LEAN MANUFACTURING PRACTICES AND PERFORMANCE OF LARGE SCALE MANUFACTURING FIRMS IN NAIROBI, KENYA

BY

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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.

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

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God bless you all.

DEDICATION

To

My

Daughter

Agnes Wamuyu Maina

ABSTRACT

The general objective of the study was to investigate lean manufacturing practices and firm performance of large scale firms in Nairobi, Kenya**.** Specifically the study aimed to; determine the lean manufacturing practices commonly implemented by large manufacturing firms in Nairobi, Kenya and establish the relationship between lean manufacturing practices and firm performance in Nairobi, Kenya. The study was underpinned under three theories which are; systems theory, resource-based view of the firm theory and information theory. This research problem was studied through the use of a descriptive research design. The target population of the study was all large scale manufacturing firms in Kenya. 655 firms were categorized as large scale manufacturing firms**.** Ten percent of total population (10 percent of 655) was approximately sixty six (66) firms which were above thirty making 10 percent a sufficient sample for the total population of large scale manufacturing firms in Kenya. The researcher used a questionnaire to collect primary data. The research was both qualitative and quantitative in nature. The researcher employed multiple regression models to study the factors influencing firm performance of large scale manufacturing firms. According to the findings lean manufacturing practices ensured performance of the firms to a great extent. Majority of the firms employed Continuous Improvement Practice. According to the findings lean transformation practices were implemented to a great extent. Use of lean transportation practices implementation in their firm was rated to a great extent. Environment lean practices implementation by the manufacturing firms was rated to a great extent. On evaluating the extent to which the firms used other lean manufacturing practices the study found that it was to a great extent. The study concludes that lean manufacturing practices are evident among the manufacturing firms in Kenya. The study further concludes that lean procurement practices influences the firm performance of large scale manufacturing firms most. The study further found that taking all other independent variables at zero, a unit increase in lean procurement practices will lead to an increase in the scores of the firm performance. The study finally concludes that there was a significant relationship between firm performance of large scale manufacturing firms and lean manufacturing practices. This portrays that when the lean manufacturing practices studied are jointly applied, they would increase firm performance of large scale manufacturing firms in Nairobi, Kenya**.** The study based on the findings recommends that the implementation of lean manufacturing practices should support the firm's business strategy**.** The study recommends that large scale manufacturing firms in Kenya need to give attention to the implementation of all the key areas of lean manufacturing practices from a holistic perspective in order to reap the full benefits of lean and significantly improve their operational performance; more specifically factory time efficiency**.**

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CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The intensification of global competition and the crisis of achieving smooth production flow by eliminating waste and by increasing the activities value have forced manufacturing companies to explore all available opportunities for reducing their costs without compromising the firm performance (John, Cannon and Pouder, 2010). Organizations of all sizes are trying to stay competitive and profitable for a long-term period. Staying competitive requires looking for new ways of reducing costs and increase the quality of the company's products. This has led many organizations to implement the Toyota Production System (TPS), otherwise known as lean manufacturing (Mackelprang and Nair, 2010). Lean thinking was considered to be one potential approach for improving organizational performance. Authors suggest that this complex highly integrated system is the reason for Japan's manufacturing effectiveness.

Most companies have a major opportunity to reduce their cost, customer lead-time and cycle time through the application of Lean Manufacturing technologies (Flynn, 2011). Lean thinking focuses on value-added lean and consists of best practices, tools and techniques from throughout industry with the aims of reducing waste and maximizing the flow and efficiency of the overall system to achieve the ultimate customer satisfaction. Lean manufacturing is a manufacturing philosophy that shortens the time between the customer order and the product build/shipment by eliminating sources of waste. Lean is most widely used in industries that are assembly oriented or have a high amount of repetitive human processes. These are typically industries for which productivity is highly influenced by the efficiency and attention to detail of the people who are working manually with tools or operating equipments. For these kinds of companies, improved systems can eliminate significant levels of waste or inefficiency (Rosenzweig and Easton, 2012). Examples of these include wood processing, garment manufacturing, automobile assembly, electronics assembly and equipment manufacturing.

When the flexibility seems to be an important issue in today's highly competitive environment Lean integrated as a complete system in the organization can ensure

company's adaptation. Developed as a production system eliminating wastes in the Toyota's plants in the 1960's, Lean is evolving into a management approach that improves all the processes at each level of an organization (Lander and Liker, 2007). The main objective of this study was exploring the process of implementation of Lean throughout all the levels of the organization as a whole business system approach analyzing to which extent organizational factors can enhance or impede this process.

1.1.1 Lean Manufacturing Practices

Vore (2002) defined lean manufacturing practices are strategies that aims to achieve smooth production flow by eliminating waste and by increasing the activities value. According to Reichhart and Holweg (2007) lean manufacturing practices include: environment lean practices, lean procurement practices, lean transformation practices and lean transportation practices. According to Tsuchiya (2010), lean manufacturing practice is a thought process and philosophy, not a tool, used to look at firm whether it is manufacturing, service or any other activity with a supplier and a customer relation with a goal of eliminating non value added tasks.

The principle of lean manufacturing includes teamwork, communication, efficient use of resources and continuous improvement. Lean manufacturing practices network is empowered to execute superlative, unique customer-winning value at the lowest cost through the collaborative, real-time synchronization of product/service transfer, demand priorities, vital marketplace information and logistics delivery capabilities (Parry and Turner, 2006). Supply chain management, especially developing and implementing lean supply chain management, has challenges that must be acknowledged. These are in addition to the usual company issues with lean, such as lack of implementation know-how, resistance to change, lack of a crisis to create urgency, gaining resources and commitment and back-sliding (Hausman, 2010).

1.1.2 Firm Performance

Performance is the competency of an organization to transform the resources within the firm in an efficient and effective manner to achieve firm goals. Firm goals vary depending on the purpose for which they are established. Firm organizations have profit, growth and survival as the main goals. Sohal (2007) asserts that firm performance consists of financial outcomes (return on invested capital or return on

asset and stock value or shareholder return). Firm performance is an indicator which measures how well an enterprise achieves their objectives (Jambekar, 2008). Firm performance can be assessed by an organization's efficiency and effectiveness of goal achievement. Specialists in many fields are concerned with firm performance including strategic planners, operations, finance, legal, and firm development. Firm performance comprises the actual output or results of an organization as measured against its intended outputs or goals and objectives.

In recent years, many organizations have attempted to manage firm performance using the balanced scorecard methodology where performance is tracked and measured in multiple dimensions such as financial performance, customer service, social responsibility and employee stewardship. Past research findings in the management, entrepreneurship, and marketing areas have demonstrated that market orientation, learning orientation, entrepreneurial management style, and firm flexibility are highly correlated with firm performance (Khurram and Hashmi, 2006). Holden and O'Toole (2004) found factors such as leadership, people management, and customer focus to positively influence firm performance.

Large companies today mainly focus on becoming efficient and flexible in their manufacturing methods in order to handle uncertainty in the business environment, they need different strategies to manage the flow of goods from the point of production to the end user (Melton, 2005). However, they have not been able to formulate the right strategies required to achieve this noble task in the customers perceived service quality. This call for a strategic fit of an organization's core competencies, strategy and core capability, which is an emerging paradigm in the study of operations management and specifically in service quality (Czabke et al., 2008).

1.1.3 Large Scale Manufacturing Firms in Kenya

Kenya has a large scale manufacturing sector serving both the local market and exports to the East African region. The sector has both subsidiaries of multinational corporations and locally owned and franchised around the region such as the East African cables limited. Manufacturing contributed to approximately 25% of the Gross Domestic Product (GDP) in 2013 (KNBS, 2014). Manufacturing also contributed 17% of formal employment and 15% of Kenya's total exports in 2013. According to Kenya

association of manufacturers (KNBS, 2014), there are 700 registered members. These are classified as large, medium and small scale manufacturing firms according to annual average turnovers made. The KAM defines small scale manufacturers as those manufacturing firms with a turnover of between ten million and twenty million Kenya shillings (KNBS, 2014).

Medium scale manufacturers range in turnover between twenty million and two hundred and fifty million while the large scale manufacturers have turnovers in excess of two hundred and fifty million Kenya shillings. The manufacturing firms in Kenya vary in terms of their output products. The Kenya Economic Sector Survey (2010) documented that major manufacturing exports from this sector included horticultural products, processed coffee and tea, iron steel, soda ash and fish products. Manufacturing imports included mainly petroleum products, industrial machinery, motor vehicles, iron and steel, plastics in primary and non-primary form, medicinal and pharmaceutical products, chemical fertilizers and animal and vegetable fats and oils. KAM notes that 80% of the 700 members are based in the city of Nairobi. The rest are spread across other cities and urban centres such as Athi River, Thika, Mombasa, Nakuru, Eldoret and Kisumu.

Despite the huge contribution to the national economy, KAM argues that the manufacturing sector faces a numbers of challenges. These include; high cost of production affects both investment decisions and competitiveness of Kenyan products; illicit trade characterized by counterfeits, substandard, or un-taxed goods; high cost of living that drives up wage costs, reduces consumer effective demand and drives inflation; inadequate government support for local produce; weak linkages with local supplies; and inadequate or weak negotiation skills in regional trade agreements. Since manufacturing firms are firm entities that participate in the production process of a nation, they are critical members of the economy. Their survival and success requires a sustained focus on critical issues such as policy advocacy, firm services, networking and coalitions locally, regionally and globally. Their leadership toward this goal is therefore, paramount (Mwirigi, 2007).

1.2 Problem Statement

Lean manufacturing is an essential strategy for competitiveness in a business environment with high uncertainty that requires high quality, faster delivery and lower costs (Melton, 2005). This can lead to firm performance when the firm experience dramatic improvement in labour productivity, reduction in customer lead time, cycle time and manufacturing costs (Womack and Jones, 2009; Sohal, 2007;).

Large scale manufacturing firms in Kenya face a number of challenges like; low product quality, delay in delivery time and high production costs that require the implementation of lean manufacturing practices. There has been considerable interest in lean philosophy by researchers especially in the manufacturing sector. According to Openda (2013) lean processes are hampered by lack of human resources, practices and organisation culture.

Research on lean systems has majorly highlighted what lean systems have been adopted in both service and manufacturing industries. A study by Rono (2013) concludes that lean manufacturing practices in cement is a continuous process industry and 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. A study by Ondiek and Kisombe (2012) recommends further research in the area of lean manufacturing, not only in the sugar sector but also in other areas of the Kenyan economy. Openda (2013) study revealed that most Kenyan firms believe that lean manufacturing practices enhance the long term firm performance and success. The study did not clearly point out the impact of these systems on performance of manufacturing companies. Njeru investigated the implementation of lean procurement among small and medium sized enterprises. They concluded that for successful implementation of lean, it required participation and full support of all the lean manufacturing practices members and also depended on factors like stable demand, long term partnership and fast and frequent exchange of information. Mwanzia (2009) in his study on lean manufacturing practices and performance of organizations listed at the Nairobi Securities Exchange (NSE) revealed that most Kenyan firms believe that lean manufacturing practices enhance the long term firm systems success.

The previous studies have not clearly detailed the impact of lean manufacturing practices on firm performance. There was very little related research work done on lean manufacturing practices and firm performance of large scale manufacturing sector. Therefore this study sought to evaluate lean manufacturing practices on firm performance of large scale manufacturing firms.

1.3 Main Objective

The general objective of the study was to investigate lean manufacturing practices and firm performance of large scale firms in Nairobi, Kenya

1.3.1 Specific Objectives

Specifically the study aimed;

i. To determine the lean manufacturing practices commonly implemented by large manufacturing firms in Nairobi, Kenya;
ii. To establish the relationship between lean manufacturing practices and performance of large manufacturing firms in Nairobi, Kenya

1.4 Value of the Study

The results of this study will provide large scale firms and operations decision makers with a basis from which they can make informed strategy and investment decisions in the light of increasing global competition.

To management profession**,** the findings from the study will help them to identify opportunities derived from implementing lean manufacturing practices that enhance acquisition of capabilities that could result in competitive advantage.

The study will have a practical significance to the manufacturers in as this will enhance the improvement of costing and pricing strategies.

The findings of this study will provide more knowledge for researchers and academicians who may be interested in studying lean manufacturing practices and the firm performance.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature review on the lean manufacturing practices and firm performance. The chapter commences with a theoretical background which contains theories underpinning the study. It summarizes the information from other researchers who have studied the field. The review covers the reviews of the existing literature. The literature review helps in understanding what other related studies have found and suggested. The reviews are used to develop conceptual frame work.

2.2 Theoretical Background

The study was underpinned under three theories which are; systems theory, resource-based view of the firm theory and information theory as presented below;

2.2.1 Systems Theory

Lean Manufacturing practices and theory of constraints are both systematic methods for improving operational performance of an organization that have received a great deal of attention in recent years. Systems theory and lean manufacturing practices both incorporate design, developing of systems and how they work in unity towards a common goal. Flynn, (2011) asserts that the theory of constraints takes a scientific approach to improvement. It hypothesizes that every complex system, including manufacturing processes, consists of multiple linked activities, one of which acts as a constraint upon the entire system.

Reichhart and Holweg (2007) explains that the ultimate goal of most manufacturing companies is to make a profit and that The Theory of Constraints provides a powerful set of tools for helping to achieve that goal, including: the five focusing steps which is a methodology for identifying and eliminating constraints, the thinking processes which are tools for analyzing and resolving problems and lastly throughput accounting which is a method for measuring performance and guiding management decisions. Vore (2002) further outlines that successful implementation of the theory of Constraints will have the following benefits: increased profit, fast improvement, improved capacity, reduced lead times, reduced inventory which means less work-in process inventory.

Systems theory is the interdisciplinary study of systems in general, with the goal of elucidating principles that can be applied to all types of systems at all nesting levels in all fields of research (Tsuchiya, 2010). Theory of systems has relevance to this study since lean manufacturing practices are components of lean systems employed with an aim at improving the manufacturing process. Systems theory can reasonably be considered a specialization of systems thinking or basically in depth scrutiny of how systems are devolved interconnect and work together. In relation to manufacturing, Holden and O'Toole (2004) explains that systems engineering is an interdisciplinary approach and means for enabling the realization and deployment of successful systems. It can be viewed as the application of engineering techniques to the engineering of systems, as well as the application of a systems approach to engineering efforts.

2.2.2 Resource-Based View Theory

RBV focuses on the internal characteristics and performance of the organization (Jambekar, 2008). The theory suggests that organizations have different types of resources that fall under two categories: cooperative and strategic, and competitive and financial. The theory is based on the assumption that firms have idiosyncratic, not identical strategic resources. Resources are not perfectly mobile and therefore heterogeneous. Thus, organizations are collections of resources, and the scarcer the organizational collection of resources the less the competitive advantage they actually hold (Lander and Liker, 2007).

Moreover, aside from resources, RBV theory also focuses on capabilities. Capabilities are accumulated knowledge in organizations resulting from using its existing resources in an efficient and effective way to achieve its final goals (Hausman, 2010). Capabilities are divided into four main categories: functional differential, positional differential, cultural differential, and regulatory differential. These capabilities develop from existing skills and experience (functional), as preferences of previous actions (positional), as a result of the perceptions of the individual of the organizational stakeholders (cultural), or from organizational policies and regulations (regulatory) (Vore, 2002). Therefore, in the context of continues improvement, the theory implies that an organization with a culture supportive of continues improvement, with existing process-based change regulations, and with previous experience in conducting

continues improvement projects, will attain higher levels of continues improvement capabilities.

Lean manufacturing practices are shares common standpoints with RBV theory since they ensure continues improvement (Paneru, 2011). The commonality is embedded in the belief that resources and capabilities of the organization are limited, thus, surviving organizations tend to use their resources in a cost-effective way. Functioning at optimum levels can lead organizations to create competitive advantage. Sustaining competitive advantage, however, may require continual improvements to differentiate themselves from competitors (Paneru, 2011). Sustained competitive advantage is achieved when capabilities are able to produce value, are rare, are imperfectly imitable, and are exploited by the organization.

2.2.3 Information Theory

Companies may seek to communicate their environmental performance to outside stakeholders, but may not always find this easy to do since they may lack full knowledge of the products, processes and materials flowing through their supply chains (Moore and Scheinkopf, 1998). Typically, suppliers may hold more information about their environmental performance and the performance impact is to be experienced by the customers. This situation is defined as information asymmetry. A major advantage of greening supply chains is derived from the capability to market and sell green products. Such capability potentially develops new products and hence builds competitive advantages for enterprises. Yet, companies may not be able to reap this image benefit due to the information asymmetry arising from consumers‟ inability to discern how green the products or materials from the supply chain are (Flynn, 2011).

Similarly, continues improvement fundamental philosophy focuses on improving existing operations within organizations allowing them to use resources more efficiently and effectively (i.e. produce value), and provides tailored solutions to solve specific organizational problems (i.e. unique and imperfectly imitable) (Melton, 2005). Sustaining competitive advantage is specifically related to the human and technical capabilities. Organizational capability in terms of staff with existing continues improvement related experience and the ownership and exposure to a variety of technical lean manufacturing practices tools have a major impact on the final results of

the continues improvement project. This accumulated experience has value, is hard to imitate, transfer or substitute and can be exploitable by the organization and thus creates 'sustainable competitive advantage' in accordance with RBV theory. Therefore, information theory and its competitive advantage sustainability are tightly related to lean manufacturing practices (Paneru, 2011).

2.3 Lean Manufacturing Practices

Lean production is integrated systems composed of highly inter related practices. The high inter correlation between practices lends to support configuration and suggests that managers should be able to recognize the contribution of each individual principle and discern the close relationship and collective importance of each practice when pursuing lean production (Huang et al., 2012). Lean manufacturing practices can only be employed upon acknowledgement of the lean principles such as: value, value stream, flow, pull, perfection and respect for people which are practiced to achieve elimination of waste (Papadopoulu and Ozbayrak, 2005). Lean manufacturing is implemented by organizations through practices of environment enablers, big just in time and the small just in time.

Lean manufacturing focuses either on conceptual philosophy or practical manufacturing techniques and characteristics (Abdulmalek et al, 2006). The latter provides the basis of Lean manufacturing practices. The concept of "Lean" has been broadly defined as follows: Lean production is an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer, and internal variability (Freeman and Perez, 2008). The above definition of Lean manufacturing does not indicate any characteristics that can be defined and measured. Abdulmalek et al., (2006) in their study on measures of Lean production suggest ten underlying Lean manufacturing characteristics. These are; supplier development, pull systems, continuous flow, quick changeover, preventative maintenance, statistical process control, employee involvement, process control and customer involvement.

Cook and Rogowski (2008) suggests the same set of characteristics but expands process control to measure standard work, process definition and focus, visual controls, cultural awareness and evidence of daily accountability. Billesbach (2006) also divides

the employee involvement characteristic into continuous improvement and the ability of the organization to perform root cause problem solving. A supplier development scorecard developed by Kotter (2007) focuses on the same characteristics above but includes transparency of the organization (visibility on value stream mapping out the process in the organization), Lean product development and leadership.

Rother and Shook (2009) asserts that defining lean manufacturing characteristics, their cultural effect, the business scope of implementation and the firm operational performance measures they impact make measuring the link between lean manufacturing and firm operational performance difficult. This is especially true for organizations adopting Lean manufacturing in operating environments that are dissimilar to those in which Lean manufacturing was developed, such as the automotive industry. Furthermore a blind focus on specific Lean manufacturing characteristics may lead companies away from industry specific best practice that is not covered in any predefined and detailed Lean manufacturing characteristic. Such practices may include the focus on supply chain pipeline inventories or retail and distribution networks (Naquib, 2004).

2.3.1 Lean Procurement

Lean procurement practices help to achieve the following: Remove the obstacles to the free flow of information to a manufacturing chain; Create real-time visibility into inventory in motion; change manufacturing chain from push to pull consumption based replenishment models; manage by exception by providing buyers and planners with proactive real-time, exception messages that strengthen their replenishment processes; eliminate the long lead-times for critical materials and assemblies; and cover the upside of your material forecast (Abdulmalek et al, 2006).

According to Vore (2002) Lean procurement is based on three core principles that are derived from demand driven manufacturing and manufacturing chain initiatives: Strengthen and improve pull manufacturing chain processes by deploying manufacturing chain event management solutions that enhance collaboration with your suppliers. Buyer Workspace and Supplier Self-Service collaboration portals connect people buyers, suppliers and partners directly to their pull business processes anytime, anywhere. These collaboration portals allow buyers and their suppliers to communicate

the following manufacturing chain exception based signals in real-time (Huang et al., 2012).

2.3.2 Lean Transformation

According to Huang et al., (2012) lean transformation is an integrated activity in SCM designed to achieve high-volume flexible transformation using minimal inventories of raw materials. Lean transformation is based on the premise that nothing will be produced until it is needed. Ideally, lean transformation is implemented throughout the manufacturing chain with the signal moving backward from the customer all the way back to the most basic raw materials (Jambekar, 2008). Lean transformation is a whole new way of thinking, and includes the integration of vision, culture, and strategy to serve the customer with high quality, low cost and short delivery times.

Smith and Hawkins (2004) assert that although lean transformation has its roots in Japan, it has been implemented successfully all over the world (Papadopoulu and Ozbayrak, 2005). Waste is something that customers are not willing to pay for and it should therefore be eliminated. One of the most important sources of waste is inventory. Keeping parts and products in stock does not add value to them, and should be eliminated (Rother and Shook, 2009).

Lean transformation is derived from the need to increase product flow velocity through the elimination of all non value-added activities (Mackelprang and Nair, 2010). Lean transformation is essentially process oriented as it seeks to eliminate all non-value adding activities and reducing waste within an organization. The logic of lean transformation, leaving aside for a moment its implications for working practices and social impact, describes value-adding processes unencumbered by waste (non-value adding activities). Wastes are usually grouped into the following categories: overproduction, motion, inventory, defects, waiting, transportation, extra processing, and underutilized people (Rosenzweig and Easton, 2012).

2.3.3 Lean Transportation

According to Lander and Liker (2007), an important feature of TPS or lean system is it is applicability to any industry, any service 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 first is the pivot role of transportation function in manufacturing chains; it is indeed the only way to move goods between different nodes of the chain. The second is the JIT system requirements regarding time, flow and delivery. Thus, succeeding a JIT system cannot be achieved without a supporting transportation system which enables the smooth flow of goods and their delivery just in time. This implies that transportation managers need to align this function to the JIT logic of the firm/ manufacturing chain, as opposed to trying to optimize it independently (Hausman, 2010).

Parry and Turner (2006) asserts that the fact that transportation managers ´criteria for selecting shippers and carriers are affected by JIT implementation (Smith and Hawkins, 2004) proves the importance of transportation function in supporting JIT system. Comparing to traditional systems where transportation management was isolated from purchasing and inventory process, in JIT system, transportation is more focused, streamlined and tailored. This reflects the need for more control for transportation process in order to fulfil a more efficient, dependable and suitable transportation for JIT systems (Huang et al., 2012).

2.3.4 Environment Lean

According to Bhasin and Burcher (2006) the environment enablers taken into consideration to achieve lean are: leadership style, corporate culture and organizational structure in the macro environment. Leadership is the management's ability to translate customer requirements into concrete policies, organizational structures and productive strengths in pursuit of a competitive advantage. Leadership allows a company have a long term strategic focus upon application of a new initiative. The top management requires commitment, deep knowledge about lean techniques and fight against organizational barriers upon implementation to achieve the vision of the improvement program (Vore, 2002).

Smith and Hawkins (2004) assert that in lean management practice, the organizational structure is flat and horizontal in focus opposite to the traditional method of vertical structure. Lean management creates a horizontal focus of assigning responsibility to a middle level manager who controls the value from design to delivery in the value

stream but with close support of a functional head who is responsible for the line and work schedules. This ensures communication; co-ordination and collaboration are required to enable individual and organizational changes within the organization need (Reichhart and Holweg, 2007). Organizational culture is the shared attitudes, beliefs, experiences, ideas and values of an organization which control the way members interact with each other and outside stakeholders.

2.3.5 Cellular Manufacturing

In cellular production layouts, equipment and workstations are arranged into a large number of small tightly connected cells so that many stages or all stages of a production process can occur within a single cell or a series of cells (Kumar and Kumar, 2012). Bhasin and Burcher (2006) explained that it is important to group closely all the facilities required to make a product or related products in order to reduce transport, waiting and process time.

Paneru (2011) explained that the advantage of a closed loop arrangement of machines is that the operators inside the cell are familiar with each other's operations and they understand each other better. This improves the relation between the operators and helps to improve productivity.

2.3.6 Continuous Improvement

Continuous improvement is defined as the planned, organized and systematic process of ongoing, incremental and company-wide change of existing practices aimed at improving company performance (Paneru, 2011). It focuses on elimination of non value added activities in the process. Identification and elimination of non value added activities in the process results to increased production, reduction of cost, time and improving quality.

The organization's ability to learn, share information and make decisions facilitates the integration of an individual in a new continuous improvement practice. The continuous improvement practice desired by organizations are: waste elimination, flow, production scheduling, problem solving, standardized processes, visual control and management, continuous improvement, respect for people, teamwork, leadership, long term focus and reflection (Womack and Jones, 2009).

2.3.7 The Five S's

Moore and Scheinkopf (1998) explained 5S as follows; Seiri means to separate the necessary things from the unnecessary and discard the unnecessary. Seiton refers to arranging neatly and identifying things for ease of use. Seiso means to always clean up; to maintain tidiness and cleanliness, to clean your workplace thoroughly. While Seiketsu, is to constantly maintain the 3S mentioned above. It means keeping a clean workplace without rubbish.

Shitsuke, to have workers make a habit of always conforming to rules. Taken together; 5S means good housekeeping and better workplace organization (Flynn, 2011). Melton (2005) explained it as activities used to create a workplace suited for visual control and lean practices. In addition, a well maintained work place creates a healthy environment to work in.

2.3.8 Standardization of Work

It refers to organizing the job and performing it in the most effective way. In a standardized workplace every worker follows the same steps within the production process (Tsuchiya, 2010). When the work is standardized, the same quality of output is achieved. Toyota managers recognize that the lack of details and explicit description of work content, sequence, timing, and outcome allows operators or employees to perform tasks differently, which results in more variation in outcome (Vore, 2002).

Perfection is achieved through organization learning where an organization when faced with a challenge it identifies the root cause of the problem by asking the 5 whys and solving the problem permanently through a team approach in line and specialist responsibility therefore constantly self reflecting to compare whether the company is working towards standardization of mission and vision desired (Flynn, 2011).

2.3.9 Total Productive Maintenance

Vore (2002) a major contributor of TPM, defined it as an innovative approach to maintenance that optimizes equipment effectiveness, eliminates breakdowns, and promotes autonomous maintenance by operators through day-to-day activities involving the total workforce (Bhasin and Burcher, 2006).

Abdulmalek et al., (2006) explained that TPM is an approach to keep the current plant and equipment at its higher productive level through cooperation of all areas of organization. Continuous improvement and quality management programs go hand in hand as they seek to achieve excellence through improvement.

2.3.10 Just In Time

Just-in-time manufacturing is a Japanese management philosophy applied in manufacturing field. It involves having the right items with the right quality and quantity in the right place at the right time (Paneru, 2011). The primary goal for all the companies is customer's satisfaction and if a company cannot reach perfection in this area then all the processes are worthless. JIT is a tool if well implemented, improves firm performance and efficiency through reduction of costs, better quality products and increased production.

2.3.11 Production Smoothing

It is a method for planning and leveling customer demand by volume and variety, while keeping the level of production as constant as possible over a specific time period (Tsuchiya, 2010). If the production level is not constant this leads to waste (such as work-in-process inventory) at the workplace (Billesbach, 2006).

Work-in-process inventory do not add value to a product and they should be eliminated or reduced. This will expose hidden problems and action can be taken immediately. Ondiek and Kisombe (2012) explained that the main advantage the manufacturing unit gains by implementing production smoothing is that the output will be the exact amount as required at the required time and there will be reduced chance of accumulating inventory.

2.3.12 Poka Yoke

Poka-yoke is a quality assurance technique developed by Japanese manufacturing engineer Shigeo Shingo in 1961. It is translated as "resistance to errors" that is avoiding (yoker) errors resulting from inattention (poka). The aim of poka-yoke is to eliminate defects in a product by preventing or correcting mistakes as early as possible (Smith and Hawkins, 2004).

Hausman (2010) explained that one of the most common sources of errors in production systems is the human being itself. Human beings are always prone to making errors. When errors are made and are not caught then defective parts will appear at the end of the process. However, if the errors can be prevented before they happen then defective parts can be avoided and eventually leading to production of high quality products.

2.3.13 Value Stream Mapping

Rother and Shook (2011) defined VSM as the process of visually mapping the flow of information and material as they are preparing a future state map with better methods and performance. This helps in the identification of value-added activities and non value-added activities. Value stream map serves as a critical tool that can reveal substantial opportunities to reduce costs improve production flow, save time and reduce inventory (Ondiek and Kisombe, 2012).

Value stream mapping practice helps to visualize the station cycle times, inventory at each stage, manpower and information flow across the supply chain. Value stream mapping practice ensure perfection is achieved by integration of organization philosophy, techniques and structures to achieve sustained performance improvements in all activities on an uninterrupted basis through product and service design in a customer focus and process oriented approach to satisfy and delight customer (Flynn, 2011).

2.3.14 Kanban

Kanban, which means “signboard” in Japanese, was first developed by Taichi Ohno to control production between processes and implement Just-in-Time (JIT) manufacturing at Toyota manufacturing plants in Japan. Kanban is an execution tool rather than a planning tool (Abdulmalek et al, 2006). Kanban is a signalling card which has information about amount of products to be produced, origin of the product, and destination of the product. The Kanban methodology is a material presentation method designed to simplify material handling and inventory management (Huang et al., 2012).

Instead of stacking the materials issued to the production near the line in larger quantities, smaller quantities of materials are physically present at point of usage on the

line and replenished only when a Kanban or signal is generated. By implementing Kanbans, Toyota manufacturing was able to reduce work-inprocess (WIP) and the cost associated with holding inventories (Huang et al., 2012). Other benefits of Kanban include: reduced inventory; improved flow; reduced or eliminated overproduction; improved responsiveness to change in demand and increased ability to manage the supply chain (Smith and Hawkins (2004).

From the benefits of Kanban it can be observed that performance metrics such as cost, delivery time and flexibility can be improved. For instance, due to improved flow and improved responsiveness to change in demand there will be improvement in delivery time and flexibility. By implementing Kanban there will be zero inventory, by which the inventory holding cost will be reduced, thus also reducing organizational cost (Mackelprang and Nair, 2010).

2.4 Firm Performance

Performance measurement is a quantifying process for the efficiency and effectiveness of an action. The main performance metrics in relation to a manufacturing company performance is based on: quality, speed, dependability and cost (Vore, 2002). Performance of Lean can be measured through various indicators which are: quality, productivity, costs, capacity and inventory. In the case of lean manufacturing the specific performance indicators include: factory time efficiency, flow time, through put and work in process inventory (WIP). Throughput simply means the amount of material that enters and goes through a machine or system. In the case of manufacturing it is basically the conversation rate of raw material to finished product per certain period of time. Business dictionary defines throughput as General Productivity of a machine, procedure, process, or system over a unit period, expressed in a figure-of-merit or a term meaningful in the given context, such as output per hour, cash turnover, and number of orders shipped (Smith and Hawkins, 2004).

According to Cua (2011) factory time efficiency is the index that measures the ability of a factory to sustain operations throughout the year without interruptions. This is the time taken from when customers make an order to the time they receive their order. How efficient a system is will determine the flow time of a particular process. Presence of waste in a system increase flow time. By eliminating wastes in a system, the

customer is able to receive their orders in time. Shortening flow time reduces inventory. Czabke et al., (2008) points out that according to Little's law, flow time = WIP inventory x cycle time. The flow time also known as flow rate is the length of the longest path through the process and includes both processing time and any time the unit spends between steps.

Work-in-process (WIP) materials are Inventory items, or units, that are released for manufacturing. These materials may include units currently being processed on equipment, units in transit within a manufacturing facility, and units waiting processing on equipment in the facility. In Holden and O'Toole (2004) model, he point out that the amplification effects between WIP and quality defaults are evaluated under the assumption that defective items are reworked or substituted by good ones. The rework is waste that increases the cost of goods. John et al., (2010) makes a main conclusion that under quite general conditions the inventory between two stations will keep growing without limit for any failure rate. This result provides a rationale for the Just-in-time practice of limiting the inventory and indicates that the expected throughput not always increases by increasing the WIP inventory buffer. According to Huang et al., (2012) Little's law expressed as WIP inventory = through put rate x flow time.

Openda (2013) explains that firm performance is the measurable aspect of an organization's process. It most encompasses production reliability and defect rates, production cycle time, on time delivery, cost of quality and scrap minimization, productivity, and inventory. Bhasin and Burcher, (2006) outlines various performance measures as within operations area namely (i) standard individual performance measures include: productivity measures, quality measures, inventory measures, lead-time measures, preventive maintenance, performance to schedule, and utilization. (ii) Specific measures include: Cost of quality - measured as budgeted versus actual, variances - measured as standard absorbed cost versus actual expenses, period expenses - measured as budgeted versus actual expenses, safety - measured on some common scale such as number of hours without an accident, profit contribution - measured in dollars or some common scale.

Vore (2002) comment that for those organizations that have adopted the Total Quality Management (TQM) approach, they have been shown to be positively associated with the improvement of general performance with higher operation efficiency and with

better financial results. Freeman and Perez (2008) conducted extensive empirical test on various OM practices effect on performance. Benefits in economic performance deriving from improved efficiency in operations, waste reduction and a new shared vision for continuous improvement were observed from test carried out on JIT. Hence Lean systems are seen to have a positive effect on organization firm performance.

2.5 Lean Practices and Firm Performance

Companies that have adopted lean manufacturing have typically cut inventories and cycle time by 50% in each wave of their lean program (Abdulmalek et al., 2006). From literature it is evident that many concepts of lean manufacturing such as JIT, Kanban, Production smoothing, TPM and TQM have been implemented in more than one process industry and resulted in huge benefits. For example, JIT concepts were successfully applied in a DuPont textile plant to decrease WIP inventory by 96% and reduced working capital by $2 million (Bhasin and Burcher, 2006). Similarly, in the Dow Chemical Company, JIT deliveries, kanban and other lean methods resulted in a 25% increase in demand forecasting accuracy, a 25% reduction in distribution lead times, and an $882,750 decrease in working capital (Vore, 2002).

A series of simulation experiments in a steel mill suggested that VSM, Kanban, JIT, Production smoothing, TPM, Setup reduction, 5S and Visual Control would result in a decrease of production lead time from 48 days to 15 days and a reduction of WIP inventory from 96 to 10 coils for a particular portion of the process (Paneru (2011). In a multi-product chemical manufacturing process, VSM, Kanban and Visual Control resulted in a reduction of overall supply chain cycle time by 50%, a reduction of inventory by 30% and an increase in customer order accuracy by 25% (Kumar and Kumar, 2012).

There are many lean practices which help manufacturing organizations to enhance their performance (Womack and Jones, 2009). They are interrelated in their ability to reduce cost through enhanced efficiency, which contributes to their influence on operational performance (Moore and Scheinkopf, 1998). Melton (2005) asserts that, lean tools should not be implemented in isolation; they were developed for a reason, which was to support an overall performance.

2.6 Conceptual Framework

The conceptual framework is comprised of lean manufacturing practices as independent variables, improvement firm performance of large scale manufacturing firms as dependent variable as shown in Figure 2.1

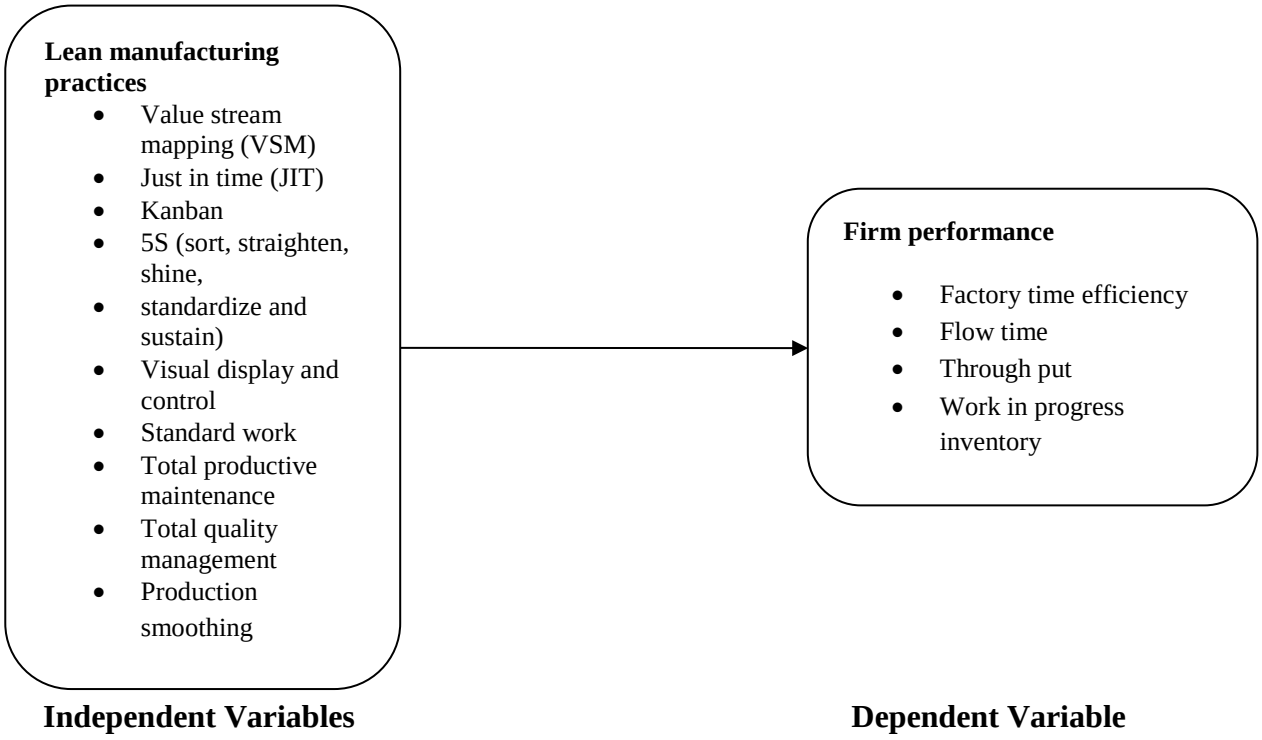


Figure 2.1: Conceptual framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter sets out various stages and phases that were followed in completing the study. It involved a blueprint for the collection, measurement and analysis of data. In this stage, most decisions about how research was executed and how respondents were approached, as well as when, where and how the research was completed. Therefore, in this section the research identified the procedures and techniques that were used in the collection, processing and analysis of data. Specifically the following subsections were included; research design, target population, sampling design, data collection instruments, data collection procedures and finally data analysis.

3.2 Research Design

This research problem was studied through the use of a descriptive research design. Descriptive research is the investigation in which quantitative data is collected and analyzed in order to describe the specific phenomenon in its current trends, current events and linkages between different factors at the current time (Saunders et al., 2003). Descriptive research design was chosen because this study described the variables associated with the problem. It enabled the researcher to generalize the findings to a larger population.

The descriptive research design approach has been credited due to the fact that it allows analysis of the relations of variables under study using linear regression as long as the sampling units for the study are many. It also allows greater flexibility in terms of money and time as well as avoiding the hardship of hunting for respondents more than once to produce high response rate (Mugenda and Mugenda 2003). These reasons justify why this study become a descriptive research design. This study therefore was able to generalize the findings to all the large scale manufacturing firms in Kenya.

3.3 Population of the Study

The target population of the study was all large scale manufacturing firms in Kenya. The unit of analysis was therefore the large scale manufacturing firm. According to KAM directory (2013), large scale manufacturing firms have more than 100

employees, medium firms have from 51 to 100 employees, small firms have employees from 11 to 50 and micro enterprises are those with 10 or fewer employees.

The number of employees is good indicator of size because being profit making, employees can be taken as a proxy for profits, technology utilization, strategy implementation and firm performance, following the above criterion, 655 firms were categorized as large scale manufacturing firms (KAM, 2013). Although categorization of manufacturing firms was according to size on number of employees, the sales turnover, capital employed and capacity utilization was also used to categorize large scale manufacturing firms. The main reason for studying large scale manufacturing firms was that the variables of the study's conceptualization were likely to manifest in lean manufacturing practices used in order to achieve starling performance. The study targeted either a Procurement Manager or Operations Manager in the selected firms since they were well acquainted with lean manufacturing practices in the firms and how the same influenced firm performance.

3.4 Sampling Technique

According to Mugenda and Mugenda (2003) and Saunders et al., (2003) at least 10 percent of the target population is generally considered acceptable method of selecting samples in such a study. Ten percent of total population (10 percent of 655) was approximately sixty six (66) firms which were above thirty making 10 percent a sufficient sample for the total population of large scale manufacturing firms in Kenya. This was adequate size and since the size was small there was need of sampling but the whole number was used using census method. Multi stage stratified sampling was used to pick the respondents. The stratification sampling procedure helped in avoiding selection bias that may arise from comparison between participating and non-participating employees. The distribution is as shown below;

Table 3.1: Sample Distribution

Large Scale manufacturing	**Sectors Population**	**Sample is** **Target Total=N/ Sample Total**
Building, Construction and Mining	19	2
Chemical and Allied	86	9
Energy, Electrical and Electronics	47	5
Food, Beverages and Tobacco	168	17
Leather Products and Footwear	9	1
Metal and Allied	64	6
Motor Vehicle Assembly and Accessories	28	3
Paper and Paperboard	42	4
Pharmaceutical and Medical Equipment	29	3
Plastics and Rubber	60	6
Fresh Produce	15	2
Textile and Apparels	63	6
Timber, Wood Products and Furniture	25	3
Total	**655**	**66**

3.5 Data Collection Instruments

The researcher developed the instruments with which to collect the necessary information. The researcher used a questionnaire to collect primary data. Questionnaires are commonly used to obtain important information about the population. According to Mugenda and Mugenda (2003), a self-administered questionnaire is the only way to elicit self-reports on people's opinion, attitudes, beliefs and values the same sentiments are shared by Saunders et al., (2003). The same instrument was used by Rono (2013) and Openda (2013) in their study. Ondiek and Kisombe (2012) used an interview shcdule and an observation checklist and mentioned the instruments as some of the limitations they experienced and proposed the use of questionnaires.

The questionnaire has items aiming at answering the study questions and it meets the research objectives. The choice of this tool of data collection was guided by the time available and the objectives of the study. Questionnaire provided a high degree of data standardization and adoption of generalized information amongst any population. Semi structured questionnaire were used to collect data. The closed ended questions made the coding and analysis easy while the open ended questions elicited more information from respondents to complete any missing links.

The questionnaire was divided into three sections; the first section contains questions on demographic information of respondents, the second section had questions on lean manufacturing practices while the last section solicited information on firm performance. Secondary data was collected to ascertain the performance level in the firms as a result of lean practices.

3.6 Pilot Test

A pilot-test was conducted on a small sample of 6 Procurement and Operations Managers who were selected randomly. The pre-test questionnaires were distributed equitably to the selected respondents in order to gather a cross-sectional feeling of respondents. This helped in ascertaining the robustness of the instrument. The questionnaire was then be modified to eliminate any ambiguities identified during the pilot-test. The post-test questionnaires were redesigned in close consultation with the assigned supervisor to ensure that possible errors are eliminated.

3.7 Data Analysis Procedures

The research was both qualitative and quantitative in nature. This implies that descriptive and content analysis techniques were employed. Once the data was collected it was checked for completeness ready for analysis. The data from the field was first coded according to the themes researched on the research. This enabled the use of computer in the summarizing of data in tables. This was to give the distribution of responses in the questionnaire in percentage form. The output was also presented in terms of pie charts and graphs.

The researcher employed multiple regression models to study the factors influencing firm performance of large scale manufacturing firms. The research deemed regression

method to be useful for its ability to test the nature of influence of independent variables on a dependent variable. Regression is able to estimate the coefficients of the linear equation, involving one or more independent variables, which best predicted the value of the dependent variable (Saunders et al., 2003). Therefore, the researcher used linear regression analysis to analyze the data. The regression model was as follows:

$Y = \beta_0 + \beta_1 X_1 + \ldots\ldots\ldots\ldots\ldots \beta_{14} X_{14} + \varepsilon$

Where:

$Y =$ Firm Performance;

$\beta_0 =$ Constant Term;

$\beta_{1,}$ to $\beta_{14} =$ Beta coefficients (lean practices)

$\varepsilon =$ Error term

Table 3.2: **Operationalization of Variables**

Objectives	**Indicators**	**Scale**	**Tools of analysis**	**Type of analysis**
To determine the lean manufacturing practices commonly implemented by large manufacturing firms in Nairobi, Kenya;	• Lean Procurement • Lean Transformation • Lean Transportation • Environment Lean • Cellular Manufacturing • Continuous Improvement • The Five S's • Standardization of Work • Total productive Maintenance • Just In Time • Production Smoothing • Poka Yoke Practice • Value Stream Mapping	- Ordinal	- Frequency distribution tables & percentages	- Descriptive
To establish the relationship between lean manufacturing practices and firm performance in Nairobi, Kenya	• Factory time efficiency • Eliminated wastes • Safe work in process inventory (WIP) • Satisfaction at all stages	- Ordinal	- Frequency distribution tables & percentages - Regression	- Descriptive - Inferential

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETITION

4.1 Introduction

This chapter presents analysis and findings of the study as set out in the research methodology. The results are presented on lean manufacturing practices and firm performance of large scale manufacturing firms in Nairobi, Kenya. The data was gathered exclusively from questionnaire as the research instrument. The questionnaire was designed in line with the objectives of the study. To enhance quality of data obtained, Likert type questions were included whereby respondents indicated the extent to which the variables were practiced in a five point Likerts scale.

The study targeted to sample 66 respondents in collecting data. From the study, 41 sampled respondents filled in and returned the questionnaire contributing to 62%. This commendable response rate was made a reality after the researcher made personal visits to remind the respondent to fill-in and return the questionnaires.

Table 4.1: Response Rate

Response	**Frequency**	**Percentage**
Responded	41	62
Not responded	25	38
Total	66	100

4.2 Data Presentation

4.2.1 Data Validity

The researcher issued six questionnaires to six respondents who included Procurement and Operations Managers so as to conduct a pilot study. Piloting of the research instrument was necessary for various reasons: It helped to clarify the wording and grammar of the instrument so as to avoid misinterpretations; to avoid research bias;

detect ambiguous questions; and to pick out in advance any problems in the methods of research. This helped to make the data used in this analysis valid.

4.2.2 Data Reliability

To test the reliability of the Likert scale used in this study, reliability analysis was done using Cronbach's Alpha as the measure. Reliability co-efficient of $\alpha \geq 0.7$ was considered adequate. In this case, a reliability co-efficient of 0.837 was registered indicating a high level of internal consistency for the Likert scale used.

Table 4.2: Cronbach's Alpha

Reliability Statistics	
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items
0. 837	0.880

4.3 General Demographics

4.3.1 Company Category

On evaluating the companies' category where respondents worked in. The distribution was as follows; 27% who were the majority were from food, beverages and tobacco sector, 17% were from chemical and allied sector, 10% were from textile and apparels sector, 7% were from energy, electrical and electronics sector as well the same percentage was shared by respondents from plastics and rubber sector. Five companies had 5% each this were; metal and allied sector, paper and paperboard sector, pharmaceutical and medical equipment sector, fresh produce sector as well as timber, wood products and furniture sector. The building, construction and mining sector, leather products and footwear as well as motor vehicle assembly and accessories sector each was represented by 2%. This indicates that all the targeted sectors were represented in the study. The findings are tabulated in Table 4.3 below.

Table 4.3: Company category

Category	Frequency	Percentage
Building, Construction and Mining	1	2
Chemical and Allied	7	17
Energy, Electrical and Electronics	3	7
Food, Beverages and Tobacco	11	27
Leather Products and Footwear	1	2
Metal and Allied	2	5
Motor Vehicle Assembly and Accessories	1	2
Paper and Paperboard	2	5
Pharmaceutical and Medical Equipment	2	5
Plastics and Rubber	3	7
Fresh Produce	2	5
Textile and Apparels	4	10
Timber, Wood Products and Furniture	2	5
Total	**41**	**100**

4.3.2 Current Level in the Organization

Respondents were asked to indicate their current level in the organization, according to the findings 59% who were the majority were Procurement Manager while 41% were Operations Manager. The high number of the Procurement Manager over the Operations Manager was due to their work description characteristics and getting the later was influenced by their tight work schedule as shown by Table 4.4.

Table 4.4: Current level in the organization

Category	Frequency	Percentage
Procurement Manager	24	59
Operations Manager	17	41
Total	**41**	**100**

4.3.3 Number of Products

The study aimed at evaluating the number of products the companies offered.

Figure 4.1: Number of products

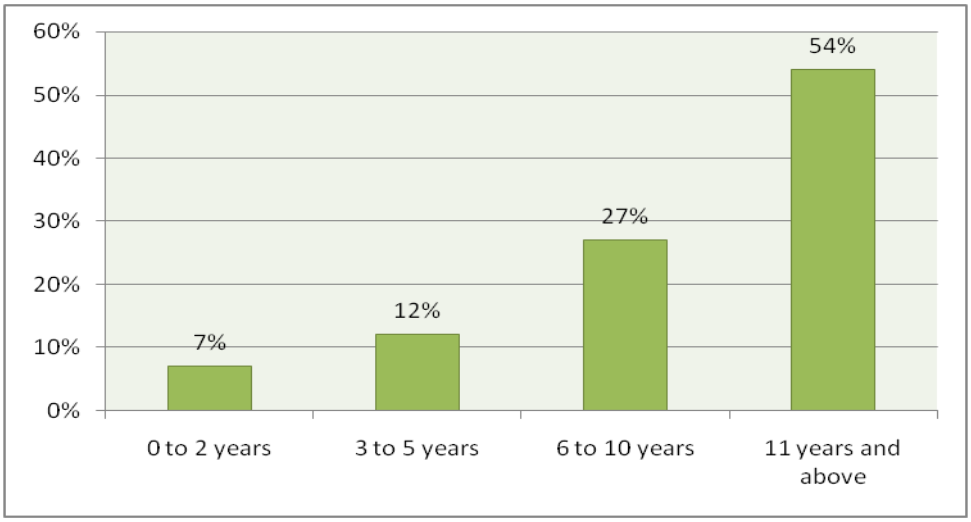
Number of products	Frequency	Percentage
5	32	78
4 products	7	17
1 product	2	5
Total	**41**	**100**

According to figure 4.1 above, 78% of the firms produced more than five products, 17% produced two to four products while 5% produced only one product. The production of more than one variety of products was due to market demand and diversification of consumer needs.

4.3.4 Length of Service in the Firm

Figure 4.2 shows responses on length of service by the respondents with the firm.

Figure 4.2: Length of service in the firm



According to the findings 54% who were the majority had worked with the companies for a period between 11 years and above, 27% had worked for a period between 6 to 10

years, 12% had worked for a period between 3 to 5 years, 7% had worked for a period between 0 to 2 years. This indicates that the employees had been in the firms long enough to understand the lean manufacturing practices sought by the study.

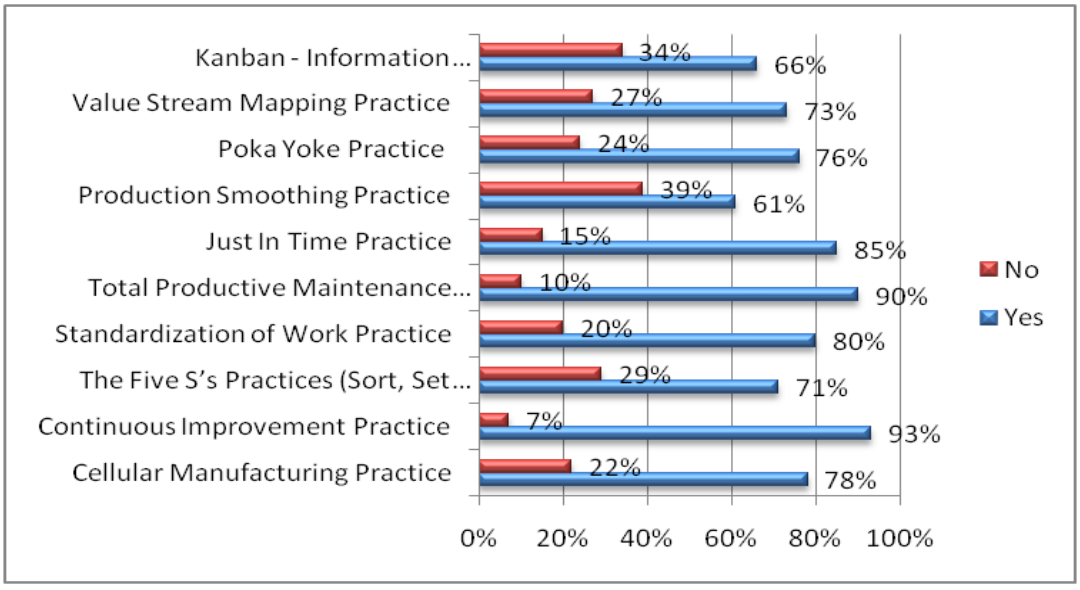
4.4 Lean Manufacturing Practice

In this section, the study sought to know the extent to which the large scale manufacturing firms have been practicing Lean manufacturing. The extent was measured on a Likert scale of 1-5 where: 5= Very Large Extent, 4= Great Extent, 3= Moderate Extent, 2= Small Extent and 1= Very Small Extent. The higher the mean, the greater the extent of agreement while the greater the standard deviation, the greater the level of variation in the responses.

4.4.1 Lean Manufacturing Techniques Employed By the Firms

The study aimed at evaluating the lean manufacturing techniques employed by the companies.

Figure 4.3: Lean manufacturing techniques employed by the firms



According to figure 4.3; 93% who were the majority employed Continuous Improvement Practice, 90% employed Total Productive Maintenance Practice, 85% employed Just In Time Practice, 80% employed Standardization of Work Practice, 78% employed Cellular Manufacturing Practice, 76% employed Poka Yoke Practice, 73% employed Value Stream Mapping Practice, 71% employed The Five S's Practices (Sort, Set In Order, Shine, Standardize, Sustain), 66% employed Kanban - Information

Transparency while 61% employed Production Smoothing Practice. This infers that the selected manufacturing firms indeed practiced lean manufacturing practices.

4.4.2 Lean Procurement used by Manufacturing Firms

Lean procurement practices are adopted by manufacturing firms to improve their performance**.** The respondents were asked to indicate to what they agreed with statement on lean procurement practices in an effort of improving its firm performance. The findings are shown by Table 4.5, below:

Table 4.5: Lean procurement in improving firm performance

Lean procurement	**Mean**	**Standard deviation**
The firm strive to establish long-term relationship with the suppliers	4.01	1.087
Key suppliers deliver to the firm on just in time (JIT) basis	3.77	1.142
The firm give suppliers feedback on quality and delivery	3.68	.238
The firm has sound replenishment models to pull consumption for its products	3.50	1.030
Suppliers are directly involved in the new product development Process	2.05	.231
Overall mean	**3.40**	**0.746**

To a great extent the firm strived to establish long-term relationship with the suppliers (mean score 4.01), key suppliers delivered to the firm on just in time (JIT) basis (mean score 3.77) and the firm gave suppliers feedback on quality and delivery (mean score 3.68). Lean procurement practices improved firm performance to a moderate extent. This was evidenced by the overall mean of 3.40.

According to the findings the firms used lean manufacturing practices to a great extent. This can be attributed Womack and Jones (2009) as well as Moore and Scheinkopf (1998) studies in that the lean practices help manufacturing organizations to enhance their performance. They are interrelated in their ability to reduce cost through enhanced efficiency, which contributes to their influence on operational performance.

4.4.3 Lean Transformation Implementation

Lean transformation implementation is part of lean manufacturing as used in manufacturing. The respondents were asked to indicate the extent to which lean transformation implementation influence performance. The findings are as tabulated on Table 4.6 below;

Table 4.6: Lean transformation implementation

Lean Transformation	Mean	Standard deviation
Use of modern machines and processes has helped the firm lower production costs	4.06	.303
The firm has ensured increase product flow velocity through the elimination of all non value-added activities	3.75	.347
The firm has updated inventory that keep parts and products in stock does not add value to them therefore ensuring elimination of waste	3.65	1.287
The firm ensures it's based on the premise that nothing will be produced until it is needed	3.19	.415
The firm use automatic monitoring devices in our processes	3.11	.289
Overall mean	**3.55**	**0.528**

To a great extent there was use of modern machines and processes helped the firm lower production costs (mean score 4.06), the firm ensured increase product flow velocity through the elimination of all non value-added activities to a great extent (mean score 3.75) and the firm updated inventory that kept parts and products in stock which did not add value to them therefore ensuring elimination of waste (mean score 3.65). According to the findings lean transformation practices was implemented to a great extent as shown by an overall mean score of 3.55.

The study was in line with Melton (2005) who asserts that, lean tools should not be implemented in isolation; they were developed for a reason, which was to support an overall performance.

4.4.4 Lean Transportation Implementation

Lean transportation implementation is part of lean manufacturing as used in manufacturing. The respondents were asked to indicate the extent to which lean transportation implementation influence performance. The findings are as shown on Table 4.7 below;

Table 4.7: Lean transportation implementation

Lean Transportation	**Mean**	**Standard deviation**
The firm has ensured there are effective transportation system which enables the smooth flow of goods and their delivery just in time.	3.77	1.142
The firm has a budget to ensure there are more control for transportation process in order to fulfill a more efficient, dependable and suitable transportation for JIT systems	3.68	.238
Production is "pulled" by the shipment of finished goods	3.61	1.087
Transportation managers have aligned the firm function to the Just-in-time (JIT) logic as well as the manufacturing chain	3.50	1.030
Overall mean	**3.64**	**0.874**

To a great extent the firm ensured there was effective transportation system which enabled the smooth flow of goods and their delivery just in time to a great extent as shown by a mean score of 3.77, the firm had a budget that ensured there were more control for transportation process in order to fulfill a more efficient, dependable and suitable transportation for Just-in-time (JIT) systems to a great extent as shown by a mean score of 3.68 and production were "pulled" by the shipment of finished goods to a great extent as shown by a mean score of 3.61. Respondents rated the use of lean transportation practices implementation in their firm to a great extent as shown by the overall mean score 3.64.

The study was in line with Lander and Liker (2007) who assert that, an important feature of TPS or lean system is it is applicability to any industry, any service and any context. The sound relation between transportation and JIT system stems from two

things. The first is the pivot role of transportation function in manufacturing chains; it is indeed the only way to move goods between different nodes of the chain.

4.4.5 Environment Lean Implementation

Environment lean implementation is part of lean manufacturing as used in manufacturing. The respondents were asked to indicate the extent to which environment lean implementation influence performance. The findings are as shown on Table 4.8 below;

Table 4.8: Environment lean implementation

Environment Lean	**Mean**	**Standard deviation**
The top management have deep knowledge about lean techniques and fight against organizational barriers hence improved manufacturing process	4.11	.415
The firm has leadership that has ability to translate customer requirements in pursuit of a competitive advantage	3.95	.231
The firm has well structured organizational policies that ensure effectiveness in the manufacturing process	3.76	.303
Overall mean	**3.94**	**0.316**

To a great extent (mean score 4.11) the top management had deep knowledge about lean techniques and fight against organizational barriers hence improved manufacturing process , the firm had leadership that had the ability to translate customer requirements in pursuit of a competitive advantage (mean score 3.95) as well it was to a great extent (mean score 3.76) that the firm had well structured organizational policies that ensured effectiveness in the manufacturing process. Environment lean practices implementation by the manufacturing firms was rated to a great extent as shown by the aggregate mean score (mean score 3.94).

These correlated with Bhasin and Burcher (2006) the environment enablers taken into consideration to achieve lean are: leadership style, corporate culture and organizational structure in the macro environment.

4.4.6 Other Lean Manufacturing Used

Other lean manufacturing used are part of lean as used in manufacturing. The respondents were asked to indicate the extent to which other lean manufacturing used influence performance. The findings are as shown on Table 4.9 below;

Table 4.9: Other lean manufacturing used

Category	Practices	Mean	Standard deviation
Cellular Manufacturing	The firm has improved the relation between the operators and helps to improve productivity	3.75	.347
	The firm has facilities that have been grouped closely reduce transport, waiting and process time for a product	3.15	1.287
Continuous Improvement	The firm's ability to learn, share information and make decisions facilitates the integration of an individual in a new continuous improvement practice	3.44	.334
	The firm has eliminated non value added activities in the manufacturing process	3.19	.289
The Five S's (Sort, Set In Order, Shine, Standardize, Sustain)	The firm has maintained the regulatory factory standards to ensure safety and quality	3.65	1.263
	The firm's has the best workplace healthy environment to work in	3.19	1.201
Standardization of Work	The firm solves problems permanently through a team approach in line and specialist responsibility for standardization of mission and vision desired	3.73	.118
	Employees in the firm follow the same steps within the production process	3.62	1.098
Total Productive Maintenance	The firm keeps the plant and its equipment at its higher productive level through cooperation of all areas of organization	3.88	.446
	The firm ensures continuous improvement and quality management programs that go hand in hand to achieve excellence through improvement	3.71	.461
Just In Time	JIP has ensured reduced costs, better quality products and increased production	3.87	1.116
	Right items with the right quality and quantity in the right place at the right	3.73	1.041

	time		
Production Smoothing	The firm ensures it exposes hidden problems and action is taken immediately	3.61	2.783
	The firm ensures levelled customer demand by volume and variety, while keeping the level of production as constant	3.54	.038
Poka Yoke	The firm ensures that employees are well trained on mistakes as well as to how to handle them	4.08	. 720
	The firm eliminate defects in their products by preventing or correcting mistakes as early as possible	3.70	.175
Value Stream Mapping	The firm has ensured efficient flow of information and material with better methods and performance	3.69	1.192
	The firm has ensured check at station cycle, inventory at each stage across the supply chain	3.65	1.018
Kanban - Information Transparency	Reduced cost of information processing	3.95	.129
	Smooth information transmission	3.75	1.026
	Increase production process transparency	3.14	.175
Overall mean		**3.62**	**0.777**

To a great extent the firm had improved relation between the operators and helped to improve productivity as shown by a mean score of 3.75. On the Five S's Practices (Sort, Set In Order, Shine, Standardize, Sustain) the study used the firm maintained the regulatory factory standards to ensure safety and quality to a great extent (mean score 3.65).

To a great extent the firms implemented standardization of work practice as shown by the firm solving problems permanently through a team approach in line and specialist responsibility for standardization of mission and vision desired (mean score 3.73) and employees in the firm following the same steps within the production process (mean score3.62). Total Productive maintenance practice was implemented in the firms to a great extent. This was by keeping the plant and its equipment at its higher productive level through cooperation of all areas of organization (mean score 3.88) and by

ensuring continuous improvement and quality management programs that went hand in hand to achieve excellence through improvement (mean score 3.71). Just In Time

To a great extent practice was implemented as JIP ensured reduced costs, better quality products and increased production (mean score 3.87) and the firms ensured they had the right items with the right quality and quantity in the right place at the right time to a great extent as shown by a mean score of 3.73.

To a great extent production smoothing practice was implemented by ensuring the firms exposed hidden problems and action taken immediately (mean score 3.61). Poka Yoke Practice was implemented to a great extent as the firm ensured that employees were well trained on mistakes as well as to how to handle them (mean score 4.08) as well the firm eliminated defects in their products by preventing or correcting mistakes as early as possible (mean score 3.70) respectively.

To a great extent value stream mapping practice were also implemented as the firm ensured efficient flow of information and material with better methods and performance (mean score 3.69) and the firm ensured check at station cycle, inventory at each stage across the supply chain (mean score 3.65) Kanban - Information Transparency was to a great extent (mean score 3.95) and implemented by reducing cost of information processing as well to a great extent (mean score 3.75).

Other lean manufacturing practices used implementation by the manufacturing firms was rated to a great extent as shown by the aggregate mean score (mean score 3.62). The study findings show that the firms had well structured organizational policies that ensured effectiveness in the manufacturing process. These findings were in line with Vore (2002) and Smith and Hawkins (2004) with best policies the firms performance is seen through factory time efficiency, flow time, through put and work in process inventory (WIP). Throughput simply means the amount of material that enters and goes through a machine or system. In the case of manufacturing it is basically the conversation rate of raw material to finished product per certain period of time.

The study found that there were driving forces towards lean manufacturing this include; reduction in litigation issues where work injury benefit is concerned. This was similar to Parry and Turner (2006) and Tsuchiya (2010) in that lean manufacturing practice is a thought process and philosophy, not a tool, used to look at firm whether it is

manufacturing, service or any other activity with a supplier and a customer relation with a goal of eliminating non value added tasks. The principle of lean manufacturing includes teamwork, communication, efficient use of resources and continuous improvement. Lean manufacturing practices network is empowered to execute superlative, unique customer-winning value at the lowest cost through the collaborative, real-time synchronization of product/service transfer, demand priorities, vital marketplace information and logistics delivery capabilities.

The sector has had a number of challenges in the process of implementing lean. The findings indicated that lack of understanding of lean manufacturing concepts, lack of managerial support and the nature of manufacturing processes and facilities as the major obstacles of implementing lean manufacturing in the companies. In support of the same idea was Vore (2002) in that leadership is the management's ability to translate customer requirements into concrete policies, organizational structures and productive strengths in pursuit of a competitive advantage. According to Herron and Braident (2007) and Bhasin and Burcher (2006), lean tools should not be implemented in isolation; they were developed for a reason, which was to support an overall strategy. They have also suggested that it was better to embrace more lean tools rather than practicing one or two isolated ones.

4.4.7 Driving Forces behind Implementing Lean Manufacturing

On evaluating the driving forces behind implementing lean manufacturing; respondents indicated that this was as a result of; Lean manufacturing helps in improving the reliability of the equipment. It also results to improved housekeeping in the plant. Implementation of poka yoke has helped reduce costly mistakes and accidents in the plant. There has been reduction in litigation issues where work injury benefit is concerned as a result of poka yoke. Automation of various process in the plant has seen a reduction in production cost in some areas since staff cost have reduced due to a leaner work force. Work process has become more standardize due to work process due to adoption of ISO Quality management system. Product consistency has been achieved in most of the parameters. Rework of materials and products has been minimized in the value stream. Condition monitoring of plant, process and equipment is being achieved due to automation and lean manufacturing implementation. Lean manufacturing has

also helped in maintaining good relationship with the customers by producing high quality product.

4.5 Firm Performance as a result of Lean Manufacturing

Firm performance as a result of lean manufacturing. The respondents were asked to indicate the extent to which performance resulted to performance. The findings are as tabulated on Table 4.10 below;

Table 4.10: Firm performance as a result of lean manufacturing

Performance indicators	**Mean**	**Standard deviation**
Improved material flow and through put	4.13	.483
Wastage reduction	4.07	1.114
Productivity improvement	4.01	.856
Inventory reduction	3.92	.153
Product and service quality improvement	3.91	1.280
Profitability improvement	3.91	.594
Lead time reduction	3.89	1.105
Labor requirement reduction	3.87	1.070
Manufacturing cost reduction	3.80	.097
Sales volume improvement	3.77	.152
Work in process reduction	3.76	1.274
Set up time reduction	3.75	1.063
Overall mean	**3.90**	**0.80**

To a great extent there was improved material flow and through put (mean score 4.13), wastage reduction (mean score 4.07), productivity improvement (mean score 4.01), inventory reduction (mean score 3.92), product and service quality improvement (mean score 3.91), profitability improvement (mean score 3.91), lead time reduction (mean score 3.89), labor requirement reduction (mean score 3.87), manufacturing cost reduction (mean score 3.80), sales volume improvement (mean score 3.77), work in process reduction (mean score 3.76) and set up time reduction (mean score 3.75). Lean

manufacturing practices ensured performance of the firms to a great extent as shown by the overal mean (3.90).

The findings were in line with Vore (2002) in that lean manufacturing practices network is empowered to execute superlative, unique customer-winning value at the lowest cost through the collaborative, real-time synchronization of product/service transfer, demand priorities, vital marketplace information and logistics delivery capabilities.

4.5.1 Challenges Faced when Implementing Lean Manufacturing

On responding to the challenges the companies faced when implementing lean manufacturing, the managers indicated that they were faced by; Skill gaps among staff that was attributed as an impediment to lean implementation. A good number of the work force was due to retire. Those left dint have the necessary skill set to implement some of the lean manufacturing practices. Most of the firms were not doing much to develop and nurture talent to ensure that staffs are equipped with relevant skills. Also noted was lack of reward systems to encourage staff to come up with innovations that can improve production system and improve efficiencies.

Respondents also cited resistance to change culture among staff was noted as a major challenge to lean implementation. Most staff thought that this would take away their jobs by making process leaner and hence reduction in staff number. This was due to lack of total acceptance of lean culture among staff that would otherwise bring about full realization of benefits of lean manufacturing. Lack of consistency in the follow up of objectives by staff, an organizational culture of ‘know it all’ also limits learning across the entire value stream. Finally lack of commitment among all various departments and management was highlighted as a challenge, this was due to lack of good team work among the cross functional teams to ensure there is synergy which is required in lean manufacturing implementation. This was lacking since each team aimed to outshine the other in performance resulting in other sectors suffering and pulling down the entire performance of the organization.

4.6 Regression Analysis of the Findings

The researcher conducted a multiple linear regression analysis so as to determine the relationship between the factors affecting firm performance and the lean manufacturing practices which were fourteen independent factors namely: Lean Procurement Practices, Lean Transformation Practices, Lean Transportation Practices, Environment Lean Practices, Cellular Manufacturing Practice, Continuous Improvement Practice, The Five S's Practices, Standardization of Work Practice, Total Productive Maintenance Practice, Just In Time Practice, Production Smoothing Practice, Poka Yoke Practice, Value Stream Mapping Practice and Kanban.

The regression equation used was;

$$Y = \beta_0 + \beta_1 X_1 + \ldots\ldots\ldots\ldots\ldots \beta_{14} X_{14} + \varepsilon$$

Table 4.11: Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	**0.843**	**0. 742**	**0.724**	**0.4216**

a) Predictors: (Constant), Lean Procurement Practices, Lean Transformation Practices, Lean Transportation Practices, Environment Lean Practices, Cellular Manufacturing Practice, Continuous Improvement Practice, The Five S's Practices, Standardization of Work Practice, Total Productive Maintenance Practice, Just In Time Practice, Production Smoothing Practice, Poka Yoke Practice, Value Stream Mapping Practice and Kanban.

b) Dependent variable: Firm performance

The study used the R square. The R Square is called the coefficient of determination and tells us how the firm performance varied with Lean Procurement Practices, Lean Transformation Practices, Lean Transportation Practices, Environment Lean Practices, Cellular Manufacturing Practice, Continuous Improvement Practice, The Five S's Practices, Standardization of Work Practice, Total Productive Maintenance Practice, Just In Time Practice, Production Smoothing Practice, Poka Yoke Practice, Value

Stream Mapping Practice and Kanban. The forteen independent variables that were studied explain 74.2% of the factors affecting firm performance as represented by R Squared (Coefficient of determinant). This therefore means that other factors not studied in this research contribute 25.8% of the factors affecting firm performance.

Table 4.12: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.72	9	1.302	44.231	.000(a)
	Residual	3.432	32	0.066		
	Total	**15.152**	**41**			

a) Predictors: (Constant), Lean Procurement Practices, Lean Transformation Practices, Lean Transportation Practices, Environment Lean Practices, Cellular Manufacturing Practice, Continuous Improvement Practice, The Five S's Practices, Standardization of Work Practice, Total Productive Maintenance Practice, Just In Time Practice, Production Smoothing Practice, Poka Yoke Practice, Value Stream Mapping Practice and Kanban

b) Dependent Variable: Firm performance

The study used ANOVA to establish the significance of the regression model from which an f-significance value of p less than 0.05 was established. The model is statistically significant in predicting how the lean practices (Lean Procurement Practices, Lean Transformation Practices, Lean Transportation Practices, Environment Lean Practices, Cellular Manufacturing Practice, Continuous Improvement Practice, The Five S's Practices, Standardization of Work Practice, Total Productive Maintenance Practice, Just In Time Practice, Production Smoothing Practice, Poka Yoke Practice, Value Stream Mapping Practice and Kanban) affect manufacturing firm performance. This shows that the regression model has a less than 0.05 likelihood (probability) of giving a wrong prediction. This therefore means that the regression model has a confidence level of above 95% hence high reliability of the results.

Table 4.13: Coefficients Results

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.116	.186		0.623	. 033
Lean Procurement	0.577	.068	.559	8.478	.000
Lean Transformation	0.157	.043	.257	3.676	.036
Lean Transportation	0.082	.042	. 301	2.252	.020
Environment Lean	0.021	.002	.245	6.906	.001
Cellular Manufacturing	0.076	.096	.033	0.797	.026
Continuous Improvement	0.015	.026	.025	0.598	.030
The Five S's	0.087	.019	.189	4.514	.000
Standardization of Work	0.386	.034	.483	11.450	.000
Total Productive Maintenance	0.137	.023	.241	5.921	.000
Just In Time	0.119	.176	.109	.675	.003
Production Smoothing	0.126	.182	.023	.145	.036
Poka Yoke	0.399	.273	.246	1.461	.041
Value Stream Mapping	0.395	.246	.256	1.601	.037
Kanban	0.137	.033	.259	4.176	.027

a) Predictors: (Constant), Lean Procurement Practices, Lean Transformation Practices, Lean Transportation Practices, Environment Lean Practices, Cellular Manufacturing Practice, Continuous Improvement Practice, The Five S's Practices, Standardization of Work Practice, Total Productive Maintenance Practice, Just In Time Practice, Production Smoothing Practice, Poka Yoke Practice, Value Stream Mapping Practice and Kanban

b) Dependent Variable: Firm performance

The established regression equation was

$$Y = 0.116 + 0.577X_1 + 0.157X_2 + 0.082X_3 + 0.021X_4 + 0.076X_5 + 0.015X_6 + 0.087X_7 + 0.386X_8 + 0.137X_9 + 0.119X_{10} + 0.126X_{11} + 0.399X_{12} + 0.395X_{13} + 0.137X_{14} + \varepsilon$$

The regression equation above has established that holding all factors (Lean Procurement Practices, Lean Transformation Practices, Lean Transportation Practices, Environment Lean Practices, Cellular Manufacturing Practice, Continuous Improvement Practice, The Five S's Practices, Standardization of Work Practice, Total Productive Maintenance Practice, Just In Time Practice, Production Smoothing Practice, Poka Yoke Practice, Value Stream Mapping Practice and Kanban) constant, factors affecting firm performance will be 0.116. The findings presented also shows that taking all other independent variables at zero, a unit increase in lean procurement practices will lead to a 0.577 increase in the scores of the firm performance. A unit increase in lean transformation practices will lead to a 0.157 increase in firm performance. On the other hand, a unit increase in lean transportation practices will lead to a 0.082 increase in the scores of the firm performance; and a unit increase in environment lean practices will lead to a 0.021 increase in the scores of the firm performance.

Also a unit increase in cellular manufacturing practice would lead to a 0.076 firm performance, a unit increase in continuous improvement practice would lead to a 0.015 increase in firm performance and a unit increase in The Five S's Practices would lead to a 0.087 increase in firm performance. A unit increase in standardization of work practice would lead to a 0.386 increase in firm performance. Further, a unit increase in total productive maintenance practice would lead to a 0.137 increase in firm performance.

A unit increase in Just In Time Practice, would lead to a 0.119 increase in firm performance and a unit increase in value stream mapping practice would lead to a 0.126increase in firm performance. On the other hand, a unit increase in Poka Yoke Practice would lead to a 0.399 increase to firm performance while a unit increase in production smoothing practice would lead to a 0.395increase in firm performance respectively. Lastly, a unit increase in Kanban would lead in a 0.137 increase in to firm performance.

This infers that lean procurement practices influences the firm performance of large scale manufacturing firms in Nairobi, Kenya most followed by Poka Yoke Practice, Value Stream Mapping Practice, Standardization of Work Practice, Lean Transformation Practices, Total Productive Maintenance Practice, Kanban, Production Smoothing Practice, Just In Time Practice, The Five S's Practices, Lean Transportation Practices, Cellular Manufacturing Practice, Environment Lean Practices and Continuous Improvement Practice.

The study also established a significant relationship between firm performance of large scale manufacturing firms and the independent variables; Lean Procurement Practices ($p= 0.000<0.05$), Lean Transformation Practices ($p= 0.036<0.05$), Lean Transportation Practices ($p= 0.020<0.05$), Environment Lean Practices ($p= 0.001<0.05$), Cellular Manufacturing Practice ($p= 0.026<0.05$), Continuous Improvement Practice ($p= 0.030<0.05$), The Five S's Practices ($p= 0.000<0.05$), Standardization of Work Practice ($p= 0.000<0.05$), Total Productive Maintenance Practice ($p= 0.000<0.05$), Just In Time Practice ($p= 0.003<0.05$), Production Smoothing Practice ($p= 0.036<0.05$), Poka Yoke Practice ($p= 0.041<0.05$), Value Stream Mapping Practice ($p= 0.037<0.05$) and Kanban ($p= 0.027<0.05$) as shown by the p values. This depicts that when the lean manufacturing practices studied are jointly applied, they would increase firm performance of large scale manufacturing firms in Nairobi, Kenya.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides the summary of the findings from chapter four, and also it gives the conclusions based on the objectives of the study. The researchers then present the recommendations for both the research and for the policy and practice.

5.2 Summary of Findings

According to the findings lean manufacturing practices ensured performance of the firms to a great extent (mean score 3.90). Majority of the firms (93%) employed Continuous Improvement Practice. According to the findings lean transformation practices were implemented to a great extent (mean score 3.55). Use of lean transportation practices implementation in their firm was rated to a great extent (mean score 3.64). Environment lean practices implementation by the manufacturing firms was rated to a great extent (mean score 3.94). On evaluating the extent to which the firms used other lean manufacturing practices the study found that it was to a great extent (mean score 3.62).

The study found that it was to a great extent (mean score 4.11) that the top management had deep knowledge about lean techniques and fight against organizational barriers hence improved manufacturing process, the firm had leadership that had the ability to translate customer requirements in pursuit of a competitive advantage (mean score 3.95) as well it was to a great extent (mean score 3.76) that the firm had well structured organizational policies that ensured effectiveness in the manufacturing process.

The study found that there were driving forces towards lean manufacturing this include; reduction in litigation issues where work injury benefit is concerned as a result of poka yoke. Automation of various process in the plant has seen a reduction in production cost in some areas since staff cost have reduced due to a leaner work force and product consistency has been achieved in most of the parameters.

The sector has had a number of challenges in the process of implementing lean. The findings indicated that lack of understanding of lean manufacturing concepts, lack of managerial support and the nature of manufacturing processes and facilities as the major obstacles of implementing lean manufacturing in the sugar companies.

5.3 Conclusion

The study concludes that lean manufacturing practices are evident among the manufacturing firms in Kenya. Manufacturing firms in Kenya that have been surveyed have exhibited some evidence of adoption of lean practices. The study findings indicate that the most prevalent practices adopted are preventative maintenance and reduction in the preliminary finishing time. The study shows that the main reasons for adoption of these practices were to reduce cost, profitability and long term survival of the firm.

The study further concludes that lean procurement practices influences the firm performance of large scale manufacturing firms most followed by Poka Yoke Practice, Value Stream Mapping Practice, Standardization of Work Practice, Lean Transformation Practices, Total Productive Maintenance Practice, Kanban, Production Smoothing Practice, Just In Time Practice, The Five S's Practices, Lean Transportation Practices, Cellular Manufacturing Practice, Environment Lean Practices and Continuous Improvement Practice.

The study further found that taking all other independent variables at zero, a unit increase in lean procurement practices will lead to an increase in the scores of the firm performance. The study finally concludes that there was a significant relationship between firm performance of large scale manufacturing firms and lean manufacturing practices. This portrays that when the lean manufacturing practices studied are jointly applied, they would increase firm performance of large scale manufacturing firms in Nairobi, Kenya.

5.4 Recommendations

The study based on the findings recommends that the implementation of lean manufacturing practices should support the firm's business strategy. The implementation should be in line with the companies' vision, mission, values and plans including communication and evaluation plans to build employee buy-in and

communicate results. This will ensure that performance is measured to track actual performance against expectations, new initiatives, budgets including resources needed for new initiatives and current operations for lean projects.

The study recommends that large scale manufacturing firms in Kenya need to give attention to the implementation of all the key areas of lean manufacturing practices from a holistic perspective in order to reap the full benefits of lean and significantly improve their operational performance; more specifically factory time efficiency.

The study finally recommends that the large scale manufacturing firms in Kenya needs to deliberately seek to develop mutually- focused relationships with external stakeholders like equipment manufacturers and technology providers, internationally recognised large scale manufacturing firms for benchmarking purposes and capacity enhancement institutions specifically those in areas of process improvement and operational excellence for purposes of developing capacity in the manufacturing sector.

5.5 Limitations of the study

Most of the organizational structure in the manufacturing firms is pyramid in shape, where every employee in the firms reports to someone else within the firms. This reporting structure increased bureaucracy and getting feedback was cumbersome. The researcher requested the management for permission to conduct the study and there after engaged the other employees. Employees were informed that participation in the study was voluntary. This was done by scheduling an initial meeting with the managers.

Fear of victimization among the employees for responding to the questionnaire was witnessed. The researcher stressed the confidentiality of the questionnaires and also asked the employees to be completely honest with their answers. The researcher encouraged the employees that the information they gave was to be used to improve the performance of the firms.

Respondents suspected that the research findings were to be used for other purposes. The researcher used cover letters from the university to mitigate this outcome as soon as the proposal was approved.

5.6 Suggestions for Further Research

This study concentrated on the study of lean manufacturing practices and the performance of organizations in the large scale manufacturing sector. The researcher recommends further research on the same topic but in other organizations other than manufacturing companies, both within the country and outside the country. This will help to establish whether the same effects will be held true in organizations other than manufacturing organizations and in other parts in and out of the country. This will also assist in providing concrete facts upon which reliable conclusions can be made.

A replication of this study should be carried out but this time using a larger sample, more time should be allocated to the same and a combination of more than one of data collecting instrument should be used like interview and focus group discussions these will help to counter check the information provided.

A further study needs to be conducted using more variables that seem to be more relevant to this study

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APPENDICES

Appendix I: Research Questionnaire

Kindly tick [√] the appropriate response or provide information as is relevant. Your responses will be anonymous and confidential and will only be used for the purposes of this study. As such, do not write your name on the questionnaire.

Section A: Demographic Information of Respondents

1. Company Category

Building, Construction and Mining [ ] Food, Beverages and Tobacco [ ]

Chemical and Allied [ ] Energy, Electrical and Electronics [ ]

Textile and Apparels [ ] Pharmaceutical and Medical Equipment [ ]

Plastics and Rubber [ ] Timber, Wood Products and Furniture [ ]

Metal and Allied [ ] Leather Products and Footwear [ ]

Motor Vehicle Assembly and Accessories [ ]

2. Indicate your current level in the organization.

Procurement Manager [ ]

Operations Manager [ ]

3. Number of products _____

4. Indicate your length of service in the firm

0 - 2 years [ ] 3 -5 years [ ]

6 -10 years [ ] 11 years and above [ ]

Section B: Lean Manufacturing Practices

5. What lean procurement manufacturing techniques has your company employed?

.....
.....

.....
.....

6. To what extent has your firm implemented the following Lean procurement practices in an effort of improving its firm performance? Use a scale of 1-5 where; 5 Very Great extent, 4 Great extent, 3 Moderate extent, 2 Small extent and 1 Very small extent

Lean procurement practices	**1**	**2**	**3**	**4**	**5**
Key suppliers deliver to the firm on just in time (JIT) basis					
The firm has sound replenishment models to pull consumption for its products					
The firm give suppliers feedback on quality and delivery					
The firm strive to establish long-term relationship with the suppliers					
Suppliers are directly involved in the new product development process					

7. To what extent has your firm implemented the following lean transformation practices in an effort of improving its firm performance? Use a scale of 1-5 where; 5 Very Great extent, 4 Great extent, 3 Moderate extent, 2 Small extent and 1 Very small extent

Lean Transformation Practices	**1**	**2**	**3**	**4**	**5**
The firm ensures its based on the premise that nothing will be produced until it is needed					
The firm has updated inventory that keep parts and products in stock does not add value to them therefore ensuring elimination of waste					
The firm has ensured increase product flow velocity through the elimination of all non value-added activities					
The firm use automatic monitoring devices in our processes					
Use of modern machines and processes has helped the firm lower production costs					

8. To what extent has your firm implemented the following lean transportation practices in an effort of improving its firm performance? Use a scale of 1-5 where; 5 Very Great extent, 4 Great extent, 3 Moderate extent, 2 Small extent and 1 Very small extent

Lean Transportation Practices	**1**	**2**	**3**	**4**	**5**
The firm has ensured there are effective transportation system which enables the smooth flow of goods and their delivery just in time.					
Transportation managers have aligned the firm function to the Just-in-time (JIT) logic as well as the manufacturing chain					
The firm has a budget to ensure there are more control for transportation process in order to fulfill a more efficient, dependable and suitable transportation for JIT systems					
Production is "pulled" by the shipment of finished goods					

9. To what extent has your firm implemented the following environment lean practices in an effort of improving its firm performance? Use a scale of 1-5 where; 5 Very Great extent, 4 Great extent, 3 Moderate extent, 2 Small extent and 1 Very small extent

Environment Lean Practices	**1**	**2**	**3**	**4**	**5**
The firm has leadership that has ability to translate customer requirements in pursuit of a competitive advantage					
The firm has well structured organizational policies that ensure effectiveness in the manufacturing process					
The top management have deep knowledge about lean techniques and fight against organizational barriers hence improved manufacturing process					

10. To what extent does your company use other lean manufacturing practices below in order to ensure firm performance? Use a scale of 1-5 where; 5 Very Great extent, 4 Great extent, 3 Moderate extent, 2 Small extent and 1 Very small extent

		1	**2**	**3**	**4**	**5**
Cellular Manufacturing Practice	The firm has facilities that have been grouped closely reduce transport, waiting and process time for a product					
	The firm has improved the relation between the operators and helps to improve productivity					
Continuous Improvement Practice	The firm has eliminated non value added activities in the manufacturing process					
	The firm's ability to learn, share					

	information and make decisions facilitates the integration of an individual in a new continuous improvement practice					
The Five S's Practices (Sort, Set In Order, Shine, Standardize, Sustain)	The firm has maintained the regulatory factory standards to ensure safety and quality					
	The firm's has the best workplace healthy environment to work in					
Standardization of Work Practice	Employees in the firm follow the same steps within the production process					
	The firm solves problems permanently through a team approach in line and specialist responsibility for standardization of mission and vision desired					
Total Productive Maintenance Practice	The firm ensures continuous improvement and quality management programs that go hand in hand to achieve excellence through improvement					
	The firm keeps the plant and its equipment at its higher productive level through cooperation of all areas of organization					
Just In Time Practice	right items with the right quality and quantity in the right place at the right time					
	JIP has ensured reduced costs, better quality products and increased production					
Production Smoothing Practice	The firm ensures leveled customer demand by volume and variety, while keeping the level of production as constant					
	The firm ensures it exposes hidden problems and action is taken immediately					
Poka Yoke Practice	The firm eliminate defects in their products by preventing or correcting mistakes as early as possible					
	The firm ensures that employees are well trained on mistakes as well as to how to handle them					
Value Stream Mapping Practice	The firm has ensured efficient flow of information and material with better methods and performance					
	The firm has ensured check at station cycle, inventory at each stage across the supply chain					
Kanban - Information Transparency	Reduced cost of information processing					
	Smooth information transmission					
	Increase production process transparency					

11. What are the driving forces behind implementing lean manufacturing?

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Section C: Firm Performance

12. To what extent has Lean Manufacturing Practices ensured performance in your company in the given areas? Use a scale of 1-5 where; 5 Very Great extent, 4 Great extents, 3 Moderate extent, 2 Small extent and 1 Very small extent

Performance indicators	**1**	**2**	**3**	**4**	**5**
Work in process reduction					
Inventory reduction					
Lead time reduction					
Product and service quality improvement					
Productivity improvement					
Wastage reduction					
Manufacturing cost reduction					
Set up time reduction					
Profitability improvement					
Sales volume improvement					
Labor requirement reduction					
Improved material flow and through put					

13. What challenges has the company faced when implementing lean manufacturing?

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THANK YOU FOR YOUR TIME AND PARTICIPATION

Appendix II: Large Scale Manufacturing Firms

Sector: Building, Construction and Mining (6)	
Central Glass Industries Ltd	Kenya Builders & Concrete Ltd
Karsan Murji & Company Limited	Manson Hart Kenya Ltd
Kenbro Industries Ltd	Mombasa Cement Ltd
Sector: Food, Beverages and Tobacco (100)	
Africa Spirits Ltd	Highlands Mineral Water Co. Ltd
Agriner Agricultural Development Limited	Homeoil
Belfast Millers Ltd	Insta Products (EPZ) Ltd
Bidco Oil Refineries Ltd	Jambo Biscuits (K) Ltd
Bio Foods Products Limited	Jetlak Foods Ltd
Breakfast Cereal Company(K) Ltd	Karirana Estate Ltd
British American Tobacco Kenya Ltd	Kenafric Industries Limited
Broadway Bakery Ltd	Kenblest Limited
C. Czarnikow Sugar (EA) Ltd	Kenya Breweries Ltd
Cadbury Kenya Ltd	Kenya Nut Company Ltd
Centrofood Industries Ltd	Kenya Sweets Ltd
Coca cola East Africa Ltd	Nestle Kenya Ltd
Confec Industries (E.A) Ltd	Nicola Farms Ltd
Corn Products Kenya Ltd	Palmhouse Dairies Ltd
Crown Foods Ltd	Patco Industries Limited
Cut Tobacco (K) Ltd	Pearl Industries Ltd
Deepa Industries Ltd	Pembe Flour Mills Ltd
Del Monte Kenya Ltd	Premier Flour Mills Ltd
East African Breweries Ltd	Premier Food Industries Limited
East African Sea Food Ltd	Proctor & Allan (E.A.) Ltd
Eastern Produce Kenya Ltd	Promasidor (Kenya) Ltd
Farmers Choice Ltd	Trufoods Ltd
Frigoken Ltd	UDV Kenya Ltd
Giloil Company Limited	Unga Group Ltd
Glacier Products Ltd	Usafi Services Ltd
Global Allied Industries Ltd	Uzuri foods Ltd
Global Beverages Ltd	ValuePak Foods Ltd
Global Fresh Ltd	W.E. Tilley (Muthaiga) Ltd
Gonas Best Ltd	Kevian Kenya Ltd
Hail & Cotton Distillers Ltd	Koba Waters Ltd
Al-Mahra Industries Ltd	Kwality Candies & Sweets Ltd
Alliance One Tobacco Kenya Ltd	Lari Dairies Alliance Ltd
Alpha Fine Foods Ltd	London Distillers (K) Ltd
Alpine Coolers Ltd	Mafuko Industries Ltd

Annum Trading Company Limited	Manji Food Industries Ltd

Aquamist Ltd	Melvin Marsh International
Brookside Dairy Ltd	Kenya Tea Development Agency
Candy Kenya Ltd	Mini Bakeries (Nbi) Ltd
Capwelll Industries Ltd	Miritini Kenya Ltd
Carlton Products (EA) Ltd	Mount Kenya Bottlers Ltd
Chirag Kenya Limited	Nairobi Bottlers Ltd
E & A Industries Ltd	Nairobi Flour Mills Ltd
Kakuzi Ltd	NAS Airport Services Ltd
Erdemann Co. (K) Ltd	Rafiki Millers Ltd
Excel Chemical Ltd	Razco Ltd
Kenya Wine Agency Limited	Re-Suns Spices Limited
Highlands Canner Ltd	Smash Industries Ltd
Super Bakery Ltd	Softa Bottling Co. Ltd
Sunny Processor Ltd	Spice World Ltd
Spin Knit Dairy Ltd	Wrigley Company (E.A.) Ltd
Sector: Chemical and Allied (62)	
Anffi Kenya Ltd	Crown Berger Kenya Ltd
Basco Product (K) Ltd	Crown Gases Ltd
Bayer East Africa Ltd	Decase Chemical (Ltd)
Continental Products Ltd	Deluxe Inks Ltd
Cooper K- Brands Ltd	Desbro Kenya Limited
Cooper Kenya Limited	E. Africa Heavy Chemicals (1999) Ltd
Beiersdorf East Africa td	Elex Products Ltd
Blue Ring Products Ltd	European Perfumes & Cosmetics Ltd
BOC Kenya Limited	Galaxy Paints & Coating Co. Ltd
Buyline Industries Limited	Grand Paints Ltd
Carbacid (CO2) Limited	Henkel Kenya Ltd
Chemicals & Solvents E.A. Ltd	Imaging Solutions (K) Ltd
Chemicals and Solvents E.A. Ltd	Interconsumer Products Ltd
Coates Brothers (E.A.) Limited	Odex Chemicals Ltd
Coil Products (K) Limited	Osho Chemicals Industries Ltd
Colgate Palmolive (E.A) Ltd	PolyChem East Africa Ltd
Johnson Diversity East Africa Limited	Procter & Gamble East Africa Ltd
Kel Chemicals Limited	PZ Cussons Ltd
Kemia International Ltd	Rayal Trading Co. Ltd
Ken Nat Ink & Chemical Ltd	Reckitt Benckiser (E.A) Ltd
Magadi Soda Company Ltd	Revolution Stores Co. Ltd
Maroo Polymers Ltd	Soilex Chemical Ltd
Match Masters Ltd	Strategic Industries Limited
United Chemical Industries Ltd	Supa Brite Ltd
Oasis Ltd	Unilever Kenya Ltd
Rumorth EA Ltd	Murphy Chemical E.A Ltd
Rumorth East Africa Ltd	Syngenta East Africa Ltd

Sadolin Paints (E.A.) Ltd	Synresins Ltd
Sara Lee Kenya Limited	Tri-Clover Industries (K) Ltd
Saroc Ltd	Twiga Chemical Industries Limited
Super Foam Ltd	Vitafoam Products Limited
Sector: Energy, Electrical and Electronics (42)	
A.I Records (Kenya) Ltd	East African Cables Ltd
Amedo Centre Kenya Ltd	Eveready East Africa Limited
Assa Abloy East Africa Ltd	Frigorex East Africa Ltd
Aucma Digital Technology Africa Ltd	Holman Brothers (E.A.) Ltd
Avery (East Africa) Ltd	IberaAfrica Power (EA) Ltd
Baumann Engineering Limited	International Energy Technik Ltd
Centurion Systems Limited	Kenwest Cables Ltd
Digitech East Africa Limited	Kenwestfal Works Ltd
Manufacturers & Suppliers (K) Ltd	Kenya Power & Lighting Co. Ltd
Marshall Fowler (Engineers) Ltd	Kenya Scale Co. Ltd/ Avery Kenya Ltd
Mecer East Africa Ltd	Kenya Shell Ltd
Metlex Industries Ltd	Libya Oil Kenya Limited
Metsec Ltd	Power Technics Ltd
Modulec Engineering Systems Ltd	Reliable Electricals Engineers Ltd
Mustek East Africa	Sanyo Armo (Kenya) Ltd
Nationwide Electrical Industries	Socabelec East Africa
Nationwide Electrical Industries Ltd	Sollatek Electronics (Kenya) Limited
Optimum Lubricants Ltd	Specialised Power Systems Ltd
PCTL Automation Ltd	Synergy-Pro
Pentagon Agencies	Tea Vac Machinery Limited
Power Engineering International Ltd	Virtual City Ltd
Sector: Plastics and Rubber (54)	
Betatrad (K) Ltd	ACME Containers Ltd
Blowplast Ltd	Afro Plastics (K) Ltd
Bobmil Industries Ltd	Alankar Industries Ltd
Complast Industries Limited	Dune Packaging Ltd
Kenpoly Manufacturers Ltd	Elgitread (Kenya) Ltd
Kentainers Ltd	Elgon Kenya Ltd
King Plastic Industries Ltd	Eslon Plastics of Kenya Ltd
Kingway Tyres & Automart Ltd	Five Star Industries Ltd
L.G. Harris & Co. Ltd	General Plastics Limited
Laneeb Plastics Industries Ltd	Haco Industries Kenya Ltd
Metro Plastics Kenya Limited	Hi-Plast Ltd
Ombi Rubber Rollers Ltd	Jamlam Industries Ltd
Packaging Industries Ltd	Kamba Manufacturing (1986) Ltd
Plastics & Rubber Industries Ltd	Keci Rubber Industries
Polyblend Limited	Nairobi Plastics Industries

Polyflex Industries Ltd	Nav Plastics Limited
Polythene Industries Ltd	Ombi Rubber
Premier Industries Ltd	Packaging Masters Limited
Prestige Packaging Ltd	Plastic Electricons
Prosel Ltd	Raffia Bags (K) Ltd
Qplast Industries	Rubber Products Ltd
Sumaria Industries Ltd	Safepak Limited
Super Manufacturers Ltd	Sameer Africa Ltd
Techpak Industries Ltd	Sanpac Africa Ltd
Treadsetters Tyres Ltd	Silpack Industries Limited
Uni-Plastcis Ltd	Solvochem East Africa Ltd
Wonderpac Industries Ltd	Springbox Kenya Ltd
Sector: Textile and Apparels (38)	
Africa Apparels EPZ Ltd	MRC Nairobi (EPZ) Ltd
Fulchand Manek & Bros Ltd	Ngecha Industries Ltd
Image Apparels Ltd	Premier Knitwear Ltd
Alltex EPZ Ltd	Protex Kenya (EPZ) Ltd
Alpha Knits Limited	Riziki Manufacturers Ltd
Apex Appaels (EPZ) Ltd	Rolex Garments EPZ Ltd
Baraka Apparels (EPZ) Ltd	Silver Star Manufacturers Ltd
Bhupco Textile Mills Limited	Spinners & Spinners Ltd
Blue Plus Limited	Storm Apparel Manufacturers Co. Ltd
Bogani Industries Ltd	Straightline Enterprises Ltd
Brother Shirts Factory Ltd	Sunflag Textile & Knitwear Mills Ltd
Embalishments Ltd	Tarpo Industries Limited
J.A.R Kenya (EPZ) Ltd	Teita Estate Ltd
Kenya Trading EPZ Ltd	Thika Cloth Mills Ltd
Kikoy Co. Ltd	United Aryan (EPZ) Ltd
Le-Stud Limited	Upan Wasana (EPZ) Ltd
Metro Impex Ltd	Vaja Manufacturers Limited
Midco Textiles (EA) Ltd	Yoohan Kenya EPZ Company Ltd
Mirage Fashionwear EPZ Ltd	YU-UN Kenya EPZ Company Ltd
Sector: Timber, Wood Products and Furniture (22)	
Economic Housing Group Ltd	Rosewood Office Systems Ltd
Eldema (Kenya) Limited	Shah Timber Mart Ltd
Fine Wood Works Ltd	Shamco Industries Ltd
Furniture International Limited	Slumberland Kenya Limited
Hwan Sung Industries (K) Ltd	Timsales Ltd
Kenya Wood Ltd	Wood Makers Kenya Ltd
Newline Ltd	Woodtex Kenya Ltd
PG Bison Ltd	United Bags Manufacturers Ltd
Transpaper Kenya Ltd	Statpack Industries Ltd
Twiga Stationers & Printers Ltd	Taws Limited

Uchumi Quick Suppliers Ltd	Tetra Pak Ltd
Sector: Pharmaceutical and Medical Equipment (20)	
Alpha Medical Manufacturers Ltd	Dawa Limited
Beta Healthcare International Limited	Elys Chemical Industries
Biodeal Laboratories Ltd	Gesto Pharmaceutical Ltd
Bulks Medical Ltd	Glaxo Smithkline Kenya Ltd
Cosmos Limited	KAM Industries Ltd
Laboratory & Allied Limited	KAM Pharmacy Limited
Manhar Brothers (K) Ltd	Pharmaceutical Manufacturing Co.
Madivet Products Ltd	Regals Pharmaceuticals
Novelty Manufacturing Ltd	Universal Corporation Limited
Oss. Chemie (K)	Pharm Access Africa Ltd
Sector: Metal and Allied (38)	
Allied Metal Services Ltd	Booth Extrusions Limited
Alloy Street Castings Ltd	City Engineering Works Ltd
Apex Street Ltd Rolling Mill Division	Crystal Industries Ltd
ASL Ltd	Davis & Shirtliff Ltd
ASP Company Ltd	Devki Steel Mills Ltd
East Africa Foundry Works (K) Ltd	East Africa Spectre Limited
Elite Tools Ltd	Kens Metal Industries Ltd
Friendship Container Manufacturers	Khetshi Dharamshi & Co. Ltd
General Aluminum Fabricators Ltd	Nampak Kenya Ltd
Gopitech (Kenya) Ltd	Napro Industries Limited
Heavy Engineering Ltd	Specialized Engineer Co. (EA) Ltd
Insteel Limited	Steel Structures Limited
Metal Crown Limited	Steelmakers Ltd
Morris & Co. Limited	Steelwool (Africa) Ltd
Nails & Steel Products Ltd	Tononoka Steel Ltd
Orbit Engineering Ltd	Welding Alloys Ltd
Rolmil Kenya Ltd	Wire Products Limited
Sandvik Kenya Ltd	Viking Industries Ltd
Sheffield Steel Systems Ltd	Warren Enterprises Ltd
Sector: Leather Products and Footwear (8)	
Alpharama Ltd	CP Shoes
Bata Shoe Co. (K) Ltd	Dogbones Ltd
New Market Leather Factory Ltd	East Africa Tanners (K) Ltd
C & P Shoe Industries Ltd	Leather Industries of Kenya Limited
Sector: Motor Vehicle Assembly and Accessories (17)	
Auto Ancillaries Ltd	Kenya Vehicle Manufacturers Limited
Varsani Brakelining Ltd	Labh Singh Harnam Singh Ltd
Bhachu Industries Ltd	Mann Manufacturing Co. Ltd
Chui Auto Spring Industries Ltd	Megh Cushion industries Ltd
Toyota East Africa Ltd	Mutsimoto Motor Company Ltd

Unifilters Kenya Ltd	Pipe Manufacturers Ltd
General Motor East Africa Limited	Sohansons Ltd
Impala Glass Industries Ltd	Theevan Enterprises Ltd
Kenya Grange Vehicle Industries Ltd	
Sector: Paper and Paperboard (48)	
Ajit Clothing Factory Ltd	Conventual Franciscan Friers-Kolbe Press
Associated Papers & Stationery Ltd	Creative Print House
Autolitho Ltd	D.L. Patel Press (Kenya) Limited
Bag and Envelope Converters Ltd	Dodhia Packaging Limited
Bags & Balers Manufacturers (K) Ltd	East Africa Packaging Industries Ltd
Brand Printers	Elite Offset Ltd
Business Forms & Systems Ltd	Ellams Products Ltd
Carton Manufacturers Ltd	English Press Limited
Cempack Ltd	General Printers Limited
Chandaria Industries Limited	Graphics & Allied Ltd
Colour Labels Ltd	Guaca Stationers Ltd
Colour Packaging Ltd	Icons Printers Ltd
Colour Print Ltd	Interlabels Africa Ltd
Kenya Stationers Ltd	Jomo Kenyatta Foundation
Kim-Fay East Africa Ltd	Kartasi Industries Ltd
Paper Converters (Kenya) Ltd	Kenafric Diaries Manufacturers Ltd
Paper House of Kenya Ltd	Kitabu Industries Ltd
Paperbags Limited	Kul Graphics Ltd
Primex Printers Ltd	Label Converters
Print Exchange Ltd	Modern Lithographic (K) Ltd
Printpak Multi Packaging Ltd	Pan African Paper Mills (EA) Limited
Printwell Industries Ltd	Ramco Printing Works Ltd
Prudential Printers Ltd	Regal Press Kenya Ltd
Punchlines Ltd	SIG Combibloc Obeikan Kenya