

**LEAN SUPPLY CHAIN MANAGEMENT PRACTICES AND
ORGANIZATIONAL PERFORMANCE IN PARASTATALS IN
THE MINISTRY OF ENERGY AND PETROLEUM IN KENYA**

PATRICK M. MUCHIRI

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the Award of Degree of Master of Business Administration, School of Business, University
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DECLARATION

This research project is my original work and has not been presented to any other institution of learning for the award of an academic certificate.

Signature: Date:

Patrick M. Muchiri

D61/75720/2014

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

Signature: Date:

Onserio Nyamwange

Supervisor

Lecturer, School of Business

University of Nairobi

DEDICATION

This project is dedicated to my family members for support and encouragement.

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ABSTRACT

The general objective of this study was to determine the impact of lean supply chain management practices on organizational performance of Parastatals in the Ministry of energy and petroleum. The specific objectives of the study were; to establish the lean supply chain management practices adopted by Parastatals in the Ministry of energy and petroleum, to establish the impact of lean supply chain management practices on organizational performance and to establish the challenges in implementation of lean supply chain management practices. The study utilized resource dependence theory, transaction cost analysis and theory of constraints. This study adopted a descriptive research design to examine the impact of lean supply chain practice on organizations performance. The target population of this study included all 8 Parastatals in the Ministry of Energy and Petroleum. This study collected primary data using a questionnaire. Descriptive statistics mainly frequencies, percentages, and mean were used to summarize the responses. Linear regression will also be applied to model the relationship between the dependent variable and the independent variables. The study findings revealed clearly that parastatals in the ministry of energy and petroleum 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 parastatals in the ministry of energy and petroleum by focusing on operational effectiveness and efficiency. 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. The study recommends that Lean supply chain need to be embraced to help the management team appreciates the direct impact of these initiatives.

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LIST OF ABBREVIATIONS

BOMs: Bill of Materials

ERB: Electricity Regulatory Board

GDC: Geothermal Development Company

JIT: Just in Time

KENGEN: Kenya Electricity Generating Company Ltd

KPC: Kenya Pipeline Company

KPLC: Kenya Power & Lighting Company Limited

KPRL: Kenya Petroleum Refineries Ltd.

LSCM: Lean Supply Chain Management

NOCK: National Oil Corporation of Kenya

RDТ: Resource Dependence Theory

REA: Rural Electrification Authority

ROA: Return on Assets

SCM: Supply Chain Management

CHAPTER ONE: INTRODUCTION

1.1 Background

Supply chain has become a vital entity to organizations' performance measurement and metrics therefore receiving much attention from researchers and practitioners. Sheffi (2011) argued that the role of these measures and metrics in the success of an organization cannot be overstated as they affect strategic, tactical and operational planning and control. Furthermore, the revolution of Supply Chain Management (SCM) in the last decade is testimony that an increasing number of companies seek to enhance performance beyond their own boundaries. Supply chain is an inter-linked set of relationships connecting customer to supplier through a number of intermediate stages such as manufacturing, warehousing and distribution processes (Skjoett-Larsen, 2013).

Li, Ragu-Nathan, Ragu-Nathan, and Rao (2012) have clearly stated that supply chain often refers either to a process-oriented management approach to sourcing, producing, and delivering goods and services to end customers, or in a broader meaning, to the co-ordination of the various actors belonging to the same supply chain. Intense competition compels companies to create close relationships with their upstream and downstream partner. In the competitive environment, most leading edge companies realized that by transferring costs either upstream or downstream, they are actually not increasing their competitiveness, since all costs ultimately make their way to consumers.

Vonderembse, Uppal, Huang and Dismukes (2006) highlighted on the strategies and methodologies for designing supply chains that meet specific customer expectations. According to them, three different types of supply chains can be defined: A lean supply chain, which employs continuous improvement efforts, which focuses on eliminating waste or non-value steps along the chain. An agile supply chain, which responds to rapidly changing, continually fragmenting global markets by being dynamic, context-specific, growth-oriented, and customer focused. A hybrid supply chain, which combines the capabilities of lean and agile supply chains to create a supply network that, meets the needs of complex products.

1.1.1 Lean Supply Chain Management

Lean supply chain has been described 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" (Buzby, Gerstemfeld, Voss & Zeng, 2002). Lean

therefore creates more value for customers with fewer resources through various principles and techniques. Lean principles are implemented through some practices which are activities undertaken to bring about improvements in organization (Karlsson & Ahlström, 2007).

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. Other identified lean practices are: sourcing of customer need information, value stream analysis (VSA), end customers focus, , workplace organization, strong and effective relationship, production of exact customer needs only when needed, problem search and problem solving (Wee & Wu, 2009).

1.1.2 Organizational Performance

Organizational performance refers to how well objectives are achieved in a firm or an organization. Richard, Devinney, Yip, and Johnson (2009) described firm performance as an encompassment of three specific areas of firm outcomes financial performance, product market performance and shareholder return. It also refers to a firm's overall financial health at a particular time and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation. Performance is a whole discipline in itself but regarding this study, the main aspect is the need to maintain optimum organizational performance for Parastatals in the Ministry of energy and petroleum with the help of organizational consultancy.

Since the rise of performance measurement, several models comprising of different frameworks have been introduced. The different frameworks and reference models for measuring organizational performance have evolved from a variety of origins. They include; Balanced Scorecard, Economic Value Added, Activity-based costing, Quality Management, Customer Value Analysis and Action-Profit Linkage Model (Haar & Spell, 2008). According to Brush (1992) assessment of organizational performance should include not only financial measures, but incorporate other measures such as employee satisfaction, social contributions, goal achievement, and effectiveness. In this study the following dimensions of organizational performance were considered; organization growth, employee development and financial performance.

1.1.3 Parastatals in the Ministry of Energy and Petroleum in Kenya

Parastatals (also known as state corporations or public corporations) are quasi government agencies linked to government ministries or departments. The Parastatals in Kenya are established by a statute or an Act of parliament in pursuance of government policy or various Acts with reference to State Corporation Act Cap.446. They extend performance of certain services of central government to the nation. These corporations make a surplus in order to sustain themselves while meeting their objectives which are to correct market failure, exploit socio-political objectives, provide education, redistribute income and develop marginal areas (Directorate of Personnel Management, 2006). Comprehensive reviews on Public Enterprise Performance were carried in 1979 (the Report on the Review of Statutory Boards), and 1982 (the Report of the Working Party on Government Expenditures). According to Taskforce on Parastatals Reform Report (2013), there are 187 Parastatals in Kenya. The Kenya government forms Parastatals to meet both commercial and social goals.

SCM has been recognized by many companies as a means by which they can gain competitive advantage and improve business results (Spekman, Kamauff & Myhr, 1998). Effective SCM therefore becomes a strategic factor in a firm's success (Spekman, Kamauff & Myhr, 2008). This is particularly the case as more companies link their advantages together and start to operate as supply networks of interdependent supply chain partners as opposed to separate, standalone, arms-length entities (Spekman, Kamauff & Myhr, 2008). Associated with such an approach is the integration of intra and inter-businesses processes in order to optimize the whole supply chain. As illustrated by companies such as Hewlett-Packard, Wal-Mart and Georgia-Pacific Corp, an effective lean supply chain network can competitively outperform the standalone model (Lummus & Alber, 2007). This superior performance manifests itself as performance advantages on aspects such as supply chain lead time, delivery reliability, ability to respond to customer demand changes, cost and inventory levels (Shin, Collier & Wilson, 2000). Effective lean supply chain management therefore becomes a strategic issue for competing organizations and is linked to value growth business results.

There are eight Parastatals in the Ministry of Energy and Petroleum in Kenya namely Kenya Power & Lighting Company Limited (KPLC), Rural Electrification Authority (REA), Kenya Petroleum Refineries Ltd. (KPRL), Kenya Electricity Generating Company Ltd (KENGEN), National Oil Corporation of Kenya (NOCK), Kenya Pipeline Company (KPC), Electricity Regulatory Board (ERB) as well as Geothermal Development Company (GDC) (Nyoike, 2016).

1.2 Research Problem

Lean supply chain philosophy and practice as observed by Manrodt and Vitasek, (2012) is the surest way the organizations would be able to remain competitive and carve out their niche in the turbulent world of business. From its origin in Japan, the lean philosophy has been adopted around the globe and beyond the production floor, into administration, healthcare and even governments. They further advanced the argument that for companies working to reduce their operational costs and improve operational performance, Lean supply chain approach is a must fit. According to Manrodt and Vitasek (2012), those companies must be armed with waste fighting tools such as value stream mapping, six sigma and supply chain optimization. They noted that organizations must work out a formula for lean material flow across the supply chain downstream.

In Kenya, many of the parastatals operating from diverse sectors are deemed to have these supply chain management practices. Such multi-business parastatal firms are managed centrally through the central authority (Wanjihia, 2011). A lean supply chain management practice of the energy and petroleum sector has myriad challenges of functionality in line with the new approach towards the streamlining of the supplies. Some of the challenges are Lack of contingency, lack of effective communication of the vision and plan for lean implementation to the workforce, Globalization of supply chains, as well as organization culture and structure rigidity. As to whether these lean supply chain practices are effectively adopted in the energy and petroleum sector in Kenya lies with the justification of the management of these parastatals (Omondi, 2008).

Several studies have been done in this area both globally and locally. Globally Lia, Ragu-Nathanb, Ragu- Nathan, and Rao (2006) studied the impact of supply chain management practices on competitive advantage and organizational performance. The results indicate that higher levels of SCM practice can lead to enhanced competitive advantage and improved organizational performance. Ranganathan and Premkumar (2013) looked into Improving Supply Chain Performance through Lean and Green and inferred that multifarious improvements by the lean via its tools on the supply chain performance by reducing the wastes and non-value added activities and green in terms of responsible business. Karimi and Rafiee (2014) analysed the Impact of Supply Chain Management Practices on Organizational Performance through Competitive Priorities (Case Study: Iran Pumps Company) and established that applying SCM practices has influence in Iran pumps Company according to competitive priorities.

Locally, Mwale (2014) studied the effect of supply chain management practices on organizational performance among large manufacturing firms in Kenya and established that there is a significant relationship between supply chain management practices and organizational performance. Githeu (2014), in his study on supply chain management practices and performance of commercial banks in Kenya found that that three variables out of the six, namely Supplier Relationships, Reverse logistics, and Outsourcing were found to have strong statistically significant relationships with performance. Musyoka (2015), studied lean supply chain management practices in the manufacturing sector in Kenya and established that the main reasons for adoption for these practices were to reduce cost, profitability and long term survival of the firm. Finally, Farah (2015), studied lean supply chain management practices and organizational performance in the public water sector in Kenya. He established that demand management was concerned with balancing the requirement of internal and external customers with supply chain capabilities.

As evidenced in the above studies, none of the studies focused on addressing lean supply chain management practices and organizational performance of Parastatals. This study therefore sought to fill this gap by answering the following question: what are the lean supply chain management practices adopted by Parastatals in the Ministry of energy and petroleum?, what is the relationship between lean supply chain management practices and organizational performance of Parastatals in the Ministry of energy and petroleum?, and what are the challenges facing Parastatals in the Ministry of energy and petroleum when implementing lean supply chain management practices.

1.3 Research Objectives

The general objective of this study was to determine the impact of lean supply chain management practices on organizational performance of Parastatals in the Ministry of energy and petroleum.

The specific objectives of the study were;

- i. To establish the lean supply chain management practices adopted by Parastatals in the Ministry of energy and petroleum.
- ii. To establish the impact of lean supply chain management practices on organizational performance of Parastatals in the Ministry of energy and petroleum.
- iii. To establish the challenges in implementation of lean supply chain management practices of Parastatals in the Ministry of energy and petroleum.

1.4 Value of the Study

This study may add on the body knowledge of lean supply chain management practices by focusing on the development of the practice in a developing country. Further it may add onto knowledge on the impact of lean supply chain management practices of Parastatals in the Ministry of energy and petroleum.

The Parastatals in the Ministry of energy and petroleum may benefit from this study as the documentation of how the practice of lean supply chain management is carried out in the institutions, the critique of the practice and the documentation of the challenges offer an impetus to the institutions to devise better ways of practicing the same. The recommendation given may guide them in strengthening the practice in such organizations.

Firms in other industries may also find this study useful as the results show how the practice of lean supply chain management is carried out in among Parastatals in the Ministry of energy and petroleum and what practices they can borrow from the same.

Finally, the academic community may benefit from the results of the study as it serves as a reference point on empirical data pertaining to lean supply chain management practices and it also identifies areas for further study.

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 Foundations

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 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 Lean Supply Chain Management Practices

According to Li *et al.*, (2006) and Tan *et al.*, (1998) the supply chain management concept was derived from the areas of purchasing and supply management, and transportation and logistics management. Li *et al.*, (2006) further contends that from the purchasing and supply chain perspective SCM is the integration of the supply base that evolved from the traditional purchasing and materials functions. From the transportation and logistics management perspective it has been argued by Fisher, (1997) that SCM is integrated logistics systems, and focuses on inventory reduction both within and across organizations in the supply chain.

Lean procurement practices 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.

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, & SkjoettLarsen, 2007). Some lean procurement processes are e-procurement and automated procurement

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). 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.

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 it is 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.

Lean customers practices 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).

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 activities(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 Organizational Performance

Organizational performance is an important result that the shareholders and management will use to evaluate the company's activities and business processes. It is important because a good performance would give the investors and the shareholders confidence in management and thus secure a profitable and sustained company future. Firms that are responsive to changes in the business environment are perceived to be able to gain competitive advantage. But still most companies use financial indicators to measure organizational performance without a second thought even though the business environment is changing at a high rate. Gold *et al.*, (2011) suggest that existing accounting systems are not appropriate for measuring knowledge assets.

Lean performance is total internal lean optimization process; therefore demand management is vital to play their role to accept the concept of lean performance within their processes subsets. The strengths of lean approach are leanness are more immediate and practical focus on waste, flow and flexibility (Industry Week, 2010), therefore, supply chain partners including the upstream suppliers and downstream customers can work together as a team to provide value to the end-user customer (Manrodt *et al.*, 2010). Some internal issues like "offset" of Bill of Materials (BOMs)'s explosions; can be handle effectively by better understand the "real" demand they are projecting (Manrodt *et al.*, 2010) in making used the approaches of lean performances like Reducing lead times, improving quality, eliminating waste, reducing the total costs, engaging and energizing

people (Industry Week, 2010). With regard to its content, performance informs about the relation between minimal and effective cost (economy), between effective cost and realized output (efficiency) and between output and achieved outcome (effectiveness).

2.5 Empirical Literature Review

Kushwasha (2012) researching on the adoption level of various supply chain management (SCM) practices implemented in paint companies operating in India also collected data. 100 companies targeted and questionnaires sent through email. He used multiple regression to analyzed the data and found out that there is a significant correlation between lean supply chain management practices and operational performance of the manufacturing firms in the country. Agus and Iteng (2013) also examined the importance of incorporating lean in production in the Malaysian manufacturing firms and its impacts on organizational operational performance. They tested the implementation of Just in time and technology and innovation use by interviewing senior managers in two hundred and five firms. Using regression analysis they concluded that long term implementation of lean supply results in improvement on organizational performance.

Locally, Wanjiku (2013) has also researched on lean supply chain management in manufacturing firms in Kenya. She sampled 100 manufacturing firms in Nairobi Kenya collecting data through survey method of data collection using questionnaires and used descriptive statistics to analyze the data. The study established that lean supply chain management implementation is being done in firms in Kenya though not all practices are fully implemented. Her study however did not cover the entire country but samples firms in Nairobi a gap which this study seeks to close.

Keitany and Riwo-Abudho (2014) researched on the effects of lean production on organizational performance in Kenyan Milling firms. Their study was designed to determine the elements of lean production, effect of lean production systems on product quality, strategies for waste reduction and the challenges of adopting lean production. From the results, they established that flexible manufacturing is a major approach that firms can use to enhance lean production and JIT and Kaizen are other approaches that firms can use to enhance lean production. From the results, they established that firms can improve lean production by adopting latest technology, involving staff, customer involvement, staff motivation to reduce resistance and proper integration of systems in the value chain, thus reducing wastes and increasing organizational performance. One key limitation of their study was that it only looked at a single manufacturing line that is flour milling firms as opposed to the entire manufacturing firms in Kenya.

Farah (2015) has studied lean supply chain management practices and organizational performance in the public water sector in Kenya. He used a census to collect data from 117 water processing firms in Kenya. The data was analyzed using descriptive statistics and found out that the three lean supply chain management used were waste management, standardization process and demand management and have a very significant impact on operational performance.

2.6 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 et al., (2014) 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.

A challenging job for the managers in all of the studied companies in the research of Czapke (2010) 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.

2.7 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).

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. 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.

2.8 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.

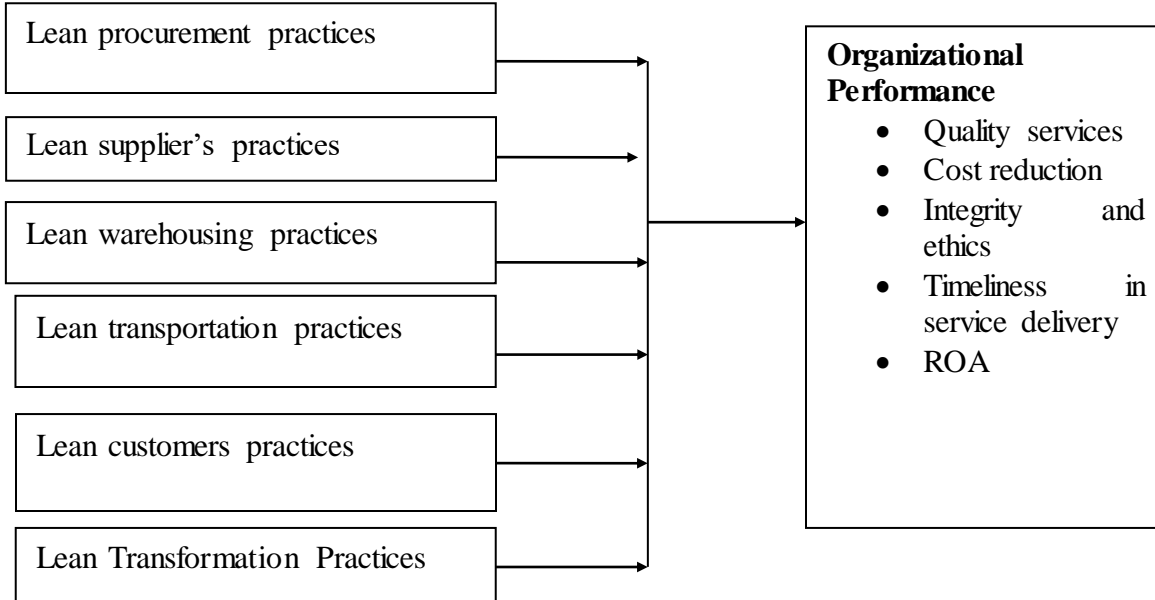
The aim of the conceptual framework is to examine and describe the relationship between the independent variable and the dependent variables. Organizational performance as the dependent variable will be measured in terms of quality services, cost reduction, integrity and ethics as well as timeliness in service delivery. On the other hand, the independent variables in this study are lean procurement practices, lean supplier's practices, lean warehousing practices, lean transportation practices, lean customers' practices and lean transformation practices

Figure 2.1: Conceptual Framework

INDEPENDENT VARIABLES

DEPENDENT VARIABLE

Lean Supply Chain Management Practices



CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter sets out various stages and phases which was followed in completing the study. Specifically the following subsections are included; research design, target population, sample design, data collection instruments, data collection procedures, data analysis and presentation.

3.2 Research Design

This study adopted a descriptive research design to examine the impact of lean supply chain practice 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 will cover several parastatals 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 Population

The target population of this study included all Parastatals in the Ministry of Energy and Petroleum. There are 8 Parastatals in the Ministry of Energy and Petroleum in Kenya as of August 31st, 2017 (GOK, 2017). Sampling is the procedure a researcher uses to gather people, places or things to study (Orodho & Kombo, 2002). In this case it refers to the procedure the researcher uses to select the final sample to study. The study was census based on this population being relatively small.

3.5 Data Collection

This study collected primary data using a questionnaire. The questionnaire included open and closed ended questions for ease of administration. To enhance quality of data, Likert type questions was provided whereby respondents were required to indicate the extent to which the statements representing variables apply to their organizations. A five point likert scale was used. The structured questions was used in an effort to facilitate easier analysis. The questionnaire was administered in person to avoid discussion among respondents from the various Parastatals which may jeopardize the whole study. The questionnaire consisted of four parts. Part A collected biographic data, part B the lean supply chain management practices adopted by Parastatals in the Ministry of Energy and Petroleum, part C the relationship between lean supply chain management

practices and organizational performance among Parastatals in the Ministry of Energy and Petroleum and part D covered challenges facing lean supply chain management practices and their impact on organizational performance among Parastatals in the Ministry of Energy and Petroleum.

3.6 Data Analysis

The raw data was collected and organized in a systematic manner that will enable 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 following regression equation was used:

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

Whereby Y = Organizational performance

X₁ = lean suppliers practices

X₂ = lean customer practices

X₃ = lean warehousing practices

X₄ = lean procurement practices

X₅ = lean transportation practices

X₆ = lean Transformation Practices and β_0 β_1 β_2 β_3 and β_4 are the regression equation coefficients for each of the variables discussed.

Regression analysis can be simple involving one dependent variable and one independent variable, or multiple involving one dependent variable and two or more independent

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 parastatals in the ministry of energy and petroleum. The study was based on the following specific objectives: To determine the lean supply chain management practices used by parastatals in the ministry of energy and petroleum; establish challenges faced in implementation of lean supply chain management practices and effect of lean supply chain management practices on the performance of parastatals in the ministry of energy and petroleum.

4.2 General information

The study was conducted using questionnaires to the parastatals in the ministry of energy and petroleum. 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.

The study sought to establish the information on the respondents employed in the study with regards to the period that their company have been in operation, lean supply chain management practices adopted by their company as well as the period that their company have adopted lean supply chain management practices

Respondents were kindly requested to indicate the period in which their company has been in operation. Based on the study findings, majority of the respondents (43%) indicated that their company has been in operation for 16-25 years, 25% indicated 5-15 years, 18% indicated under 5 years, while 14% indicated Over 25 years. This implies that most of the parastatals in the ministry of energy and petroleum in Kenya have been in operation for 16-25 year

The study sought to establish Parastatals have adopted Lean supply chain management practices.

From the findings, respondents indicated that Parastatals have adopted Lean supply chain management practices as indicated by majority of the respondents (83%), while 17% indicated that Parastatals have not adopted Lean supply chain management practices. This infers that Parastatals have adopted Lean supply chain management practices

The study sought to establish the period of time in which parastatals have adopted Lean supply chain management practices.

Based on the study findings, majority of the respondents (47%) indicated that their company have adopted Lean supply chain management practices for Under 5 years, 26% indicated 5-15 years, 19% indicated 16-25 years, while 8% indicated Over 25 years. This implies that most of the parastatals in the ministry of energy and petroleum in Kenya have adopted Lean supply chain management practices for Under 5 years

4.3 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. Mean scores were categorize as follows; range 1 to <1.5 very great extent; range 1.5 to <2 great extent; range 2 to <2.5 moderate extent; range 2.5 to <3.5 small extent; range 3.5 to >4 Does not affect at all.

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.

Table 4.1: Lean supply chain management practices

	Mean	Std. deviation
Firm efficiently utilizes its space and machine	1.18	0.44
Firm stores what is needed and required by the firm	1.24	0.52
Only what will satisfy the customer is delivered	1.28	0.54
Customer needs are established	1.4	0.61
Firm use modern machines on its process to reduce cost	1.52	0.68
There is close collaboration with supplier	1.54	0.58
Firm has ensured there are effective transportation system	1.56	0.58
Firm use automatic monitoring devices	1.56	0.76
Firm has updated inventory that ensure flow of product	1.6	0.67
Firm has integrated its system with the suppliers	1.66	0.87
The firm gives suppliers feedback on quality and delivery	1.76	0.62
Firm has budget to ensure control for transportation process	1.82	0.69
Supplier are directly involved in the new product development	1.92	0.97
Production is pulled by the shipment of finished goods	2.08	0.9
Firm has sound replenishment models to pull consumption	2.08	0.83

Source: Research data, (2017)

The findings after analysis show that there is close collaboration with suppliers to a very great extent (M=1.54, SD=.58), 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 parastatals in the ministry of energy and petroleum 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=.67). 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 sought 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 Table 4.2.

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 parastatals in the ministry of energy and petroleum. According to Lu (2011) elimination of waste is one of the key aims of 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.

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

	Mean	Std. deviation
Increased profitability	1.52	0.81
Increased space saving	1.56	0.99
Quality improvement	1.62	0.88
Increased performance	1.62	0.83
Increased utilization of machine and space	1.62	0.88
Reduced inventory level	1.64	0.83
Decreased labour costs	1.66	0.94
Minimized waste in manufacturing process	1.72	0.86
Reduced manufacturing cycle time	1.74	0.78
Enhanced relationship between the company and customers	1.76	0.94
Increased response to customers	1.76	0.87
Improved working capital	1.8	0.88
Reduced customer lead time	1.82	0.96
Reduced bottlenecks in the company	1.92	0.99
Increased capacity utilization	1.92	0.92
Predictable throughput times	2	1.05
Lower warranties to customers	2.08	1.03
Synchronized manufacturing process with lean supply chains	2.34	1.14

Source: Research data, (2017)

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 parastatals in the ministry of energy and petroleum, 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 .

4.5.1 Problem Search and Problem Solving

Respondents were kindly requested to rate the extent they agree with the following statement on problem search and problem solving. Where; 1= very high extent, 2= high extent, 3=Moderate, 4= low extent, 5= very low extent.

Table 4.3: Problem Search and Problem Solving

Statements	Mean	Std. deviation
The organization weighs the short- and long-term pros and cons of each solution	1.23	0.47
The organization learns as much as it can about a problem	1.26	0.58
The organization finds solutions for parts of the problem (as opposed to the problem as a whole)	1.37	0.23
The organization evaluates all of the different ways in which the problem could impact it	1.45	0.23
The organization sometimes seeks out help in its problem solving steps by polling trusted colleagues or friends	2.13	0.17
The organization evaluates how it was and was not successful	2.16	0.23
The process of generating solutions helps in looking at the problem from multiple perspectives	2.46	0.13
The organization evaluates how feasible each solution is	2.56	0.33
The organization chooses a solution and implements it.	2.74	0.45
The organization brainstorms and comes up with as many solutions as it possibly can for the problem	2.89	0.41

Source: Research data, (2017)

The study established to very high extent that the organization weighs the short- and long-term pros and cons of each solution (M=1.23), The organization learns as much as it can about a problem (M=1.26), The organization finds solutions for parts of the problem (as opposed to the problem as a whole) (M=1.37) and that The organization evaluates all of the different ways in which the problem could impact it (M=1.45). In addition, respondents indicated to a high extent that the organization sometimes seeks out help in its problem solving steps by polling trusted colleagues or friends (M=2.13), The organization evaluates how it was and was not successful (M=2.16), the process of

generating solutions helps in looking at the problem from multiple perspectives (M=2.46), The organization evaluates how feasible each solution is (M=2.56, The organization chooses a solution and implements it (M=2.74) and that the organization brainstorms and comes up with as many solutions as it possibly can for the problem (M=2.89). This implies that to very high extent the parastatals weighs the short- and long-term pros and cons of each solution, the parastatals learns as much as it can about a problem, the parastatals finds solutions for parts of the problem (as opposed to the problem as a whole) and that the parastatals evaluates all of the different ways in which the problem could impact it

4.6 Challenges of supply chain management practices

In examining the possible challenges in the ministry of energy and petroleum in Kenya, 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 4.4: Challenges of lean supply chain management practices

	Mean	Std. deviation
Cost and profit allocation	3.58	1.14
Misunderstanding of lean	3.76	0.98
Lack of broad organization involvement	3.96	0.97
Resistance to change	4.06	1
Limited resources	4.14	0.95
Lack of clear benefits from lean supply chain management	4.34	0.77
Lack of supply chain integration	4.36	0.85
Lack of employee training and motivation	4.46	0.73
Lack of top management commitment	4.48	0.76
Demand volatility	4.5	0.76
Negative attitude from employees	4.52	0.74
Limited control and monitoring to suppliers delivery time	4.52	0.71
Lack of proper capacity planning	4.62	0.67
Conflicts with other initiatives of the company	4.64	1.54
Lack of effective communication	4.72	0.61

Source: Research data, (2017)

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 Correlation Analysis Between lean supply chain management practices and organizational performance

To establish the degree of association between organizational performance of parastatals in the ministry of energy and petroleum 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 procurement practices (r=0.674), lean warehousing practices (r=0.713), 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 4.5: Pearson Correlation Coefficients Matrix

	Organization Performance	lean suppliers practices	lean customer practices	lean warehousing practices	lean procurement practices	lean transportation practices	lean Transformation Practices
Organization Performance	1.000	.674	.627	.713	.679	.533	.719
lean suppliers practices	.674	1.000	.725	.456	.743	.561	.541
lean customer practices	.627	.725	1.000	.632	.478	.700	.534
lean warehousing practices	.713	.456	.632	1.000	.484	.618	.632
lean procurement practices	.679	.743	.478	.484	1.000	.444	.517
lean transportation practices	.533	.561	.700	.618	.444	1.000	.566
lean Transformation Practices	.719	.541	.534	.632	.517	.746	1.000

4.8 Relationship Between lean supply chain management practices and organizational performance

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:

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

Where:

Y = Organizational Performance

β_0 = Constant Term

β_1 = Beta coefficients

X₁ = Lean suppliers practices

X₂ = Lean customer practices

X₃ = Lean warehousing practices

X₄ = Lean procurement practices

X₅ = Lean transportation practices

X₆ = Lean Transformation Practices

ϵ = error term

Table 4.6: Regression Model Summary

Model	R	R Square	Adjusted Square	RStd. Error of the Estimate	F	P-value
1	.930 ^a	.864	.858	.239	47.341	.000

a. Predictors: 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, (2017)

From the analysis in the table above $R^2=0.864$, i.e. 86.4% variation in the performance of parastatals in the ministry of energy and petroleum is explained by predictors in the model. However 13.6% variation unexplained in performance of parastatals in the ministry of energy and petroleum 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 4.7: 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, (2017)

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 4.8: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	T	
1(Constant)	.181	.416		.192	.847
lean suppliers practices	.469	.100	.383	4.69	.033
lean customer practices	.140	.014	.157	.002	.015
Lean warehousing practices	.309	.086	.317	.027	.013
Lean procurement practices	.350	.110	.159	.039	.029
Lean transportation practices	.241	.113	.331	.027	.035
Lean Transformation Practices	.254	.224	.267	.057	.041

a. Dependent Variable: Organizational Performance

Source: Research data, (2017)

From the table 4.8, 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 parastatals in the ministry of energy and petroleum 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 parastatals in the ministry of energy and petroleum 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, parastatals in the ministry of energy and petroleum 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.

Parastatals in the ministry of energy and petroleum 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.

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 parastatals in the ministry of energy and petroleum 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.

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 parastatals in the ministry of energy and petroleum.

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 parastatals in the ministry of energy and petroleum 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 parastatals in the ministry of energy and petroleum 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 parastatals in the ministry of energy and petroleum 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 parastatals in the ministry of energy and petroleum 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.

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 parastatals in the ministry of energy and petroleum 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 parastatals in the ministry of energy and petroleum are to grow.

5.5 Limitations of the Study

The study was faced by several limitations. Firstly, the study was also limited in scope as it only covered parastatals in the ministry of energy and petroleum 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.

5.6 Suggestions of Further Research

The study sought to explore the lean supply chain management practices and organizational performance of parastatals in the ministry of energy and petroleum. 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 parastatals in the ministry of energy and petroleum, 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.

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**APPENDIX 1: PARASTATALS IN THE MINISTRY OF ENERGY AND PETROLEUM
IN KENYA**

1. Kenya Power & Lighting Company Limited (KPLC)
2. Rural Electrification Authority (REA)
3. Kenya Petroleum Refineries Ltd. (KPRL)
4. Kenya Electricity Generating Company Ltd (KENGEN)
5. National Oil Corporation of Kenya (NOCK)
6. Kenya Pipeline Company (KPC)
7. Electricity Regulatory Board (ERB)
8. Geothermal Development Company (GDC)

(SOURCE: GOK, 2017)

APPENDIX 11: QUESTIONNAIRE

SECTION A

(Please complete this section by checking the correct answer)

1. Name of the company.....

2. How long has your company been in operation?

- a) Under 5 years
- b) 5-15 years
- c) 16-25 years
- d) Over 25 years

3. Has the Parastatals adopted Lean supply chain management practices

- Yes
- No

4. If yes for how long have they adopted Lean supply chain management practices

- a) Under 5 years
- b) 5-15 years
- c) 16-25 years
- d) Over 25 years

Section B: Lean supply chain management practices adopted by Parastatals in the Ministry of Energy and Petroleum

1. 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					
Production is pulled by the shipment of finished goods					
Firm has budget to ensure control for transportation process					
Lean transportation practices has ensured cost and waste reduction					
b. Lean procurement practices					
Firm has sound replenishment models to pull consumption for its product					

The firm gives suppliers feedback on quality and delivery					
Lean procurement practices has ensured cost and waste reduction					
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					
Lean transformation practices has ensured cost and waste reduction					
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					
Lean suppliers practices has ensured cost and waste reduction					
e. Lean customer practices					
Customer needs are established					
Only what will satisfy the customer is delivered					
Lean customer practices has ensured cost and waste reduction					
f. Lean warehousing practices					
Firm efficiently utilises its space and machine					
Firm stores what is needed and required by the firm					
Lean warehousing practices has ensured cost and waste reduction					

Section C: Relationship between lean supply chain management practices and business performance

2. 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					

3. To what extent do you agree with the following statement on problem search and problem solving. Rate them according to the extent to which they are practiced in your organization where; 1=very low extent, 2=low extent, 3=Moderate, 4= high extent, 5= very high extent.

Statements	1	2	3	4	5
The organization learns as much as it can about a problem					
The organization evaluates all of the different ways in which the problem could impact it					
The organization brainstorms and comes up with as many solutions as it possibly can for the problem					
The process of generating solutions helps in looking at the problem from multiple perspectives					
The organization finds solutions for parts of the problem (as opposed to the problem as a whole)					
The organization sometimes seeks out help in its problem solving steps by polling trusted colleagues or friends					
The organization weighs the short- and long-term pros and cons of each solution					
The organization evaluates how feasible each solution is					
The organization chooses a solution and implements it.					
The organization evaluates how it was and was not successful					

Section D: Challenges facing lean supply chain management practices

4. 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
Lack of employee training and motivation					
Limited resources					
Lack of top management commitment					
Negative attitude from employees					
Lack of clear benefits from lean supply chain management					
Resistance to change					
Cost and profit allocation					
Misunderstanding of lean					
Conflicts with other initiatives of the company					
Lack of broad organization involvement					
Lack of supply chain integration					
Limited control and monitoring to suppliers delivery time					

5. Any other (Please specify).....
.....

THE END.

THANK YOU FOR YOUR COOPERATION!!!