

**LEAN SUPPLY CHAIN MANAGEMENT IN
MANUFACTURING FIRMS IN KENYA**

BY:

MONICA WANJIKU KIMANI

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requirements for the award of the Degree of Master of Business
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DECLARATION

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

Signature:

Date:

Name: Monica Wanjiku Kimani

Registration Number: D61/76049/2009

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

Signature

Date:.....

Mr. Ernest Akelo

Supervisor

Lecturer, School of Business

University of Nairobi

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DEDICATION

I wish to dedicate this work to my daughter Faith Njoki and son Victor Mburu for their unwavering support and tireless sacrifices of their precious family time throughout the entire degree program and especially during the research project.

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ABSTRACT

Wholesalers, manufacturers, retailers, distributors, suppliers, third party service providers (3PLs) and every party involved in the supply chain are under pressure to reduce and balance their costs, time and inventories in order to continue to be profitable while still meeting their customers' demands. The best way for them to achieve this is to implement lean supply chain management (Borac, Milovanovic & Andjelkovic, 2010). The objective of the study was to explore lean supply chain management in the manufacturing sector in Kenya. The study adopted a survey study design and targeted manufacturing companies in Kenya. A questionnaire was used as the research instrument and data was collected and analyzed. Manufacturing firms in Kenya that were surveyed have exhibited some evidence of adoption of lean supply chain 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 for these practices was to reduce cost profitability and long term survival of the firm. The study recommends that as much as the survey provided information on lean supply chain practices among manufacturing firms in Kenya, the management of the of these firms needs to invest more on skill and knowledge acquisition on the management of the lean supply chain. They also need to bench mark themselves with world class organization practicing lean supply. The organization should also try improve the relationship they have with their suppliers.

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CHAPTER ONE: INTRODUCTION

1.1 Background of the study

In today's highly competitive business environment, finding competitive edge is a critical success factor not only to expand business, but also to survive. Some firms tend to work on price, others on quality of products, but in the end they are all pursuing the same goal; maximizing profit by acquiring, converting and retaining their most valuable asset: customers. Wholesalers, manufacturers, retailers, distributors, suppliers, third party service providers (3PLs) and every party involved in the supply chain are under pressure to reduce and balance their costs, time and inventories in order to continue to be profitable while still meeting their customers' demands. The best way for them to achieve this is to implement lean supply chain management (Borac, Milovanovic & Andjelkovic, 2010).

Supply Chain Management is a set of synchronized decisions and activities utilized to efficiently integrate suppliers, manufacturers, warehouses, transporters, retailers, and customers so that the right product or service is distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying customer service level requirements. Lean is a dynamic process of continual change and is not a standardized, one-size-fits-all approach. It is an adaptive means of efficiency improvement. In supply chain, lean can be applied to logistics management. Lean logistics is focused on eliminating waste from the internal and external supply chains and this is achieved by reducing excessive inventories, replenishment times and unnecessary costs. Lean supply chains are designed to pull, not push, to replenish inventory levels (Jaskanwal, Deep and Rajdeep, 2013).

Supply Chain Management (SCM) encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, 3PLs, and customers. In essence, supply chain management integrates supply and demand management within and across companies. Supply Chain Management has matured from a compelling method of deriving competitive advantage, to a "ticket to ride". It is now a baseline expectation for any company wishing to compete in the 21st century, and with that the professions and occupations comprising Supply Chain Management are now firmly entrenched in the armory of essential business executives.

Supply chains tend to accrue waste and non-value added activities for many reasons, both internal to the company and external. Regaining lean supply chain efficiencies may mean addressing many of the same issues that created the problems of extra and unnecessary time, inventory and costs (Borac et al., 2010).

1.1.1 Lean Supply Chain Management

According to Manrodt and Vitasek (2008), lean is defined as a systematic approach to enhancing value to the customer by identifying and eliminating waste (of time, effort and materials) through continuous improvement, by flowing the product at the pull of the customer, in pursuit of perfection. They also defined therefore lean supply chain as a set of organizations directly linked by upstream and downstream flows of products, services, finances and information that collaboratively work to reduce cost and waste by efficiently and effectively pulling what is required to meet the needs of the individual customer.

According to McKee and Ross (2010), lean SCM is a supply chain operational and strategic management philosophy that utilizes Internet-enabling technologies to effect the continuous regeneration of supplier and service partner networks. A lean supply chain 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. 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.

Lean has become a strategic method for gaining competitive advantage and even for survival, for manufacturers, retailers and wholesalers. Adding value and removing waste are no longer options for companies. Non-lean practicing companies face competition from foreign made goods—competition which can have significant impacts on their business and industry. Even lean practitioners understand that the effort to be lean is ongoing (Jaskanwal et al, 2013).

When the focal firm, its suppliers, and its customers begin to work together to identify customer requirement, remove waste, reduce cost, and improve quality and customer service, it marks the beginning of lean supply chain relationships. Lean supply chain management gained popularity in the manufacturing area as this is where significant improvement can be achieved. Manufacturing processes can be improved to reduce waste and resources while maintaining operational performance. Companies who have adopted

lean supply chain practices have examined each of their routings, billed of materials and equipment to identify where improvements can be achieved (Jaskanwal, et al, 2013).

1.1.2 Manufacturing Sector in Kenya

Manufacturing is the art of transformation of raw materials into either intermediate goods or final products through mechanized process. Manufacturing sector comprises establishment that engages in the mechanical, physical or chemical transformation of materials, substances or component into new products. Kenya has a large manufacturing sector serving both the local market and exports to the East African region and the rest of the world. It is dominated by subsidiaries of multinationals. Kenya's manufacturing sector is among the key productive sectors identified for economic growth and development because of its immense potential for wealth, employment creation and poverty alleviation. In addition, the sector will continue to provide impetus towards achievement of Millennium Development Goals (MDGs) both in the medium and long term particularly goal one on Eradication of extreme Poverty and hunger and goal eight on Global Partnerships for Development. The sector is expected to play a key role in the growth of the Kenyan economy. The overall goal of the sector is to increase its contribution to Gross Domestic Product (GDP) by at least 10 per cent per annum (Mars Group Kenya, 2011).

Under the economic pillar of the Kenya vision 2030, manufacturing is one of the key sectors expected to deliver the envisaged 10 per cent economic growth rate per annum, by increasing and sustaining its contribution to Gross Domestic Product (GDP) by at least 10 percent per annum. The sector will also support the country's social development agenda through creation of jobs, generation of foreign exchange, and attracting local and

foreign investment. However, the performance of the sector has been affected by low capital injection, use of obsolete technologies and high costs of doing business which is attributed to poor state of physical infrastructure, limited access to finance, limited research and development, poor institutional framework, and inadequate managerial, technical and entrepreneurial skills. This has as a result led to the limited local and Foreign Direct investment (FDI) in the country and the high outflow of investment to the neighboring countries (Mars Group Kenya, 2011).

1.2 Problem Statement

More than ever, today's business environment is in a constant state of change. The way businesses are conducted is impacted by changing customer's needs, product portfolio, evolving marketplace demographics and geographies. For this reason companies need methods, tools and trading partner relationships that allow them to be more flexible and adapt quickly to these changes. For this reasons the need for flexibility has led many traditional manufacturers to shed their plants and rely on domestic and international contract manufacturers or to move production to low-cost countries, making the supply chain long and more complex. Companies have faced challenges of dealing with scope global market place and its supply chain while retaining speed and flexibility, elimination of wasted time, effort and materials from all point in the supply chain and meet the needs of customer without holding more inventory. To address these issues, today's organizations can leverage a variety of tools and business philosophies to drive improvements across their business. Lean is philosophy is one of them (Manrodt and Vitasek (2005).

According to Borac et al. (2010), lean has become a strategic method for gaining competitive advantage and even for survival, not just for manufacturers, but also for retailers and wholesalers. Adding value and removing waste are no longer options for companies. Non-lean practicing companies face competition from foreign made goods, competition which can have significant impacts on their business and industry. Even lean practitioners understand that the effort to be lean is ongoing.

When the focal firm, its suppliers, and its customers begin to work together to identify customer requirement, remove waste, reduce cost, and improve quality and customer service, it marks the beginning of lean supply chain relationships. Lean supply chain management has popularity in the manufacturing area as this is where significant improvement can be achieved. Manufacturing processes can be improved to reduce waste and resources while maintaining operational performance. Companies who have adopted lean supply chain practices have examined each of their routings, billed of materials and equipment to identify where improvements can be achieved (Winsner, Keah & Choon, 2009).

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

Rachna *et al.* (2003) examined the effects of three contextual factors, plant size, plant age and unionization status, on the likelihood of implementing twenty two manufacturing practices that are key facets of lean production systems. Plant size, unionization and plant age, matters with regard to implementation of lean practices, although not all aspects matter to the same extent. All the above studies were conducted abroad and it is not right to import the whole some results of a research without taking into account the environmental differences and hence the need to carry out local research in order to understand the problem better (Aosa, 1992). Locally Wanjihia (2011) did a study in the manufacturing sector. He examined innovation management in this sector and found that more investment need to put in innovation.

Having understood crucial role played by manufacturing sector and the bridge offered by lean supply chain management in enabling the sector achieve competitiveness several questions arises that needs to be answered. For instance: to what extent has lean manufacturing practices have permeated in firms in Kenya's manufacturing sector? What are the main drivers of lean supply chain practices in firms in Kenya's manufacturing sector? And what challenges are faced by these firms when implementing lean supply chain practices?

1.3 Research Objectives

The general objective of the study was to explore lean supply chain management in the Kenyan manufacturing sector.

The specific objectives were:

- (i) To determine lean supply chain management being adopted by manufacturing firms in Kenya;
- (ii) To determine the reasons for adoption of lean supply chain management by these firms;
- (iii) To examine the challenges faced by Kenyan manufacturing firms when using lean supply chain management practices

1.4 Value of the Study

This study is expected to benefit both academicians and practitioners. The study will explore various lean supply chain practices used in the manufacturing sector. It is expected to add more knowledge in field of supply chain management and therefore scholars are to benefit from this.

To policy makers this study will provide practitioners with valuable information to policy makers and managers in manufacturing sector. The findings will also help them to find out which lean supply chain practices are critical for better organizational performance. This study is also expected to help managers as the decision makers to improve on other management practices in the manufacturing sector and identifying the major reasons as to why firms in this sector should now move to embrace lean philosophy as a strategy to enhance firm productivity now more than ever before.

The study form a basis for interested researchers, scholars and supply chain management practitioners to research on and add to the body of knowledge on Supply Chain Management.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of literature on the concept of the study. The chapter has looked at supply chain management, lean supply chain management, lean supply chain management practices, lean supply chain drivers and challenges of lean supply chain.

2.2 Supply Chain Management

According to Ganesan and Harrison (1999) a supply chain is a network of facilities and distribution options that perform the functions of procurement of materials, transformation of these materials into intermediate and finished products and the distribution of these finished products to customers. Laming (1996), argues that for eventual product or service to be commercially advantageous to the organization involved value must be added to the process of supply chain management faster than the cost. Christopher (1998) supported the argument by defining supply chain management as management of upstream and downstream relationships with suppliers and customer to deliver superior value at less cost to the supply chain as a whole. Supply Chain Management involves integration, co-ordination and collaboration across organizations and throughout the supply chain of such functions as distribution planning, demand forecasting, purchasing, requirement planning, production planning, warehousing, material handling, inventory, packaging, order processing, and transportation, etc. All these functions are considered as building blocks of SCM in today's business environment.

According to Agus and Hajinoor (2012), SCM seeks to enhance performance by closely integrating the internal functions within a company and effectively linking them with the

external operations of suppliers and chain members. This effort requires a firm's activities to be closely coordinated with that of customers and suppliers. More often than not, the dynamics of the market makes this coordination complicated as other firms continue to search and build strategic alliances. As a result, internally firms must have achieved a relatively high degree of integration in order to effectively reap benefits of SCM from the external coordination. This is a tall order as it calls for integration, coordination, and collaboration across organizations and throughout the supply chain. Christopher (1998) argues that SCM has the potential to assist organizations in achieving both cost and value advantages. Many researchers claim that SCM can result in better supply chain performance (Christopher, 1998; Christiansee and Kumar, 2000), however very few empirical studies have been carried out to investigate the impact of SCM on itself (i.e. supply chain performance) along with that on profitability and return on sales.

2.3 Lean Supply Chain Management

Manrodt and Vitasek (2008), defined lean as a systematic approach to enhancing value to the customer by identifying and eliminating waste (of time, effort and materials) through continuous improvement by flowing the product at the pull of the customer in pursuit of perfection. They further suggest that the concept of Lean originated in the 1920s, when Henry Ford applied the concept of "continuous flow" to the assembly-line process. This practice focused on cost reduction by improving quality and throughput. Ford's assembly line continued to be recognized as the most advanced manufacturing process until two Japanese executives at Toyota introduced the Toyota Production System (TPS), following a visit to Ford in the 1950s. As Toyota soon realized, optimizing only a part of the process is not as beneficial as optimizing the whole. If real changes were to take

place, they would have to include suppliers and customers. Without all of the key players, the timing and quality of components from the supplier will continue to impede manufacturer performance. This was the birth of the Lean supply chain.

Lean supply chain management is a set of organizations directly linked by upstream and downstream flows of products, services, finances and information that collaboratively work to reduce cost and waste by efficiently and effectively pulling what is required meeting the needs of the individual customer. Virtually all products involve a supply chain. If one could look through a telescope from the point of consumer purchase and see all of the upstream entities and activities involved, all of the way back to the point of obtaining raw materials, one could visualize the end-to-end supply chain. A person would also most likely see a group of entities and activities that are completely independent of one another. These autonomous functions create waste, the kind of waste that costs money and time, and may in some cases even disrupt the ecology of the planet. Lean adopting firms work together to identify and eliminate the waste wherever it exists in order to bring greater value (LaSalle, Manrodt and Vitasek, 2010).

2.3.1 Lean Supply Chain Management Practices

Building and maintaining a lean supply chain, revolves around two main areas i.e. waste management and demand management. Demand management is providing products when demanded while waste management is elimination of process, activities or anything else that does not add value to customers.

2.3.1.1 Waste Management

The focus of the lean concept is to eliminate all waste i.e. all activities that do not add value. Waste can be measured in time, inventory and unnecessary costs. Value added

activities are those that contribute to efficiently placing the final product at the customer. The supply chain and the inventory contained in the chain should flow. Any activity that stops the flow should create value. Any activity that touches inventory should create value. Lean concept can be easily applied in relatively stable and therefore predictable environment where the requirements (demands) of customers are similar (Barac & Milovanovic, 2006).

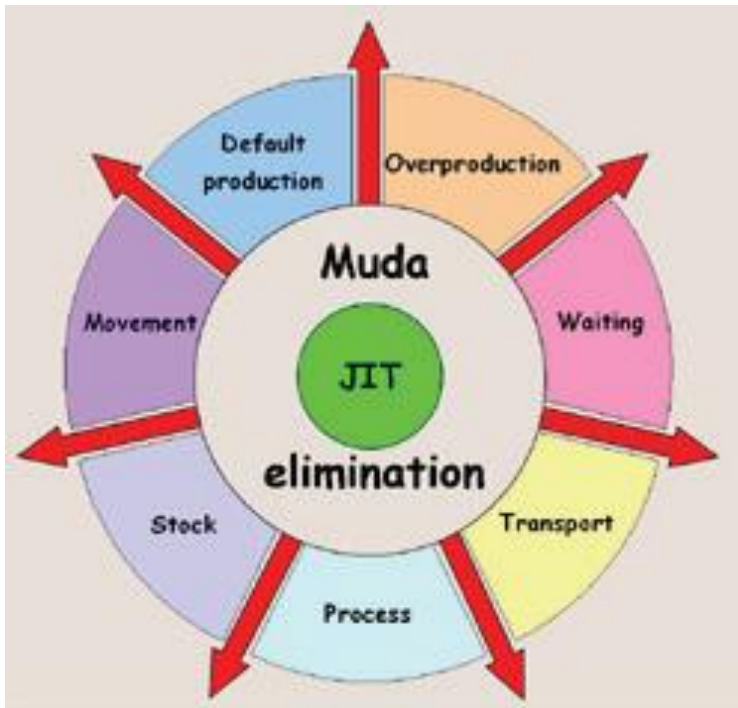
There are seven basic types of waste that were defined by Toyota managers. Such systematization can be applied in any company, for any process and it is the basis of lean concept – enterprise without waste. According to Gross, John, McInnis and Kenneth (2003), enterprises that practice the lean concept overtime have systematized nine types of waste: Overproduction - production that exceeds demand. Any product that is not immediately sold, or built into the final product, takes space, reduces the financial resources that a company has and disrupts the flow of production.

The other wastes are: Defects - (errors, malfunction) defects of the product itself which directly increase the cost of the product, are the only ones covered by this term. The term defect includes errors in documents, giving false information about the product, late delivery or making too much waste during processing. Inventory- cost occurs when there is an unnecessarily high level of raw materials, unfinished manufacturing or parts. All this increases the cost of storage as well as the percentage of defects in production. Transportation – any movement of materials that does not contribute to products value, such as transportation among working units. Ideal situation which the manufacturers are striving for is when a material is transferred to the next machine immediately after the processing was finished on the previous one. Waiting – waiting means idle machine time

and workers who don't do anything until the part for processing arrives. This happens because of bottlenecks, bad compliance or delay in transportation (Gross, John, McInnis & Kenneth, 2003)

Gross, et al, (2003), also include Correction – any errors in production that can lead to correcting the product should be avoided, because they increase the cost, impede the continuous flow of materials and increase the time of production. It is necessary to aim for 0% spoilage and implementation of total quality management. Motion - any unnecessary walking or unnecessary movements of workers which hinder workers while working. Also, poor workplace ergonomics or unprepared workplace affects preliminary-finishing time of machines, which reduces efficiency. Over processing – it is the processing of the product that does not contribute to its value and the buyer will not recognize it as a higher quality. Incoherence of knowledge – (also known as "waste of unused human talent") this happens when knowledge and information are not available when needed. This is usually related to the limitations of the procedures, or their inaccessibility and the result is often the production bottleneck or defects on products.

Figure 2.1: Initial Seven Types of Waste



Source: <http://www.valessentia.com/Productivity-1.html>, Accessed 15.07.2013

2.3.1.2 Demand Management

One of the key principles of Lean is to move to a 'pull system', in which products or services are pulled (work initiated, services performed, products delivered) only when requested by the final customer. In its purest form, such a system would be developed using data from the point of sale and conveyed upstream to all members of the supply chain, from point to point, without a change in the volume. End user requirements for the finished product, however, would typically be meaningless to an upstream supplier, who may provide only a fraction of the materials included and most probably does not understand how their materials contribute to the end-product structure. Therefore, suppliers at each level of the process must receive their downstream customer's demand

signal and convert it to something usable) to their upstream partners. This can be difficult to accomplish, especially when choosing to work in a virtually real-time manner. A Lean supply chain will work to have products pulled through the channel using customer demand from the point of sale in real time (Manrodt & Vitasek, 2008).

2.3.2 Components of Lean Supply Management

Lean is an approach to improving businesses that focuses on the elimination of activities that don't add value to customers. In a commercial setting, this is normally indicated by whether or not the customer would be prepared to pay for the activity. The traditional approach is to understand the end-to-end process within an organization – the value stream. Through this, the activities that can be eliminated, reduced in size or impact or combined to gain efficiencies are modified – streamlining the whole process. Extending the value stream from a single organization to encompass the whole supply chain gives us the concept of a lean supply chain (Eaton, 2013). The study will focus on lean procurement, lean manufacturing and lean transportation.

2.3.2.1 Lean procurement

Lean procurement practices help to achieve the following: Remove the obstacles to the free flow of information to a supply chain; Create real-time visibility into inventory in motion; change supply chain from “push” to “pull” consumption based replenishment models; 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 (Oracle, 2006).

Lean procurement is based on three core principles that are derived from demand driven manufacturing and supply chain initiatives: Strengthen and improve your “pull” supply chain processes by deploying supply 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 supply chain “exception based” signals in real-time (Oracle, 2006).

2.3.2.2 Lean production

Lean production is an integrated activity in SCM designed to achieve high-volume flexible production using minimal inventories of raw materials. Lean production is based on the premise that nothing will be produced until it is needed. Ideally, lean production is implemented throughout the supply chain with the signal moving backward from the customer all the way back to the most basic raw materials (Davis and Heineke, 2005). Lean production 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.

Although lean production has its roots in Japan, it has been implemented successfully all over the world (Davis and Heineke, 2005, p. 349). 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 (Karlsson and Ahlstrom, 1996).

The logic of lean production, leaving aside for a moment its implications for working practices and social impact, describes value-adding processes unencumbered by waste (non-value adding activities) (Lamming, 1996). Wastes are usually grouped into the following categories: overproduction, motion, inventory, defects, waiting, transportation, extra processing, and underutilized people (Alabama Technology Network, 1998). Lean production is derived from the need to increase product flow velocity through the elimination of all non value-added activities (Arnheiter and Maleyeff, 2005). Lean production is essentially process oriented as it seeks to eliminate all non-value adding activities and reducing waste within an organization.

2.3.2.3 Lean transportation

According to Womack (1990) and Badurdeen (2008), an important feature of TPS or lean system is its 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 (Ohno, 1978). The sound relation between transportation and JIT system stems from two things. The first is the pivot role of transportation function in supply 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/ supply chain, as opposed to trying to optimize it independently.

From another side, the fact that transportation managers' criteria for selecting shippers and carriers are affected by JIT implementation (Regan & Garrido, 2000) 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 fulfill a more efficient, dependable and suitable transportation for JIT systems (Perry, 1988).

2.4 Drivers to Lean Supply Chain

More than at any other time in history, today's business environment is in a constant state of change. Changing customer requirements, product portfolios, marketplace demographics and geographies are in constant evolution and are impacting the way business is conducted. Companies need methods, tools and trading partner relationships that allow them to be more flexible and adapt more quickly to these changes. In part, the need for flexibility has led many traditional manufacturers to shed their plants and rely on domestic and international contract manufacturers, or to move production to low-cost countries, causing a longer and more complex supply chain (Borac et al., 2010).

In today's highly competitive environment finding competitive edge is a critical success factor not only to expand business, but also to survive. Some companies tend to work on price, others on quality of service, but in the end they are all pursuing the same goal; increasing profit by acquiring, converting and retaining their most valuable asset: customers. Wholesalers, manufacturers, retailers, distributors, suppliers, third party service providers (3PLs) and every party involved in the supply chain are under pressure to reduce and balance their costs, time and inventories in order to continue to be

profitable while still meeting their customers' demands. The best way for them to achieve this is to implement lean logistics (Borac et al., 2010).

2.5 Challenges of Lean Supply Chain

Despite the virtues of lean production system, implementation challenges are surmountable. To highlight a vital one, lean production changes how people work but not necessarily the way they think. Most people – including so-called blue collar workers – will find their jobs more challenging as lean production spreads. They are more likely to become productive but at the same time they may find their work more stressful because a key objective of lean production is to push responsibility far down the organizational ladder (Womack et al., 1990)

Building and managing a lean supply chain poses a challenge owing to the highly interconnected nature of the activities in the supply chain. The present business environment is also significantly more challenging than the business environment of the production-centric era that prevailed for the greater part of the twentieth century. In the production-centric era, demand for goods and services often outstripped production capacity. The producers held the most clout in the supply chain, charged what the market would bear, and operated businesses to maximize the use of their own scarce capacity. Lack of global competition created, in effect, domestic cartels in many industries that dictated the price the consumer paid for the product. Sohal et al. (1993), provide evidence of failures by which improvement initiatives “faded away” or “simply died” after a few years.

In general, the success of implementation of any particular management practice frequently depends upon organizational characteristics, and not all organizations can or

should implement the same set of practices (Galbraith, 1977). Consideration of organizational contexts has been noticeably lacking in research on implementation of JIT and TQM programs or other lean manufacturing practices. Perhaps because of the failure to consider organizational context, evidence on the impact of JIT and TQM programs on organizational performance has been mixed (Adam Jr., 1994; Powell, 1995; Samson & Terziovski, 1999).

A limited number of empirical studies suggest that implementation or adoption of a manufacturing practice is contingent upon specific organizational characteristics (White et al., 1999; McKone et al., 1999). For example, White et al. (1999) found significant evidence that large US manufacturers adopted JIT practices more frequently than small manufacturers. While the role of plant size in implementation process has been studied previously, plant age and unionization status remains comparatively unexplored.

It is often assumed that because implementation of most manufacturing practices requires negotiating changes in work organization, unionized facilities will resist adopting lean practices and thus lag behind non-unionized facilities. Drucker (1987) discussed the problems of existing union work rules and job classifications in the implementation of JIT systems. In a similar vein, the business press has often asserted that unionization prevents the adoption of some “Japanese” manufacturing practice in US manufacturers.

Plant age may imply either a tendency toward resistance to change or a liability of newness. The “resistance to change” view is supported by the organizational sociology literature which suggests that the age of an establishment should inversely influence the rate of adoption of innovations, because organizational forms tend to be “frozen” at birth

(Stinchcombe, 1965). Evolutionary economics provides additional support for this view (Aldrich, 1979; Nelson and Winter, 1982). The evolutionary perspective suggests that organizations develop a set of organizational routines (manufacturing practices) over a period of time and these practices change infrequently. Further, the longer an organization has experience with the practices, even if the results are inferior relative to the new practices, the harder it is for the organization to replace the older, inferior practices (Pil & MacDuffie, 1996).

Several authors (e.g. Chandler, 1962; Child, 1972) have noted that since any administrative task tends to be more complicated in large firms, managers may not even attempt to change; instead they may allow existing systems to linger. This is equally true of implementation of new operational practices. That is, large organizations suffer from structural inertial forces (Hannan and Freeman, 1984) that negatively affect the implementation of lean manufacturing practices. Further, inertial effects of size are more prevalent in manufacturing industry than in service industry (Gopalakrishnan and Damanpour, 1997).

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was used to conduct the study. It covers the research design, the target population, data collection and data analysis.

3.2 Research Design

A survey approach was used in carrying out this study where the units to be studied were manufacturing firms in Kenya selected to the criteria described in section 3.3. The survey focused on factual information or opinions depending on its purpose and it involved administering structured questionnaire to individuals. Since objective of the study was to seek answers to specific questions from a large number of respondents in lean supply chain management and also collect similar information from a large number of respondents, a survey approach deemed to be appropriate.

3.3 Population

The target population for this survey consists of Kenyan manufacturing firms listed in Kenya Association of Manufacturers (KAM) directory that are in Nairobi and surrounding areas. The list comprises multinationals, local companies and private owned companies. The population consists of 463 firms. Kenya association of manufacturers has divided the firm into groups, i.e. energy, electrical and electronics; plastic and rubber; textile and apparels; food, beverage and tobacco; pharmaceutical and medical equipment; metal and allied; paper and paperboard; motor vehicle assembly and accessories; building construction and mining; chemical and allied.

3.4 Sampling

The survey population taking into account low response rate and other hurdles (e.g. technical, financial and time) targeted 100 manufacturing firms. Proportionate Stratified sampling design was used as the sampling strategy. The population was divided into 12 strata which were: energy, electrical and electronics; plastic and rubber; textile and apparels; food, beverage and tobacco; pharmaceutical and medical equipment; metal and allied; paper and paperboard; motor vehicle assembly and accessories; building construction and mining; chemical and allied; plastic and rubber; and leather products and footwear. Table 3.1 shows the sampling schedule.

Table 3.1: Sampling schedule

Group (strata)	Strata size	Targeted Sample size
Energy, electrical and electronics	40	9
plastic and rubber	55	12
Textile and Apparels	38	8
Timber wood	15	3
Metal and allied	40	9
Food, beverage and tobacco	100	21
Pharmaceutical and medical equipment	20	4
Paper and paperboard	56	12
Motor vehicle assembly and accessories	17	4
Building construction and mining	12	3
Leather products and foot wear	9	2
Chemical and allied.	61	13
Total	463	100

3.5 Data Collection

The study relied heavily on primary data, collected through administering questionnaires to some selected firm's representatives. Two respondents from each firm were asked to fill in the questionnaire. One of the respondent came from the strategic level of the organization that is either managing director, chief executive officer, procurement manager etc. while the other came from the operational level i.e. production manager, operations manager, supervisor etc. Mostly quantitative data was collected. The research instrument was divided into three parts. The first part was used to collect the biographic data of respondent and some information about the firm. The second part was used to collect information on extent to which lean philosophy was being implemented in manufacturing firms while the third part collected data on challenges faced by these firms.

3.6 Data Analysis

The process of data analysis involved several stages. The complete questionnaires were edited for completeness and consistency, checked for errors and omissions and then coded (Keasworth & Harding, 1992). In order to determine the extent to which firms in the manufacturing sector use lean supply chain philosophy, descriptive statistics including percentages, mean and standard deviation was used in the analysis. To determine the main drivers of lean philosophy and challenges in implementing lean philosophy descriptive statistics including frequencies, mean, variance standard deviation and percentages were used in the analysis of data.

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the data analysis and interpretation which draws from the objectives of the study. The analysis was both qualitative and quantitative. In this chapter we are going to analyze more extensively the findings that we acquired from the survey, distributed to several manufacturing firms in Nairobi and surroundings. The chapter is structured according to the questionnaire and provides discussion of the findings. In addition, data and observations, gained from the survey will be well incorporated into the discussion.

4.2 Data collection and population studied

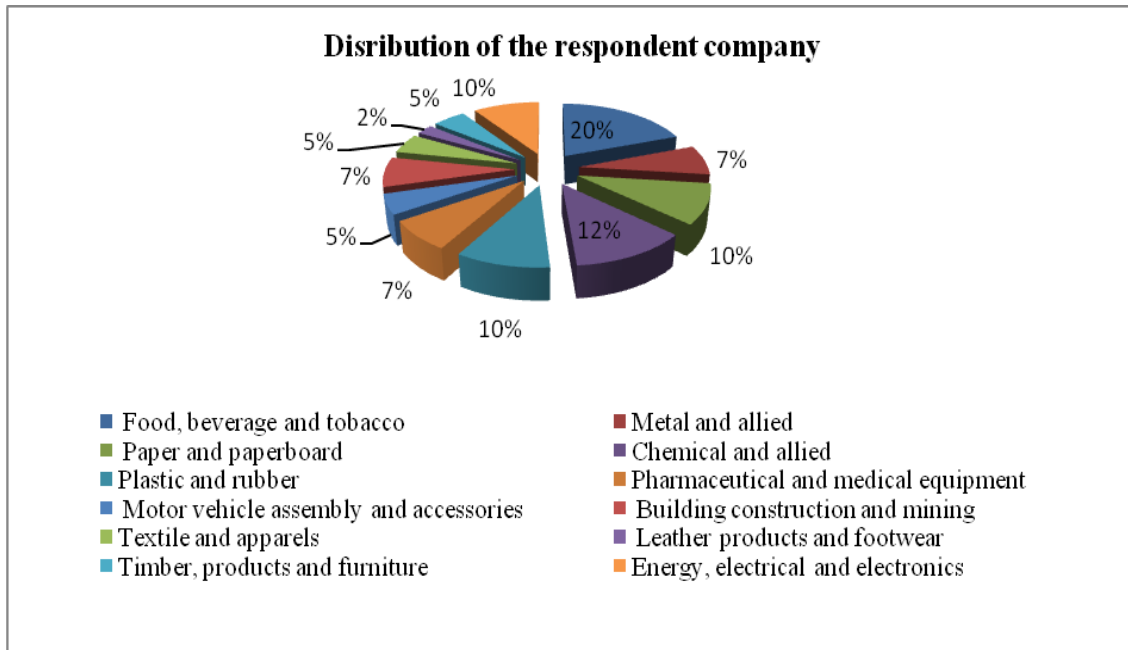
The research was personally administered by researchers themselves by issuing questionnaires to Manufacturing firms in Nairobi, Kenya. The study was carried out within Nairobi because of the limitation in resources and time. Out of the targeted 100 companies only 39 responded by completing the questionnaire thus achieving a response rate of 39%. The response rate was considered statistically sufficient for further analysis. The response rate is presented in Table 4.1 and Figure 4.1.

Table 4.1: Distribution of response by groups

Group	Response frequency	Percentage
Food, beverage and tobacco	6	15.4%
Chemical and allied	5	12.8%
Paper and paperboard	4	10.3%
Plastic and rubber	4	10.3%
Energy, electrical and electronics	4	10.3%
Metal and allied	3	7.7%
Pharmaceutical and medical equipment	3	7.7%
Building construction and mining	3	7.7%
Motor vehicle assembly and accessories	2	5.1%
Textile and apparels	2	5.1%
Timber, products and furniture	2	5.1%
Leather products and footwear	1	2.6%
Total	39	100%

Source: research data

Figure 4.1: Distribution of respondents by group



Source: Research Data

Majority of the respondents came from Food, beverage and Tobacco, this constituted 20% of the respondents while only one respondent came from leather products and footwear which constituted 2%.

4.3 Respondent level of education

The respondents were asked to fill the highest level of education they have attained. This question was important to the researcher because it determined the validity of the questionnaires that were returned. Majority of the respondents were undergraduate degree holders. They represented 77% of the respondent. The minority were master degree holders representing only 5% of the respondents. The distribution of respondent level of education is shown in Table 4.2.

Table 4.2: Respondents Education level distribution

Level of education	Frequency	Percentage
College education	7	18%
undergraduate degree	30	77%
Masters degree	2	5%

Source: research data.

4.4 Respondent's number of years in the organization

The respondents were asked to fill how many years they have worked for the firm. A majority of them (54%) had worked for the organization between three to five years while 1% had worked for the organization for more than 10 years. The distribution is shown in the Table 4.3.

Table 4.3: Distribution of respondent's number of years in the organization

Years	Frequency	Percentage
<1	2	5%
1 to 3	8	21%
3 to 5	19	49%
5 to 10	9	23%
>10	1	2%
Total	39	100%

Source: Research data.

4.5 Number of employees in the organization

The respondents were asked to fill the number of employees in the organization. This information is useful in determining the size of the organization by the number of employees in the organization. The distribution of number of employees is given in Table 4.4

Table 4.4: distribution of numbers of employee in the organization

Number of employee	frequency	percentages
<100	2	5%
100-300	22	56%
301-500	13	33%
501-1000	2	5%
>1001	0	0%
Total	39	100%

Source: Research data.

From the findings majority (56%) of the organizations that responded have between 100 and 300 employees while 5% percent that responded had less than 100 employees. None of the organization that responded has more than 1000 employees.

4.6 Lean Supply Chain Practices

The study sought to determine the main lean supply chain practices that are indulged in by manufacturing firms. In these regard respondents were asked to indicate the extent to which they think their firms indulged in the order of importance on a five point Likert scale where 5 represents very great extent and 1 very small extent. The results are as depicted in Table 4.5.

Table 4.5: lean supply practices

Lean supply practices	Mean (m)	Standard deviation (SD)
Preventative maintenance	4.4667	0.51640
Reduction in the preliminary finishing time	4.3333	0.61721
Balance of working process in production	4.3000	0.60721
Reduction in series – the aim of LEAN is to have the movement of material through the factory in the smallest possible series	4.2667	0.88372
Manufacturing plant layout –machines are placed in the plant in a way that minimizes transportation within the manufacturing plant.	4.2667	0.79881
Overall equipment efficiency	4.1333	0.74322
Total preventative maintenance	4.0667	0.70373
Kaizen- continuous improvement	4.0507	0.03280
Total quality management	3.5239	0.0873
Takt time	3.2344	0.03445
Lean procurement	2.4235	0.7034
Demand driven supply chain- use of pull system	1.1723	0.0292

Source: research data

A mean of between 4-5 meant that the practice was adopted to a greater extent, 3-4 to a moderate extent, 2-3 to a lesser extent and 1-2 to the least extent. Table 4.4 shows that most of the respondents indicated that preventative maintenance (m=4.7, SD=0.52), reduction in the preliminary finishing time (m=4.3, SD=0.62) and balance of working process in production (m=4.33, SD=0.61) are the lean supply chain practices that have

been adopted to a great extent by the manufacturing firms surveyed. This is in disagreement with a study done by Daud and Zailani (2011). In their study Lean Supply Chain Practices and Performance in the Context of Malaysia they found that the major lean supply practices adopted include demand management and waste management.

Lean procurement and demand driven supply chain are the least likely used practices applied by the manufacturing firms with means 2.4235 and 1.1723 respectively.

4.7 Reasons for Practicing Lean Supply Chain Management

The study also sought to know the reasons why manufacturing firms indulge in lean supply chain. The respondents were asked to indicate the extent the indicated reasons are the reasons why manufacturing firms indulged in the practices in section 4.6. A Likert point scale of point of five was used with five indicating the major reason and 1 not a reason. The results are indicated in table 4.6.

Table 4.6: Reasons for practicing lean supply chain

	Mean	Standard deviation
Reduce cost	4.4667	0.63994
Long term survival of firm	4.4010	0.73679
Eliminate defects	4.4000	0.63246
Increase profitability	4.2667	0.59362
Reduce material consumption	4.2667	0.59362
To gain competitive advantage	4.1333	0.74322
Reduce demand side lead time	3.7333	1.09978
Trimming Supply Side Lead Times	3.5333	1.30201
Obsolete practices	3.2000	1.32017
Green initiative	3.1667	0.63994

Source: Research Data

A mean of between 4 -5 meant that this was the major reason for adopting lean practices, while 3-4 meant less of a reason. The results indicate the major reasons for manufacturing firms in Kenya to indulge in lean supply chain management are reduce cost ($m=4.67$, $sd=0.64$), long term survival of the firm ($m=4.40$, $sd= 0.74$) and to eliminate defects ($m=4.40$, $sd=0.63$). This is in agreement with a study done by Aberdeen group (2006) where they found that most manufacturing firms are applying lean across the supply chain to improve operational performance and reduce operating cost. Industry Week, (2010) argues that lean organization optimizes the flow of products and services to its customers. It delivers customer value by reducing lead times Improving quality, eliminating waste and reducing the total.

The results also indicate that the least reasons why they organizations indulge in lean supply chain practices are obsolete practices and green initiative with mean 3.2000 and 3.1677 respectively and standard deviation 1.32017 and 0.63994 respectively.

4.8 Challenges Facing Adoption of Lean Supply chain

There are a number of challenges facing logistics implementation of lean supply chain management. In a Likert scale of 1-5, the respondents were asked to rate the extent to which the listed factors hampered effective implementation of lean supply chain with 5 indicating the highest extent and 1 the least extent. The respondents were also asked to add other challenges that they perceive are affecting logistics outsourcing. However no significant additions were made by the respondents in this regard. The findings were captured in Table 4.6

Table 4.7: Challenges Facing implementation of Lean Supply chain

	Mean	Standard deviation
Resistance to change by employees	4.48	0.48795
Financial resources	3.50	0.00180
Organizations Rules, procedures and policies	4.23	0.08233
Size of the firm	2.90	0.51640
Unions	1.80	0.0734
Age of the firm	2.92	0.99043
Lack of robust and professional relationships with suppliers	4.22	0.56061
Organization structure	4.18	0.55795

Source: Research data

Lack of robust and professional relationships with suppliers ($m=4.22$, $sd=0.56$), organizations rules, procedures and policies ($m=4.23$, $sd=0.08$) and resistance to change by employees ($m=4.48$, $sd=0.48$) were rated by respondents as the most challenging issues when it comes to implementation of lean supply chain practices in manufacturing firms in Kenya. On the other hand respondents indicated that influence of the unions and age of the firms as the least challenging issues when it comes to implementing lean supply chain management practices with mean of 1.80 and 2.92 respectively.

This is partly in agreement with study conducted in Malaysian electrical and electronic industry by Wong *et al.* (2009) that established the major obstacles of lean supply chain management are employee resistance to change and backsliding to the old ways. Resistance from employees might be due to the “fear factor” that they would lose their

jobs if they find out that their jobs do not add value, since lean manufacturing is about eliminating non value added activities.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings from chapter four, and it also gives the discussions, conclusions and recommendations of the study based on the objectives of the study. The objectives of this study were to determine the lean supply chain practices adopted in the manufacturing firms in Kenya, to determine the reasons that are pushing manufacturing firms to adopt the lean supply chain practices and to determine the challenges they faced when implementing these practices.

5.2 Summary of the Findings

This study adopted a survey design method in determining the. It sought answers to three main questions: what are the lean supply chain practices being adopted? What are the reasons for the adoption of these lean supply chain practices? And what are the challenges faced by manufacturing firms in Kenya when applying lean supply chain practices?

After evaluating several Manufacturing firms, it was determined that although the culture of lean supply chain is gaining root in the manufacturing firm in Kenya some of the practices are not well adopted by these firms. Most of the lean supply practices adopted by these firms are within the operations of these firms. For instance the study determined lean practices like preventative maintenance, reduction in the preliminary finishing time and balance of work process in production are the main practices adopted by the manufacturing firms. Other practices that affect the demand side and supply side of the

supply chain like lean procurement and demand driven supply chain are the least adopted lean supply chain practices.

The study also determined that cost reduction, long term survival of the firm, elimination of defects and increasing profitability were the major reasons why manufacturing firms adopted the lean supply chain practices. Obsolete practices and green initiative were termed as the least reason why manufacturing firms adopted lean practices. Womack et al., (1990) in their study found a 2 : 1 difference in productivity between car assembly plants in Europe and those in Japan, with the Japanese plants showing a 50% superiority on defects per car. Womack et al. (1990) have explained concluded that companies can dramatically improve their performance by adopting the 'lean production' approach pioneered by Toyota.

Lastly the study also determined the resistance to change by employees, organizations rules, procedures and policies and lack of robust and professional relationships with suppliers as the major challenges. Employees resist change because of fear of the unknown and adoption of lean practices bring with them some changes. Lamming (1993) argues that lean supply cannot be achieved unless some kind of close relationship, built upon mutual trust and openness is present, which is not compatible with an arm's length strategy. Manufacturing companies should improve their relationship with suppliers so that they can adopt more of these lean practices.

5.3 Conclusions

Lean supply chain 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 supply chain 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 was to reduce cost , profitability and long term survival of the firm.

Manufacturing firms faces a lot of challenges when it comes to adoption of lean supply practices. The survey established that manufacturing firms are faced with challenges like lack of robust and professional relationships with suppliers, organizations rules, procedures and policies and resistance to change by employees.

5.4 Recommendations

As much as the survey provided information on lean supply chain practices among manufacturing firms in Kenya, the management of these firms needs to invest more on skill and knowledge acquisition on the management of the lean supply chain. They also need to bench mark themselves with world class organization practicing lean supply. The organization should improve the relationship they have with suppliers. As Lamming (1993) argues, lean supply cannot be achieved unless some kind of close relationship with suppliers is adopted. Objectively the challenges that the manufacturing firms experience in lean supply chain management are a means towards continuous improvement. Manufacturing firms need to be cognizant of the challenges that come along as a package of successful adoption to new ways of doing business and work on ways of tackling these challenges and hence improve their supply chain performance. The unfolding events can be referred to as indicators to the successful implementation of a lean supply chain practice. If progressively monitored and used as corrective benchmarks, implementation of these lean supply chain practices and challenges will

enable the firms to fully adopt lean supply chain practices thereby achieve their key objective of cost reduction.

5.5 Limitation of the Study

The major problem encountered during the study was the unwillingness of some respondents to provide some information. This was compounded with the fact that the respondents who were required to fill some information were not accessible. The study was also limited in scope as it only covered manufacturing firms operating in Nairobi. Ideally in a study of this kind, one would wish to conduct a survey of all manufacturing firms in Kenya but such a procedure was not possible owing to time and financial constraints

5.6 Suggestions for Further Study

This study has a number of issues that can be addressed in future research. First, a confirmatory analysis and cross-sector validation using a large sample gathered from other regions is required for greater generalization. Second, the study was only done in manufacturing sector, the same can be done in a service sector of the role of logistics outsourcing on supply chain performance among universities in Kenya.

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APPENDICES

Appendix I : Letter of Introduction

Dear Sir/ Madam,

RE: MBA RESEARCH

I am a student at The University of Nairobi (UON), pursuing a Master of Business and Administration (MBA). I am undertaking a research project in partial fulfillment of the academic requirements. My study is on “*LEAN SUPPLY CHAIN MANAGEMENT IN MANUFACTURING FIRMS IN KENYA*”

Your firm has been selected to form part of the study. I will be very grateful if you would spare sometime from your busy schedule, to respond to the questions listed on the attached questionnaire.

Your response will be treated with uttermost confidentiality. The findings of this research may be availed to you upon completion of the research if you so request.

Your assistance and co-operation will be highly appreciated.

Yours faithfully,

Monica Kimani
University of Nairobi
Master of Business student

Appendix II: Questionnaire

I am a postgraduate student at University of Nairobi school of Business. I am conducting a research on. *Lean Supply Chain Management Practices In Manufacturing Firms In Kenya*.

This study is being carried out in partial fulfillment of the Award of a Master of Business Administration Degree of the University of Nairobi.

Part 1: Biographical and organizational details.

1. Name of the
organization

2. Group under which the organization falls

- | | |
|---|---|
| ☐ Energy, electrical and electronics | ☐ Timber, products and furniture |
| ☐ Food, beverage and tobacco | ☐ pharmaceutical and medical equipment |
| ☐ Metal and allied | ☐ Motor vehicle assembly and accessories |
| ☐ Paper and paperboard | ☐ Building construction and mining |
| ☐ Chemical and allied | ☐ Textile and apparels |
| ☐ Plastic and rubber | ☐ Leather products and footwear |

3. Kindly indicate the highest level of education have you attained?

Primary education ☐ Secondary education ☐ College education ☐

Undergraduate degree ☐ Masters Degree ☐ Doctorate ☐

Others (Indicate).....

4. Number of years you have worked in the organization

5. Number of employees in your organization

[] <100 [] 100-200 [] 201-300 [] 301-500

[] 501-1000 [] 1001-2000 [] >2000

Part 2:

6. In the tables below, kindly indicate the extent to which you think your firm indulges in the following lean supply chain practices.

Lean supply practices	Highly	Moderately	Less	Least	Not at all.
Preventative maintenance (this is a series of practices and procedures that are undertaken in order to find and fix problems before they arise.	[]	[]	[]	[]	[]
Total productive maintenance (TPM) gives the workers basic maintenance tasks such as inspection of the machines, cleaning, lubricating, tightening, and calibration.	[]	[]	[]	[]	[]
Reduction in the preliminary finishing time – lean aims to	[]	[]	[]	[]	[]

reduce delays which occur due to tools changing and machines preparation.					
Reduction in series – the aim of LEAN is to have the movement of material through the factory in the smallest possible series	[]	[]	[]	[]	[]
Total productive maintenance (TPM) gives the workers basic maintenance tasks such as inspection of the machines, cleaning, lubricating, tightening, and calibration.	[]	[]	[]	[]	[]
Manufacturing plant layout –machines are placed in the plant in a way that minimizes transportation within the manufacturing plant.	[]	[]	[]	[]	[]
Balance of working process in production -aims to put the same amount of pressure on the manufacturing system and to minimize the accumulation of unfinished products.	[]	[]	[]	[]	[]
Takt time – each working unit has to manufacture a certain product at speed that is neither too small nor too great for the next unit in the process	[]	[]	[]	[]	[]
Overall equipment efficiency – this is the measure of utilization of each piece of equipment in relation to the possible capacity.	[]	[]	[]	[]	[]
Demand driven supply chain - use of pull system	[]	[]	[]	[]	[]
Lean procurement	[]	[]	[]	[]	[]
Kaizen - continuous improvement	[]	[]	[]	[]	[]
Total quality management	[]	[]	[]	[]	[]

Others (specify)	[]	[]	[]	[]	[]
	[]	[]	[]	[]	[]
	[]	[]	[]	[]	[]

7. Indicate in scale of 1-5, the extent to which the following reasons are why your firms practice lean supply chain (Where 5= major reason and 1= not a reason).

	5	4	3	2	1
Reduce cost	[]	[]	[]	[]	[]
Eliminate defects	[]	[]	[]	[]	[]
Long term survival of firm	[]	[]	[]	[]	[]
Reduce inventory cost	[]	[]	[]	[]	[]
Trimming Supply Side Lead Times	[]	[]	[]	[]	[]
Reduce material consumption	[]	[]	[]	[]	[]
Reduce demand side lead time	[]	[]	[]	[]	[]
Increase profitability	[]	[]	[]	[]	[]
To gain competitive advantage	[]	[]	[]	[]	[]
Green initiative	[]	[]	[]	[]	[]
Obsolete practices	[]	[]	[]	[]	[]
Others (specify)	[]	[]	[]	[]	[]

8. Identify the extent to which the following challenges affect adoption of lean supply chain (5=greatly affecting and 1=not affecting)

	5	4	3	2	1
Resistance to change by employees	[]	[]	[]	[]	[]
Financial resources	[]	[]	[]	[]	[]
Organizations Rules, procedures and policies	[]	[]	[]	[]	[]
Size of the firm	[]	[]	[]	[]	[]
Unions	[]	[]	[]	[]	[]
Age of the firm	[]	[]	[]	[]	[]
Lack of robust and professional relationships with suppliers	[]	[]	[]	[]	[]
Organization structure	[]	[]	[]	[]	[]
Other challenges (specify)	[]	[]	[]	[]	[]
	[]	[]	[]	[]	[]
	[]	[]	[]	[]	[]
	[]	[]	[]	[]	[]
	[]	[]	[]	[]	[]

	[]	[]	[]	[]	[]
	[]	[]	[]	[]	[]
	[]	[]	[]	[]	[]

Thank you