2.0
36	1.9	2.2	2.8	2.0	2.4
37	2.3	2.4	2.5	2.3	2.6
38	2.2	2.0	3.0	2.0	2.4
39	2.1	2.0	2.5	2.0	2.0
40	2.0	1.8	1.8	1.7	2.0
41	2.1	2.8	2.0	2.0	3.0
42	2.1	2.2	2.0	1.7	2.6

Source: Researcher, 2016

APPENDIX IV: INTRODUCTION LETTER



UNIVERSITY OF NAIROBI MOMBASA CAMPUS

Telephone: 020-2059161
Telegrams: "Varsity", Nairobi
Telex: 22095 Varsities
Our Ref: D61/68316/2013

Tel: 020 2059161
Mombasa, Kenya

DATE: 11TH OCTOBER, 2016

TO WHOM IT MAY CONCERN

The bearer of this letter, **Martin Thuranira** of Registration Number **D61/68316/2013** is a Master of Business Administration (MBA) student of the University of Nairobi, Mombasa Campus.

He is required to submit as part of his coursework assessment a research project report. We would like the student to do his project on ***The Effect of Lean Supply Chain Management Components on Operational Performance Among Tea Factories in Kenya***. We would, therefore, appreciate if you assist him by allowing him to collect data within your organization for the research.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organization on request.

Thank you.

A handwritten signature in black ink, appearing to read 'Zephaniah Ogero Nyagwoka'.

Zephaniah Ogero Nyagwoka

Administrative Assistant, School of Business-Mombasa Campus

