LEAD TIME AND SUPPLY CHAIN PERFORMANCE IN THE MOTOR INDUSTRY IN NAIROBI

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF BUSINESS ADMINISTRATION DEGREE, SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI

NOVEMBER 2017

DECLARATION

This research project is my original work and has not been submitted for a degree in this or any other University.

Signed…… Date…….

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This research project has been submitted for Examination with our approval as the University Supervisors.

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ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to all the people who offered their assistance and encouragement during the development of this research project. I also wish to express my earnest appreciation to my supervisors Mr. Joel Lelei and Ms. Angela Kaguara for their overwhelming support and for sharpening my research skills, improving my research work and creating a flexible and friendly environment for consultation. A debt of gratitude to my family, for their encouragement and emotional support, without which, this journey would not have been possible. I wish above all to thank the Almighty God for His provision, guidance and success throughout the process.

DEDICATION

This project is dedicated to my family who gave me invaluable moral support throughout the period.

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ABSTRACT

The study focused on lead time (fixed lead time, pre-processing lead time, processing lead time and post processing lead time) and supply chain performance in the motor industry in Nairobi. The first objective of the study sought to determine the factors influencing lead time and the second objective sought to establish the relationship between lead time and supply chain performance in the motor industry in Nairobi. The study employed a descriptive research design on a population of 35 registered motor companies in Nairobi who were members of Kenya Motor Industry Association (KMIA) by the year 2017.The study conducted a census of the 35 motor companies instead of adopting a sampling methodology. The respondents for the study were operations managers, logistic managers, procurement officers and finance officers working in the motor companies. The data used for analysis was primary data collected via the use of questionnaires administered through drop and pick later method. Descriptive statistics (mean, standard deviation and frequencies) and inferential statistics (regression and correlation analysis) were used to perform data analysis. Data was presented in form of tables. A multiple linear regression analysis model was used to test and link the variables. The study established that fixed processing lead time had a positive but insignificant relationship with supply chain performance because the p-value was greater than 0.05. On the other hand, pre-processing lead time, processing lead time and post processing lead time, were found to have a significant and positive relationship with supply chain performance this is because their p-values were less than 0.05. The study concluded that motor companies that had good lead time management significantly impacted on supply chain performance in their companies. The recommendations were that motor companies need to promise a constant lead time to all customers, regardless of the characteristics of the order and the current status of the system.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

This section presents the back ground of the study globally, regionally and locally. Uncertainties in the market and competition worldwide, has forced numerous companies to engage in international operations. This has resulted to an incessant desire by the corporations to be efficient, profitable and ensuring customer satisfaction derived from better customer service. In essence it is essential to secure flexibility in supply chains in contexts regarding changing lead time (Mae & Ohno, 2012).

In USA, Lynch (2013) argues that delay in delivery of supplies due to poor procurement planning, failure to issue request for quotations punctually, tardy preparation of bids, receiving incomplete documents; failure to form the evaluation panel in time, lengthy negotiation processes; poor estimation of lead times and approvers delaying to review and approve tenders.

Rad (2008), in a study on reduction of lead time among UK based firms, focusing on reduction of lead time by emphasizing on ordering and production times, argues that identifying and eliminating waste, facilitates an organization to concentrate on value adding activities and resulting in cost efficiency. He further states that logistics management is an essential ingredient in the reduction of lead time.

Adinortey (2015) argues that in Ghana, the average procurement lead time for drugs and laboratory supplies in hospitals is within four (4) weeks. Chopra, Reinhardt and Dada (2004) state that firms in Nigeria that have cycle service levels of 50% or above, reorder point and safety stock can be reduced drastically when firms are able to reduce the variability of their lead

time. In Kenya, Mfwaya (2013) argues that companies that have good lead time management when dealing with multiple suppliers of various products and services, putting in efforts to reduce variability, efficient workflow, avoidance of delays through proper queue control, expediting some processes in order to avoid delays, using multiple modes of transport to avoid delays and offering of at least twelve (12) months warranty on products/services, significantly boosts customer satisfaction.

Tarty (2012) argues that in the public health sector in Kenya, long lead times occurs due to; equipment failures, poor warehouse management, in adherence to logistics standards, inferior transport networks. Other factors include poor sorting of orders sorting and poor planning in warehouses.

Lead time is a fundamental component in procurement of supplies or goods in many organizations, companies and institutions (Laizer, 2013). The capability of hastily obtaining and deployment of supplies requires engagement of professionals with necessary competences in an organization. This is the principal reason on the popularity of procurement and supply chain management as specialization modules in learning institutions. A proper understanding of lead time and supply chain performance in organizations is hence vital. This study is lead time and supply chain performance in the motor industry in Nairobi.

1.1.1 Lead Time

Harland, Telgen, Knight, Callender and Thai (2009) define lead time as the time taken in preparation of bids, making an award and placement of an order, the delivery time and the duration of time between receipting and actual payment. Long lead times involve costs upsurge due to larger buffer stocks and safety stocks and unfulfilled delivery time promises. Short lead

times are profitable to both customer and supplier, demand increases with lesser delivery times in addition to lower prices. As a result, lead times are inversely related to market shares (Munster and Vestin, 2012).

On the other hand, Christopher (2008) indicates that companies strive to balance supply and demand so as to increase the profitability levels. Thus, for supply chain performance optimization, product availability has to be met at the required time. The importance of short lead time and high speed cannot be understated as Ireland and Webb (2007) put it, high speed does not always equate to proper utilization of time, but elimination of delays invariably improves output level and customer satisfaction. Performance improvement reports nowadays highlight on the need to reduce lead times.

The companies in motor industry in Nairobi, Kenya face a number of activities that require short lead times and hence this can affect supply chain performance. For example, fixed lead time which is the time it takes to process or respond to request for quotations from customers (Greene, 2000); pre-processing lead time which entails time it takes to process a requisition to the time a local purchase order (LPO) is executed (Keskinocak & Tayur, 2004); processing lead time which is the time taken to complete an order e.g. assembling a motor vehicle (Munster & Vestin, 2012) and post processing lead time which entails the time taken to handle finished products for instance transportation and delivery (Woxenius, 2006). These activities are hereditary urgent and need to be performed with the least lead time. Thus, to manage the supply chain processes well, lead times should be taken into consideration and managed well. Agile supply chains require minimal lead times. Lead time is the duration of time taken from the moment a requisition for a product or service is done by a customer, until the time it is delivered (Christopher, 2000).

Alp and John (2003) assert that the most appropriate method to cushion a supply chain against random fluctuations in demand is via dynamic modification in systems with regards to lead times. They argue that this can be done by having flexibility in the supply chain lead times by engaging of numerous suppliers, use of multiple transportation routes, expediting certain processes via different possible channels for a unit to go through the supply chain.

1.1.2 Supply Chain Performance

Gunasekaran and McGaughey (2004) view supply chain performance as the extent to which supply chain activities meet end-customer requirements. Beamon (1999) defines supply chain as a series of activities made up of processes such as purchasing, inventory management, production, transportation and as well as distribution of inventories.

Hausman (2017) holds that supply chain performance cuts across a company's boundaries as it involves primary material, components, subassemblies and finished products being distributed to consumers. He further states that the end-customers' requirements include constraints such as product availability, on-time delivery and quality of services or products among others (Hausman, 2017). Various organizations perform variedly yet they operate in the same industry with similar economic challenges. The most notable cause of the varied level of organizational performance is linked to supply chain performance. Some supply chains performs better than the others because of the type of supply chain performance metrics adopted by those companies (Cachon & Lariviere, 1999).

The adoption of poor supply chain performance metrics can be an impediment to the success of a supply chain or the performance of an organization (Hausman, 2017). Therefore, an enterprise should ensure that all factors within a supply chain are considered before adopting the supply

performance metrics to be used. In this context, the supply chain performance measurements must address customer needs such as quality and timely delivery, cost minimization, reduction of waste or loss or products during transportation or distribution and inventory management among others.

1.1.3 The Motor Industry in Kenya

The motor industry in Kenya is predominantly engaged in assembling, merchandising and distribution of motor vehicles and motor vehicle parts. As an integral part of the Kenyan economic pillar, the automotive industry is one of the core areas that serve the interest of transport, communication sectors, as well as infrastructure development. However, even though Kenyan motor industry has jump-started its development in the recent past, it is worth noting that the industry remains as one of the secondary sectors since it relies on the supplies or manufactured spare parts from abroad (Kipchirchir, 2008).

In the country there are several automobile dealers operating (PWC, 2014). Companies operating in the industry are registered by the Kenya Motor Industry Association. Currently there are 35 registered companies with KMIA in Nairobi County (See Appendix II).

Kenya Motor Industry Association, as the prominent confederation of motor companies in the country, embraces all the major automobile marquees, vehicle assemblers, part manufacturers, equipment dealers, parts suppliers and many auxiliary services. It mobilizes and represents the motor industry on all commercial, industrial and national policy related issues. KMIA therefore acts as a forum between its members, other associations, the media, Kenyan government and general public (PWC, 2014).

The motor industry in Kenya through creation of employment in assembly lines, transport, as well as training and innovation sectors, has enabled the country to record an increased workforce that has driven the economy index and improved living standards. It also creates employment opportunity in the informal sectors and formal sectors as evident in Jua Kali sector which has been on the rise by assimilating the technology used in assembling to design other automobile parts. Moreover, the formal sector such as car import agencies have also benefited and created more employment, as well as full range of revenue to the government through payment of import duty, levies and other taxes.

However, even though the industry is perceived to be booming, problems such as such stiff competition from developed countries, tough economic times experienced during currency exchange or importation, strict legal environment for importation and high tariffs imposed on the importation of motor vehicles negatively impact the sector (Kipchirchir, 2008)

1.2 Research Problem

Lead time is an essential element in supply chain management in any organization for its efficiency and effectiveness performance, as Woeppel (2001) indicates, lead time is an exceptionally vital competitive advantage tool when stock is not held in advance. Supply chain failures involving long lead times can result in reduction of a company's revenue, dropping in market share, inflation of costs above the budget and thereby posing a threat to production and distribution. Such interferences may injure a firm's reputation to its investors and stakeholders leading to increased cost of capital.

Bosman (2006) indicates that supply chain failure involving long lead time has been ranked as a major risk, more than any other that poses utmost potential to upset revenue drivers. It has been

observed that in some organizations there is a tendency of non-compliance due to lack of proper lead time adherence which leads to dissatisfaction of customers. A perfect example is Toys R Us and Macy's, both companies situated in the United States (US). The companies had promised to make deliveries on specific dates during a holiday season in the year 1999. Unfortunately they did not deliver as they had promised due to late shipments. The companies also failed to notify customers that their shipments would be late. The two firms had to make a settlement of $1.5 million which was ordered by the Federal Trade Commission (FTC) due to late deliveries (Enos, 2000). However, the contribution of the lead time management with regards to business performance is not yet well known to many organizations (Laizer, 2013).

The motor industry is among many firms where lead time is a critical element in the execution and/ or delivery services to their customers (efficiently and effectively regarding to its objectives) (Laizer, 2013). The Kenyan motor industry operations call for utmost efficiency and effectiveness in executing lead time in order to achieve performance objectives such as costs reduction, market share growth, increase in production levels, high sales returns and increase in profit margins among others. This can only be attained through proper understanding by the motor industry players on the importance of lead time management since it influences supply chain performance. In addition the motor industry in Kenyan faces challenges such as such stiff competition from developed countries, tough economic times resulting in variability of demand, currency fluctuations, strict legal environment for importation and high tariffs imposed on the importation of motor vehicles that negatively impact the sector (Kipchirchir, 2008).

A couple of research studies have been conducted on lead time management. These studies have however focused on other sectors other than the motor industry and thus creating contextual and conceptual research gaps. A study by Alp and John (2003) on dynamic lead time management in

supply chains presents a contextual gap since it was not conducted in Kenya. A study by Miskelly (2009) on improving customer satisfaction with lean-six sigma and a study by Mae and Ohno (2012) conducted in Sweden to find out how variations in lead time influences purchasing, production and logistics performance present contextual and conceptual research gaps.

Other studies for instance Rad (2008) and Theuri (2012) focused on manufacturing sector, none of the studies on lead time has focused on the motor industry. In Kenya, Petri (2012) focuses on the influence of customer order lead time decisions centered on a firm's ability to make money, Bosire et al. (2011) look at the impact of outsourcing on lead time and customer services among supermarkets in Nairobi and Mfwaya (2013) focuses on lead time management and customer satisfaction in the telecommunications industry in Kenya. None of these studies have focused on the motor industry. This sectorial difference created a contextual research gap which the current study sought to fill. This is because the circumstances in those sectors are not similar to motor industry sector. The studies also indicate conceptual research gaps since they have not directly studied the relationship between lead time and supply chain performance in the motor industry.

This study therefore sought to address the research gaps by answering one major question: What is the relationship between lead time and supply chain performance in the motor industry in Nairobi? The other question was; what are the factors influencing lead time in the motor industry in Nairobi?

1.3 Research Objectives

The broad objective of the study was on lead time and supply chain performance in the motor industry in Nairobi. The specific objectives were;

i. To determine the factors influencing lead time in the motor industry in Nairobi.

ii. To establish the relationship between lead time and supply chain performance in the motor industry in Nairobi.

1.4 Value of the Study

The findings of the current study were anticipated to be relevant to a number of groups as discussed under this section. This study is expected to provide recommendations to facilitate improvement in the execution of lead time management in the motor industry in Nairobi. The recommendations may benefit the motor industry operators so as to improve on their customer service and attract more customers.

Supply chain management practitioners can also get new information that may be more beneficial in their day to day management of their operations. This study is expected to generate literature that may be of practical use by procurement and supply chain practitioners who will use the findings to improve their operations.

Supply chain management is proving to be a significant concept in both corporate and academic aspects. Future researchers specializing on supply chain performance and lead time can find reference materials for their studies. The study is expected to enhance knowledge to the existing research. It will explore the various gaps and prompt further research by scholars and other stakeholders.

This study can also be a benchmarking tool for the Government of Kenya and other governments that are challenged by poor lead time management practices. They can benefit from the findings of the study which can enable them to understand better on how to improve the public institutions through proper and efficient lead time execution in the supply chains.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The introductory part of the paper presents an overview of the study. It presents a theoretical viewpoint of various literature on the variables in the study.

2.2 Theoretical Literature Review

This is a collection of various interrelated concepts that guide a researcher to establish the variables of the study to be measured and determine their statistical relationship (Defee, Randal, Thomas & Williams, 2010). Research theories are fundamental in describing, explaining, predicting and controlling human phenomena in a research design. This section provides the theories that the current study is hinged on. This study is guided by Queuing Theory and the Theory of Constraints.

2.2.1 Queuing Theory

This concept refers to an arithmetical assessment of waiting line in a service delivery processing, (Sundarapandian, 2009). In this theory, a model is structured to facilitate the prediction of the time an individual or an activity will take while waiting for a service in a line. The process is commonly believed to be a component of operations research because its application outcomes are widely applied in crafting managerial decisions about the production efficiency and mobilization of resources necessary for provision of services. The theory originated from Agner Krarup Erlang research whereby he developed models to describe the Copenhagen telephone exchange (Mayhew & Smith, 2006).

The theory is also applied in services provisions as it lays down various scheduling policies which can be used to serve customers. This will explain the different times it takes to finish a process. The policies for the theory include First-in-first-out where clients are attended to based on their arrival, Last-in-first out where customers with the least waiting times are served first, Processor sharing for equal sharing of capacities by customers, Priority principle that serves customers with high priority first. However, Priority queues include non-preemptive and preemptive scheduling.

The model was relevant for the current study because it offered an insight into lead times between different processes. The model offers the possibility of estimating waiting times of orders. Aksin et al. (2007) resonated that the concept of queuing theory can be applied in various sectors ranging from banking sector, manufacturing sector and customer care services among others in constructing an equal intermodal and lead time. The model can be used to dimension the number of people who are handling the various activities involving pre-processing lead time for example local purchase orders (LPOs), to keep the pre-processing lead time short or the number of people who deal with activities involving fixed lead time for instance preparation of a request for quotations or to keep the quotations lead time short and further investigate the relationship it has on supply chain performance. The theory was thus relevant in explanation of both preprocessing and fixed lead times which are independent variables of the study.

2.2.2 Theory of Constraints (TOC)

The philosophy of TOC came into existence in the year 1948 when Eliyahu M. Goldratt minted this concept in his book entitled “Goal that is geared to help organizations continually achieve their goals,” (Goldratt et al, 1986).

The (TOC) considers a management process as being limited to achieve one or some of its objectives by a few contraints (Goldratt, 2004). The theory puts emphasis on managing the capacity and capability of the constraints if the competitiveness of the organization is to be improved and this can be achieved by proper lead time execution.

The hurdles in the Theory of Constraints are: elongated lead times, numerous unfulfilled orders, numerous orders categorized as emergency, failure to engage customers and absence of control related to priority orders (Goldratt, 2004). The TOC thus focuses on managing these constraints (Cooper, 2006).

This approach was fundamental in this study due to its focus on the general independent variable of the study which is lead time containing all the four types of lead time investigated namely; fixed lead time, pre-processing lead time, processing lead time and post processing lead time hence its relevance to the study.

2.3 Categories of Lead Time

Studies have been conducted on lead time on global, regional and even local contexts. This section thus expounds on a review of some of the empirical works by other scholars on the forms of lead time. There are four types of lead time namely; fixed lead time, pre-processing lead time, processing lead time and post processing lead time.

2.3.1 Fixed Lead Time

The time taken to get all the details required by a customer and responding back to the client is known as fixed lead time or quotation lead time (Greene, 2000). Generally, when companies change from producing in bulk to mass customization, the quotation lead time remains the central control modal creating balance in shift of the activities. Moreover, online business has

increased the need for adequate lead time quotation strategies that meet the demand of potential clients that opt to use e-supply chain transactions or those who prefer making their orders over the internet while expecting unbeatable price quotation (Greene, 2000).

Controlling or management of the available forecasted capacity is a fundamental aspect of influencing fixed lead time in a supply chain. Demand smoothing can be obtained via production of enough inventories within specific standards (Jiao & Tseng, 2004).

Nevertheless, the use of fixed lead time in serving every client without emphasizing on the nature of their orders and the status of the system will help in attaining effective lead time quotation. Conversely, the use of lead time is associated with myriad challenges that compromises the efficiency of supply chain performance. However, where clients place bigger orders, there will a possibility of understating the lead time, hence resulting in lack of meeting the deadline and inconvenience of customers while low demand will result to overstating of lead time (Keskinocak, Ravi & Tayur ,2001).

2.3.2 Pre-Processing Lead Time

Keskinocak and Tayur (2004), define pre-processing lead time as an administrative or procurement lead time. This is the time it takes to process a requisition up to the time an LPO or contract is executed. Pre-processing lead time eases the relationships between the stakeholders and creates balance between placed order and payment services. It allows efficient processing of orders and settlement of their payment within the scheduled time frame and ensures that there is accuracy in order processing. It, therefore, implies that production can only commence upon arrival of materials (Poiger, 2010)

Keskinocak and Tayur (2004),further state that a major aspect of LPO lead time relies on a strategy to quote a shorter lead time and the actual realization of quotation lead time. Conversely, where there are multiple clients classifications of various capacities, the tradeoffs will encompass capacity allocation decision models. In this context, there is need to either allocate future capacity to a low-margin order or high-margin order. As such, many studies have alluded that companies that are outstanding in their performance do so due to reduced or minimum level of variance in production output and the forecasted output, efficient deliveries and effective production scheduling which reduce the lead time between these processes (Mapes et al., 2000)

2.3.3 Processing Lead Time

Munster and Vestin (2012) define processing lead time as the duration of time taken to complete an order e.g. assembling a motor vehicle. They further assert that when the processing lead time is known, it enables a company to react prompter to consumer demand and therefore avoid postponing of commencement of production. Therefore, the cases of overproduction can be sorted by use of lower share. Moreover, vendors ability to accommodate customers' huge demand depends on the price of the products and the lead-time for processing orders.

Planning and regulation of placing an order for the production is universally complex as a result of fluctuations in the production outcome. The primary categories here include the ability to hold safety inventory capacity and use of aided information to reduce process variability. The three areas, therefore, constitute Operations Management (OM) triangle, inventory managemnent and information management system among others.

Poiger (2010), holds that shorter lead time is efficient when a company or client customer, while work-in-process is relatively lower making the delivery process to be faster. From customers'

point of view, client purchase order or lead time is appropriate when it covers the necessary duration for for the client to make an order upto the time the products are delivered to the customers. Where client's lead-times are longer as compared to production flow time and delivery flow time, it makes (MTO) production realistic. Hence, production can only commence upon delivery of orders that will help in eliminating unpredicted demand.

2.3.4 Post Processing Lead Time

Woxenius (2006) defines post processing lead time as the time required to handle finished products for instance transportation and delivery to customers or end users. He further asserts that logistics or conveyance of goods is one of the fundamental aspects of transportation that must be considered before processing orders to clients. While evaluation of transportation constraints such as speed time, there is need to assess components of transportation time such as frequency of transportation and the possible available exit time between served stations. Further, the mode of transportation, factors affecting supply chain and logistics must assess factors such as capacity, transport and infrastructure that support supply chain performance.

Transportation process begins with timing as an integral determinant of transporting time. Generally, many cases resonate timing as a crucial speed that helps in avoidance of congestion, as well as time for shipments during transportation process (Woxenius, 2006).

The time interval relating to timing and punctuality is known as frequency (Woxenius, 2006). Usually, the larger the transport mode's capacity, the lower is the frequency. This might fluctuate from momentum departure times via the use of trucks or aircraft to weekly departure via sea vessels or trains.

Atallah (2005) states that there is a complete emergence of a system that facilitates supply chain management, hence aiding in reducing transport and delivery lead time. In areas where vendors fail to meet their efficiency in delivery process, Mfwaya (2013) noted that lead time management can be of great challenge to a company and this case expediting or rescheduling some of the processes becomes a necessary evil. In various business sectors in the form of business-business model, the process oriented approach creates an order to be a winner. In this context, the firm must design a stable and well mechanized transportation system to help in efficient delivery (Poiger, 2010).

2.4 Supply Chain Performance

A supply chain system depends on the industry on which an organization operates in.To ensure that there is efficient performance of supply chain within the motor industry, the respective motor companies should use qualitative and quantitative supply chain performance metrics or measures geared towards cost reduction, customer satisfaction, growth of sales reveunes and profit margins, reduction of defects during deliveries, inventory management, time management and working capital measures.

Cost reduction in an organization is an indicator of supply chain performance. The entities involved in the importation of vehicles or parts of vehicles for assemblies must ensure that the adopt a supply chain is a cost effective to provide affordable prices to their potential customers (Bolo & Wainana, 2011). Cost effectiveness also leads to increased profit margins.

Management of inventory is a crucial part of supply chain management. Effective and efficient inventory management is an indication of successful supply chain performance (Beamon, 1999).The motor industry must ensure that there are enough storage points and means of

transportation from the importation to the subassemblies and distribution areas (Bolo & Wainana, 2011). This ensures that the companies attract many customers and achieve customer satifaction and retention.

Measuring working capital in a supply chain determines the expenditure and revenues associated with the supply chain used in the business. When a company records a higher quartile of working capital, its supply chain performance is deemed efficient while companies with low working capital quartile of revenues have poorly performing supply chain (Beamon, 1999). Lastly, time is an imperative factor in business, particularly when the organization imports materials, assemble, transport and distribute to the clients. To measure supply chain performance, an organization should evaluate aspects of time such as cycle time, receive time, delivery time, promise time, transit time and lead time among others (Gunasekaran & McGaughey, 2004).

2.4.1 The Supply Chain Operations Reference (SCOR) Framework

The SCOR framework got its approval as the universal industry diagnostic tool. It was introduced by the Supply Chain Council as a key metric for supply chain performance measurement. This reference framework assists clients in handling, advancing, as well as communicating supply chain management practices to all stakeholders' in the great corporation (Poluha, 2007).

SCOR operates on specific principles that help in making it efficient with regard to its analytical processes. The framework's main functions revolve around manegerial functions such as planning, sourcing, making, delivering, returning and enabling activities. planning process involve development of equilibrium between demand and supply of goods to help in sorting out supply chain crisis. As a major concept of SCOR, sourcing of supplies, production process and

delivery of services requires a comprehsensive approach that transforms raw materials to finished goods ready for delivery to clients. Further, delivery process refers to a series of activities that complement the process of meeting the demand level of commodities in the market. To facilitate effective delivery process, an organizational supply chain and logistics management must corporate the role of return as related to receiving and dispatching products to potential customers (James, 2006).

This framework was relevant for this study as it highlights relationships between clients from recording of an order through invoicing process and other procurement processes such as make and delivery activities. To ensure that there is equal intermodal performance rate, there is need to account for the flow time required for the performance of activities or process involved in the supply chain. Flow time is essential in determining production flow that provides an estimate time or lead time for the entry of raw materials to the factory, as well as their conversion to finished products or inventories. In the study, this is the assembly time. Delivery flow time entails the time taken by as finished goods inventory, as well as time for consignment and transportation to the customer. In the study, this involves the transport lead time and local purchase order lead time. The model differentiates between these lead times. The theory was relevant to the study as it described the post processing lead time which involves the transport and delivery lead time and processing lead time for instance assembly lead time.

2.5 Summary of Literature Review

This study focused on the theory of constraints, queuing theory and the supply chain operations reference (SCOR) framework. The theories were relevant to the study as they explained more on the independent variables (fixed lead time, pre-processing lead time, processing lead time and post processing lead time) and the dependent variable (supply chain performance). Empirical literature review indicates that studies have been conducted on lead time and supply chain performance, as well as different mechanisms of handling lead time across various sectors globally, locally and regionally. This review however indicated missing studies in the motor industry.

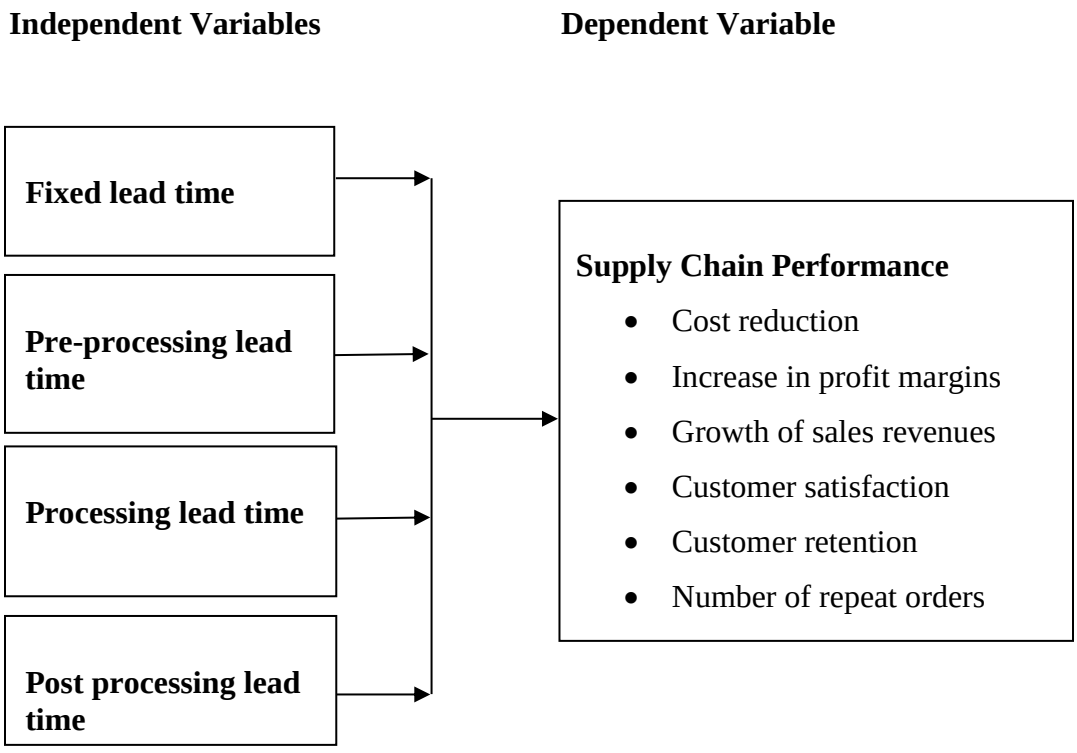
Most studies for instance, Rad (2008) focused on the manufacturing sector. In fact no study has focused on motor industry. Furthermore, the reviewed studies are across various contexts globally and regionally. A study by Mae and Ohno (2012) was conducted in Sweden to find out how variations in lead time influences purchasing, production and logistics performance thereby overall efficiency of inbound logistics process. This is a different context from the Kenyan context.

Other studies indicated both contextual and conceptual research gaps. Miskelly (2009) who focused on improving customer satisfaction with lean-six sigma was conducted in a different context. Bosire et al., (2011) looked at the impact of outsourcing on lead time and customer services among supermarkets in Nairobi and Mfwaya (2013) focuses on lead time management and customer satisfaction in the telecommunications industry in Kenya. The specific variables considered in those studies were different from the variables under this study. This leaves a gap in the knowledge which the current study sought to explore.

2.6 Conceptual Framework

A conceptual framework is an establishment of the interactions among the variables that help in informing the researcher or study to meet its objectives or goals. The use of independent and dependent variables is to establish generalization of phenomena. In this context, the dependent variable is supply chain performance; while the independent variables that apply to the elements of research requiring an explanation based on the research conclusion are fixed lead time, pre-processing lead time, processing lead time and post processing lead time.

Figure 2.1 Conceptual Model



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter offered information on the techniques and methods that were used to obtain the required data necessary in aiding the study. It comprised of the research design, population of study, data collection techniques and instruments, data collection procedure and data analysis.

3.2 Research Design

Descriptive research design was adopted in the study. Descriptive research design enhanced clear examination of the relationship between lead time and supply chain performance in the motor industry and also facilitated data collection process by answering questions concerning the study as per the research objectives or characteristics associated with the subject population.

3.3 Population of Study

The population of study comprised of all the registered motor companies in Nairobi who were members of Kenya Motor Industry Association (KMIA) by the year 2017. A census approach was used since it was the most approriate method for the study. The total number of motor companies who were members of KMIA located in Nairobi was 35 (See Appendix II).

3.4 Data Collection

Primary data was collected via administration of questionnaires to respondents working in the motor industry in Nairobi. The suitable respondents were operations managers, logistics managers, procurement officers or finance officers. The target was to collect data from 35 respondents that is one respondent per organization from each of the 35 motor companies (See

Appendix II). The questionnaires were divided into sections A to G. Section A was to gather data on demographic information of respondents, section B to E contained questions on the factors influencing lead time on the four categories of lead time and section F had questions on actual time used in the four forms of lead time and Section G(I &II) had questions on the actual data on supply chain performance on average in the motor industry recorded over the last 12 months and the extent to which levels of performance were achieved.

3.5 Data Analysis

The collected questionnaires were sorted and analyzed for completeness and accuracy. The questionnaires generated quantitative data, which was analyzed by use of descriptive statistics and inferential statistics. Descriptive statistics included measures of central tendency (mean), frequencies, percentages and measures of dispersion (standard deviation). On the other hand, inferential statistics included correlation analysis and multiple regression analysis. Demographic characteristics of the respondents were analyzed using frequencies and percentages. To identify the factors influencing lead time in the motor industry in Nairobi, the study used descriptive statistics. In establishing the relationship between lead time and supply chain performance in the motor industry in Nairobi, the study used correlation analysis and regression analysis. The outcomes of the study were further presented by the use of tables. The analysis of variance (ANOVA) was conducted to provide an overall model significance upon which the statistical generalization or deduction was made.

A multiple linear regression model was used to link the independent variables to the dependent variable as follows;

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

Whereby;

Y represented Supply chain performance

X_1 represented Fixed lead time

X_2 stood for Pre-processing lead time

X_3 stood for Processing lead time

X_4 represented Post processing lead time

β_0 was equivalent to the constant term while the coefficient of $\beta_i i$ represented numerical orders such as 1….4

β0 and βii of the model was to help the researcher in determining the sensitivity of the dependent variable (Y) as caused by the change in predictor variables X1, X2, and X3… further, an error constant (μ) addressed the variations resulting from unknown factors to the model.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter dealt with the data analysis and results of the data and discussions. The findings were presented based on the specific objectives of the study. A total number of 35 questionnaires were administered to operations managers, logistics managers, procurement officers and finance officers working in the motor industry in Nairobi. According to Table 4.1, 27 questionnaires were properly filled and returned. This constituted a response rate of 77.14%. According to Mugenda and Mugenda (2003), a response rate of 50% and above is adequate for a descriptive study hence the response rate of 77.14% was adequate for this study. The number of respondents is as shown in the Table 4.1.

Table 4.1: Response Rate

Unit	Returned Questionnaires	Unreturned Questionnaires	Total
Operations Managers	9		9
Logistics Managers	7		7
Procurement Officers	8		8
Finance Officers	3		3
Total	**27**	**8**	**35**

4.2 Demographic Information

This section involved data analysis on the demographic characteristics of the respondents. This included academic qualifications and work experience of the respondents.

4.2.1 Level of Education of the Respondents

Data on level of education of the respondents was collected and analyzed. The study intended to find out the level of academic qualification of the respondents. This was measured in two

categories those with college level of education and those with university level of education. College level of education included all the respondents with certificates and diplomas while university included bachelor's degree, masters and post graduate qualifications. The findings indicated that 15 (55.6%) respondents had university level of education while 12 (44.4%) respondents had college level of education. These findings implied that majority of the respondents were highly educated and were better placed to respondents to the questions in the questionnaires. The findings on level of education are as outlined in Table 4.2.1.

Table 4.2.1: Level of Education of the Respondents

	Level of Education	Frequency	Percentage
1.	University Education	15	55.6%
2.	College Education	12	44.4%
	Total	**27**	**100%**

4.2.2 Work Experience of the Respondents

The study was further interested in how long the respondents had been working in motor industry. The findings showed that 10 respondents had worked in the motor industry for between 2 and 5 years, 8 respondents had worked for 6-10 years, 5 respondents had worked for over 10 years while 4 respondents had worked for less than 1 year. This work experience indicates that the information given by the respondents was reliable enough to be used to make conclusions. The findings are as shown in Table 4.2.2.

Table 4.2.2: Work Experience of the Respondents in the Motor Industry

	Years	Frequency	Percentage
1.	Less than 1 year	4	14.8%
2.	2 to 5 years	10	37%
3.	6 to 10 years	8	29.6%
4.	Over 10 years	5	18.5%
	Total	**27**	**100%**

4.3 Factors Influencing Lead Time in the Motor Industry in Nairobi

The study sought to determine factors influencing the four categories of lead time in the motor industry in Nairobi. The respondents were asked to indicate the extent to which the outlined factors influenced the various categories of lead time in their respective motor companies.

4.3.1 Factors Influencing Fixed Lead Time in the Motor Industry in Nairobi

The study sought to determine factors influencing fixed lead time in the motor industry in Nairobi. In this regard respondents were asked to indicate the extent to which the outlined factors influenced fixed lead time. The responses were on a 5 point scale as follows; 1 to represent No Extent; 2 Little Extent; 3 Moderate Extent; 4 Great Extent and 5 Very Great Extent. Data was then analyzed using means and standard deviation. Mean was interpreted using the 5 point scale where 0-1.5 to indicate No Extent; 1.5-2.5 Little Extent; 2.5-3.5 Moderate Extent; 3.5-4.5 Great Extent and 4.5-5.0 Very Great Extent. Responses were as shown in the Table 4.3.1.

Table 4.3.1: Factors Influencing Fixed Lead Time

Factors influencing Fixed Lead Time	No Extent	Little Extent	Moderate Extent	Great Extent	V. Great Extent	Mean	Std Dev
Poor flow of information in quotation processes	1 (3.9%)	2 (6.2%)	2 (6.2%)	9 (32.0%)	13 (51.6%)	4.21	1.07
Poor order sorting	2 (7.0%)	1 (3.9%)	2 (7.0%)	8 (32.8%)	14 (49.2%)	4.13	1.16
Demand variability	1 (3.9%)	1(4.7%)	2 (5.5%)	12 (46.9%)	11(39.1%)	4.13	0.99
Lack of adherence to logistics standards	2 (7.0%)	1 (6.2%)	2 (7.0%)	12 (43.8%)	10 (35.9%)	3.95	1.15
Irregular reviews and audits of quotation processes	2 (4.7%)	2 (4.7%)	1(3.1%)	10 (42.2%)	12(45.3%)	4.19	1.03

The Table 4.3.1 shows that most of the respondents indicated that poor flow of information in quotation processes, poor order sorting, demand variability, lack of adherence to logistics standards and irregular review and audits of quotation processes with means of 4.21, 4.13, 4.13, 3.95 and 4.19 respectively influenced fixed lead time to a great extent since they all had a mean of between 3.5-4.5.

4.3.2 Factors Influencing Pre-Processing Lead Time in the Motor Industry in Nairobi

The study sought to determine factors influencing pre-processing lead time in the motor industry in Nairobi. In this regard respondents were asked to indicate the extent to which the outlined factors influenced pre-processing lead time. The responses were on a 5 point scale as follows; 1 to represent No Extent; 2 Little Extent; 3 Moderate Extent; 4 Great Extent and 5 Very Great Extent. Data was then analyzed using means and standard deviation. Mean was interpreted using the 5 point scale where 0-1.5 to indicate No Extent; 1.5-2.5 Little Extent; 2.5-3.5 Moderate Extent; 3.5-4.5 Great Extent and 4.5-5.0 Very Great Extent. Responses were as depicted in the Table 4.3.2.

Table 4.3.2: Factors Influencing Pre-Processing Lead Time

Factors influencing Pre-Processing Lead Time	No Extent	Little Extent	Moderate Extent	Great Extent	V. Great Extent	Mean	Std Dev
Uncoordinated order shipping	3 (10.9%)	4 (14.1%)	4 (15.6%)	10 (36.7%)	6 (22.7%)	3.51	1.29
Poor order listing procedures	2 (7.8%)	4 (15.6%)	4 (12.5%)	9 (34.4%)	8 (29.7%)	3.63	1.27
Challenges in order sorting	3 (12.5%)	4 (15.6%)	3 (9.4%)	6 (22.7%)	11 (39.8%)	3.62	1.45
Irregularities in order picking	3 (10.9%)	3 (12.5%)	4 (15.6%)	7 (26.6%)	10 (34.4%)	3.61	1.36

The Table 4.3.2 indicates that majority of the respondents indicated that uncoordinated order shipping, poor order listing procedures, challenges in order sorting and irregularities in order picking with means of 3.51, 3.63, 3.62 and 3.61 respectively, influenced pre-processing lead time to a great extent since they all had a mean of between 3.5-4.5.

4.3.3 Factors Influencing Processing Lead Time in the Motor Industry in Nairobi

The study sought to determine factors influencing processing lead time in the motor industry in Nairobi. The respondents were asked to indicate the extent to which the outlined factors influenced processing lead time. The responses were on a 5 point scale as follows; 1 to represent No Extent; 2 Little Extent; 3 Moderate Extent; 4 Great Extent and 5 Very Great Extent. Data was then analyzed using means and standard deviation. Mean was interpreted using the 5 point scale where 0-1.5 to indicate No Extent; 1.5-2.5 Little Extent; 2.5-3.5 Moderate Extent; 3.5-4.5 Great Extent and 4.5-5.0 Very Great Extent. Responses were as depicted in the Table 4.3.3.

Table 4.3.3: Factors Influencing Processing Lead Time

Factors influencing Processing Lead Time	No Extent	Little Extent	Moderate Extent	Great Extent	V. Great Extent	Mean	Std Dev
Loss of demand due to economic down turns	4 (14.1%)	4 (14.1%)	3 (9.4%)	8 (31.2%)	8 (31.2%)	3.52	1.42
Poor queue control measures	4 (15.6%)	6 (20.3%)	1 (4.7%)	8 (28.1%)	8 (31.2%)	3.39	1.49
Poor ware house planning	4 (15.6%)	3 (10.9%)	3 (9.4%)	9 (34.4%)	8 (29.7%)	3.52	1.42
Poor inventory management practices	3 (9.4%)	5 (17.2%)	4 (14.1%)	8 (31.2%)	7 (28.1%)	3.52	1.42
Equipment failures affecting operations	4 (17.2%)	3 (10.9%)	2 (6.2%)	8 (30.5%)	10(35.2%)	3.55	1.49

The Table 4.3.3 indicates that majority of the respondents indicated that loss of demand due to economic down turns, poor ware house planning, poor inventory management practices and equipment failures affecting operations with means of 3.52, 3.52, 3.52 and 3.55 respectively influenced processing lead time to a great extent since they had a mean of between 3.5-4.5. Majority of the respondents also indicated that poor queue control measures influenced lead time to a moderate extent with a mean of 3.39.

4.3.4 Factors Influencing Post Processing Lead Time in the Motor Industry in Nairobi

The study sought to determine factors influencing post processing lead time in the motor industry in Nairobi. In this regard respondents were asked to indicate the extent to which the outlined factors influenced post processing lead time. The responses were on a 5 point scale as follows; 1 to represent No Extent; 2 Little Extent; 3 Moderate Extent; 4 Great Extent and 5 Very Great Extent. Data was then analyzed using means and standard deviation. Mean was interpreted using the 5 point scale where 0-1.5 to indicate No Extent; 1.5-2.5 Little Extent; 2.5-3.5 Moderate Extent; 3.5-4.5 Great Extent and 4.5-5.0 Very Great Extent. Responses were as depicted in the Table 4.3.4.

Table 4.3.4: Factors Influencing Post Processing Lead Time

Factors influencing Post Processing Lead Time	No Extent	Little Extent	Moderate Extent	Great Extent	V. Great Extent	Mean	Std Dev
Poor logistics activities	3 (12.5%)	3 (10.9%)	3 (10.9%)	9 (32.0%)	9 (33.6%)	3.63	1.37
Inefficient scheduling of pickups	4(14.1%)	2 (7.8%)	3 (10.9%)	9 (32.8%)	9 (34.4%)	3.64	1.38
Delay or unavailability of either inbound or out bound transport to move supplies due to breakdown or weather problem	3 (9.4%)	2 (7.8%)	3 (9.4%)	9 (35.9%)	10(37.5%)	3.83	1.26
Order packing challenges	2 (7.8%)	3 (9.4%)	4 (15.6%)	9 (32.8%)	9 (34.4%)	3.75	1.23
Poor transportation networks	3 (12.5%)	4(15.6%)	3(10.9%)	7(25.8%)	10(35.2%)	3.55	1.42

The Table 4.3.4 indicates that majority of the respondents indicated that poor logistic activities, inefficient scheduling of pickups, delay or unavailability of either inbound or outbound transport to move supplies due breakdown or weather problem, order packing challenges and poor transportation networks with means of 3.63, 3.64, 3.83, 3.75 and 3.55 respectively influenced post processing lead time to a great extent since they all had a mean of between 3.5-4.5.

4.3.5 Supply Chain Performance

The study sought to determine the extent of achievement of supply chain performance in the motor companies in Nairobi. In this regard respondents were asked to indicate the extent to which the supply chain parameters were met at their respective motor companies. The responses were on a 5 point scale as follows; 1 to represent No Extent; 2 Little Extent; 3 Moderate Extent; 4 Great Extent and 5 Very Great Extent. Data was then analyzed using means and standard deviation. Mean was interpreted using the 5 point scale where 0-1.5 to indicate No Extent; 1.5-

2.5 Little Extent; 2.5-3.5 Moderate Extent; 3.5-4.5 Great Extent and 4.5-5.0 Very Great Extent. Responses were as depicted in the Table 4.3.5.

Table 4.3.5: Supply Chain Performance

Supply Chain Performance Indicators	No Extent	Little Extent	Moderate Extent	Great Extent	V. Great Extent	Mean	Std Dev
Customer satisfaction	1 (3.9%)	2 (6.2%)	2 (6.2%)	9 (32.0%)	13 (51.6%)	4.21	1.07
Customer retention	1 (3.9%)	2 (7.0%)	2 (7.0%)	8 (32.8%)	14 (49.2%)	4.13	1.16
Number of repeat orders	1(4.7%)	1(4.7%)	2(3.1%)	11(42.2%)	12(45.3%)	4.19	1.03

The Table 4.3.5 indicates that majority of the respondents indicated that customer satisfaction, customer retention and number of repeat orders with means of 4.21, 4.13 and 4.19 as supply chain performance parameters in the motor industry by a great extent since they had a mean of between 3.5-4.5.

4.4 Correlation Analysis Results

Correlation analysis was done to determine the strength and significance of the relationships between the variables as per the objectives of the study.

4.4.1 Relationship between Fixed Lead Time and Supply Chain Performance

The correlation was conducted to test the strength of the relationship between Fixed Lead Time and Supply Chain Performance. The findings indicate there existed a strong and significant relationship between Fixed Processing Lead Time and Supply Chain Performance ($r=0.388$, $p=0.000$).

Table 4.4.1: Correlation Results for Relationship between Fixed Lead Time and Supply Chain Performance

		Fixed Processing Lead Time	Supply Chain Performance
Fixed Processing Lead Time	Pearson Correlation	1	.388**
	Sig. (2-tailed)		.000
	N	27	27
Supply Chain Performance	Pearson Correlation	.388**	1
	Sig. (2-tailed)	.000	
	N	27	27

**. Correlation is significant at the 0.01 level (2-tailed).

4.4.2 Relationship between Pre Processing Lead Time and Supply Chain Performance

The correlation was conducted to test the strength of the relationship between Pre Processing Lead Time and Supply Chain Performance. The findings indicate there existed a strong and significant relationship between Pre Processing Lead Time and Supply Chain Performance (r=0.578, p=0.000).

Table 4.4.2: Correlation Results for Relationship between Pre-Processing Lead Time and Supply Chain Performance

		Pre Processing Lead Time	Supply Chain Performance
Pre Processing Lead Time	Pearson Correlation	1	. 578**
	Sig. (2-tailed)		.000
	N	27	27
Supply Chain Performance	Pearson Correlation	. 578**	1
	Sig. (2-tailed)	.000	
	N	27	27

**. Correlation is significant at the 0.01 level (2-tailed).

4.4.3 Relationship between Processing Lead Time and Supply Chain Performance

The correlation was conducted to test the strength of the relationship between Processing Lead Time and Supply Chain Performance. The findings indicate there existed a strong and significant relationship between Processing Lead Time and Supply Chain Performance (r=0.479, p=0.000).

Table 4.4.3: Correlation Results for Relationship between Processing Lead Time and Supply Chain Performance

		Processing Lead Time	Supply Chain Performance
Processing Lead Time	Pearson Correlation	1	. 479**
	Sig. (2-tailed)		.000
	N	27	27
Supply Chain Performance	Pearson Correlation	. 479**	1
	Sig. (2-tailed)	.000	
	N	27	27

**. Correlation is significant at the 0.01 level (2-tailed).

4.4.4 Relationship between Post Processing Lead Time and Supply Chain Performance

The correlation was conducted to test the strength of the relationship between Post Processing Lead Time and Supply Chain Performance. The findings indicate there existed a strong and significant relationship between Post Processing Lead Time and Supply Chain Performance (r=0.728, p=0.000).

Table 4.4.4: Correlation Results for Relationship between Post Processing Lead Time and Supply Chain Performance

		Post Processing Lead Time	Supply Chain Performance
Post Processing Lead Time	Pearson Correlation	1	.728**
	Sig. (2-tailed)		.000
	N	27	27
Supply Chain Performance	Pearson Correlation	.728**	1
	Sig. (2-tailed)	.000	
	N	27	27

**. Correlation is significant at the 0.01 level (2-tailed).

4.5 Regression Analysis Results

A multivariate regression model was conducted to test the joint relationship of all the independent variables and dependent variable. The result showed that jointly Post Processing Lead Time, Fixed Processing Lead Time, Pre Processing Lead Time and Processing Lead Time had a significant relationship with Supply Chain Performance (R=0.842). The results further revealed that Post Processing Lead Time, Fixed Lead Time, Pre Processing Lead Time and Processing Lead Time jointly accounted for 70.9% of the variation in Supply Chain Performance in motor industry in Nairobi. The model summary is as depicted in the Table 4.5.1.

Table 4.5.1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.842[a]	.709	.700	.52356

a. Predictors: (Constant), Post Processing Lead Time, Fixed Lead Time, Pre Processing Lead Time, Processing Lead Time

The results of ANOVA indicate that Post Processing Lead Time, Fixed Lead Time, Pre-Processing Lead Time and Processing Lead Time were significant predictor variables of Supply Chain Performance in the motor industry in Nairobi. This was indicated by the F-statistics results (F=74.942, p=0.000) indicating that the model used to link the independent variables and dependent variable was statistically significant.

Table 4.5.2: ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.2172	4	20.543	74.942	.000[b]
	Residual	3.3717	22	.274		
	Total	11.5889	26			

a. Dependent Variable: Supply Chain Performance

b. Predictors: (Constant), Post Processing Lead Time, Fixed Lead Time, Pre Processing Lead Time, Processing Lead Time

In the multivariate regression model, Fixed Lead Time (β_1 = 0.098, p=0.126) was found to have a positive but insignificant relationship with Supply Chain Performance this because the p-value was greater than 0.05. On the other hand, Pre-Processing Lead Time (β_2 = 0.404, p=0.000), Processing Lead Time (β_3= 0.25, p=0.001), and Post Processing lead Time (β_4= 0.325, p=0.000), were found to have a significant and positive relationship with Supply Chain Performance this because the p-value was less than 0.05.

Table 4.5.3: Multivariate Regression Coefficient Results

	B	Std. Error	Beta	t	Sig.
(Constant)	0.449	0.288		1.56	0.121
Fixed Processing Lead Time	0.098	0.064	0.082	1.542	0.126
Pre Processing Lead Time	0.404	0.082	0.361	4.924	0.000
Processing Lead Time	0.25	0.075	0.262	3.341	0.000
Post Processing Lead Time	0.325	0.081	0.285	4.013	0.000

a Dependent Variable: Supply Chain Performance

Optimal Model

Supply Chain Performance =0.449+ 0.098 **(Fixed Lead Time)** + 0.404 **(Pre Processing Lead Time)** + 0.25 **(Processing Lead Time)** + 0.325 **(Post Processing Lead Time)**

The findings in the model implied that a unit change in fixed lead time would cause a positive change of 0.098 units in supply chain performance. The findings also implied that a unit change in pre-processing lead time would case a positive variation of 0.0404 units in supply chain performance. Similarly, the findings implied that a unit change in processing lead time would cause a variation of 0.25 units in supply chain performance. Finally, the findings in the optimal model implied that a unit change in post processing lead time would result in 0.325 units variation in supply chain performance.

4.6 Discussions on the findings

The findings on factors influencing lead time in the motor industry in Nairobi concurred with Rad (2008) who established that when an organization identifies and eradicates waste in its supply chain, it can then concentrates on value adding activities and thus lead to cost reduction. Similarly, Nordas and Geloso (2006) concluded that proper logistics management is an essential ingredient in the reduction of lead time. Tarty (2012) further established that in the public health sector in Kenya, long lead times occur due to; equipment failures, poor warehouse management, in adherence to logistics standards, inferior transport networks. Other factors include poor sorting of orders sorting and poor planning in warehouses.

The findings on the relationship between lead time and supply chain performance in the motor in Nairobi, concurred with Mae and Ohno (2012) who indicated that variations in lead time

influences purchasing, production and logistics performance and thereby overall efficiency of inbound logistics processes in manufacturing companies.

The study findings also concurred with Mfwaya (2013) who conducted a study to analyze the good lead time management of telecommunications companies in Kenya. The study findings indicated that the companies with good lead time management impacted positively on customer satisfaction.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter contained a summary of the findings, recommendations, conclusion and areas for further studies that the study identified. The summary of the findings was done in line with the study objectives.

5.2 Summary of Findings

The objectives of the study were; to determine the factors influencing lead time in the motor industry in Nairobi and to establish the relationship between lead time and supply chain performance in the motor industry in Nairobi.

5.2.1 Factors Influencing Lead Time in the Motor Industry in Nairobi

The first objective of the study sought to determine the factors influencing the four forms of lead time (fixed lead time, pre-processing lead time, processing lead time and post processing lead time) in the motor industry in Nairobi. The findings were as follows;

On factors influencing fixed lead time in the motor industry in Nairobi, it was noted that poor flow of information in quotation processes, poor order sorting, demand variability, lack of adherence to logistics standards and irregular review and audits of quotation processes influenced fixed lead time in the motor industry in Nairobi.

On factors influencing pre-processing lead time in the motor industry in Nairobi, it was established that uncoordinated order shipping, poor order listing procedures, challenges in order

sorting and irregularities in order picking influenced pre-processing lead time in the motor industry in Nairobi.

The study further determined that loss of demand due to economic down turns, poor ware house planning, poor inventory management practices and equipment failures affecting operations influenced processing lead time in the motor industry in Nairobi.

The study finally established that poor logistic activities, inefficient scheduling of pickups, delay or unavailability of either inbound or outbound transport to move supplies due breakdown or weather problem, order packing challenges and poor transportation networks influenced post processing lead time in the motor industry in Nairobi.

5.2.2 Relationship between Lead Time and Supply Chain Performance in the Motor Industry in Nairobi

The second objective of the study sought to establish the relationship between lead time (fixed lead time, processing lead time, pre-processing lead time and post processing lead time) and supply chain performance in the motor industry in Nairobi. The findings of the study were as follows;

On the relationship between fixed lead time and supply chain performance in the motor industry in Nairobi, the findings indicated that fixed lead time had a positive but insignificant relationship with supply chain performance.

On the relationship between pre-processing lead time and supply chain performance in the motor industry in Nairobi, the findings indicated that pre-processing lead time had a significant and positive relationship with supply chain performance.

On the relationship between processing lead time and supply chain performance in the motor industry in Nairobi, the findings indicated that processing lead time had a significant and positive relationship with supply chain performance.

On the relationship between post processing lead time and supply chain performance in motor industry in Nairobi, the findings indicated that post processing lead time had a significant and positive relationship with supply chain performance.

5.3 Conclusion

The study established that supply chain performance parameters in the motor industry include; cost reduction, increase in profit margin, growth of sales revenues, increase in number of customers served, customer satisfaction, customer retention, and number of repeat orders. The study findings indicated a significant relationship between lead time and supply chain performance in the motor industry. The study findings established that lead time management is a vital aspect in the achievement of supply chain performance and eliminating delays invariably improves throughput and customer service in the motor industry.

5.4 Recommendations

Based on the findings the following recommendations were made; the motor companies in Nairobi should promise a constant lead time to all customers, regardless of the characteristics of the order and the current status of the system.

The motor industry players should strive to ensure good lead time management and good customer satisfaction within the motor industry. This will ensure that the organization environment is conducive for economic growth resulting to higher returns on investment.

It would be beneficial for the companies in the motor industry to develop a process to define the most appropriate reaction time and logistics setup, according to specifications of product category. This work could be done within a cross-functional team that could develop optimal solutions and probably inspire other employees to commit.

5.5 Limitations of the Study

One of the challenges that faced the study was that some respondents failed to fill the questionnaires as they were busy serving their clients in the motor industry. However, in such cases, the researcher left the questionnaires for them to fill at their free time. The questionnaires were then collected later. Some of the respondents also felt as if they were being investigated and hence were hesitant to fill the questionnaires. The researcher however worked at winning their confidence by ensuring participants confidentiality.

The study was also limited in scope as it only covered motor companies operating in Nairobi other than conducting a census on all the motor companies in Kenya because of time and financial constraints.

5.6 Areas for Further Research

This study was conducted in Nairobi, and due to differences in business environment in various parts of Kenya, generalizing the findings of this study is not possible. Therefore, the study suggests similar studies to be done in other counties in Kenya. A study can also be conducted to establish whether similar findings can be established in a different context other than the motor industry. A study can also be done on lead time and customer satisfaction in the motor industry in Kenya.

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Appendix I: Questionnaire

I am a postgraduate student at University of Nairobi, School of Business. I am conducting a research on ***Lead Time and Supply Chain Performance in the Motor Industry in Nairobi***.

This is an academic exercise and all information collected from respondents will be treated with strict confidentiality.

This questionnaire is divided into seven short sections that should take only a few moments of your time to complete. Please respond by ticking the appropriate box or filling in your answers in the blank spaces provided.

Questionnaire Summary

Section	**Description**	**Objectives**
Section A	Demographic Characteristics of Respondents	To obtain data on the educational levels, work experience and designations of the respondents in the motor industry.
Section B	Fixed Processing Lead Time	To gather data on factors influencing fixed lead time such as demand variability, order sorting challenges, adherence to logistics standards, poor flow of quotation information
Section C	Pre-Processing Lead Time	To collect data on factors influencing pre-processing lead time such as coordination of order shipping, order listing, order sorting and order picking procedures.
Section D	Processing Lead Time	To obtain data on factors influencing processing such as, poor warehouse planning, poor inventory management practices and equipment failures.
Section E	Post Processing Lead Time	To collect data on factors influencing post processing lead time such as poor logistic activities, poor scheduling of pickups, unavailability of transport and poor order packing.
Section F	Lead time in actual time/number of days	To get data on actual time taken to accomplish the four categories of lead time in the motor industry.
Section G (I & II)	Supply Chain Performance	To acquire the actual data on supply chain performance on average in the motor industry recorded over the last 12 months and the extent to which levels of performance are achieved.

Section A: Demographic Information

1. What is your level of education? Please tick (√) where appropriate

College…… ☐

University…… ☐

Others (specify)……

2. How long have you been in Motor Industry? Please tick (√) where appropriate

1 year or less……. ☐

2 to 5 years……. ☐

6 to 10 years……... ☐

Over 10 years…….. ☐

3. Position held: Please tick (√) where appropriate

Operations Manager…… ☐

Logistics Manager……... ☐

Procurement Officer…… ☐

Finance Officer……. ☐

Others (specify)…….

Section B: Fixed Lead Time

Please indicate the extent to which the following factors affect fixed lead time in your organization.

Use the following scale:

1= No extent; 2 =Little extent; 3=Moderate extent; 4=Great extent; 5 =Very great extent

Factors influencing fixed lead time (time it takes to process or respond to request for quotations from customers)	**No extent**	**Little extent**	**Moderate extent**	**Great extent**	**Very great extent**
	1	**2**	**3**	**4**	**5**
Poor flow of information in quotation processes					
Poor order sorting					
Demand variability					
Lack of adherence to logistics standards					
Irregular reviews and audits of quotation processes					

Others (specify and rate accordingly)……...

Section C: Pre-Processing Lead Time

Please indicate the extent to which the following factors affect pre-processing lead time in your organization.

Use the following scale:

1= No extent; 2 =Little extent; 3=Moderate extent; 4=Great extent; 5 =Very great extent

Factors influencing pre-processing lead time (time it takes to process a requisition to the time an LPO is executed)	**No extent**	**Little extent**	**Moderate extent**	**Great extent**	**Very great extent**
	1	**2**	**3**	**4**	**5**
Uncoordinated order shipping					
Poor order listing procedures					
Challenges in order sorting					
Irregularities in order picking					

Others (specify and rate accordingly)……...

Section D: Processing Lead Time

Please indicate the extent to which the following factors affect processing lead time in your organization.

Use the following scale:

1= No extent; 2 =Little extent; 3=Moderate extent; 4=Great extent; 5 =Very great extent

Factors influencing processing lead time (time it takes to complete an order e.g. assembling a motor vehicle)	**No extent**	**Little extent**	**Moderate extent**	**Great extent**	**Very great extent**
	1	**2**	**3**	**4**	**5**
Loss of demand due to economic down turns					
Poor queue control measures					
Poor ware house planning					
Poor inventory management practices					
Equipment failures affecting operations					

Others (specify and rate accordingly)……..

Section E: Post Processing Lead Time

Please indicate the extent to which the following factors affect post processing lead time in your organization.

Use the following scale:

1= No extent; 2 =Little extent; 3=Moderate extent; 4=Great extent; 5 =Very great extent

Factors influencing post processing lead time (time it takes to handle finished products for instance transportation and delivery to customers/end users)	**No extent**	**Little extent**	**Moderate extent**	**Great extent**	**Very great extent**
	1	**2**	**3**	**4**	**5**
Poor logistics activities					
Inefficient scheduling of pickups					
Delay or unavailability of either inbound or out bound transport to move supplies due to breakdown or weather problem					
Order packing challenges					
Poor transportation networks					

Others (specify and rate accordingly).……

Section F: Lead time in actual number of days or time taken to accomplish a task

Please state the actual number of days or the time it takes to execute the four lead time categories in your organization.

Lead Time Category	**Actual number of days or time it takes to accomplish**
Fixed Lead Time (Time it takes to process or respond to request for quotations from customers)	
Pre-Processing Lead Time (Time it takes to process a requisition to the time an LPO is executed)	
Processing Lead Time (Time it takes to complete an order e.g. assembling a motor vehicle)	
Post processing Lead Time (Time it takes to handle finished products for instance transportation and delivery to customers/end users)	

Section G: (I) Supply Chain Performance Actual Data

Please state the actual supply chain performance data on average recorded at your organization over the last 12 months

Supply Chain Performance Indicators	**Actual data recorded**	**Percentage (%)**
Cost reduction		
Increase in profit margin		
Growth of sales revenues		
Increase in no of customers served		

Others (specify)……

Section G: (II) Supply Chain Performance

Please indicate the extent to which your organization has achieved supply chain performance for each of the following performance parameters.

Use the following scale:

1= No extent; 2 =Little extent; 3=Moderate extent; 4=Great extent; 5 =Very great extent

Supply Chain Performance Indicators	**No extent**	**Little extent**	**Moderate extent**	**Great extent**	**Very great extent**
	1	**2**	**3**	**4**	**5**
Customer satisfaction					
Customer retention					
Number of repeat orders					

Others (specify and rate accordingly)……..

Thank you very much for your cooperation

Appendix II: Registered Motor Companies In Nairobi

	Company	Physical Location
1.	Alios Finance Kenya Limited	7th Floor, Timau Plaza, Arwings Kodhek Road
2.	Amity Equipment Ltd Garage	Industrial Area, Nairobi, Kenya
3.	Auto-Sueco Kenya Ltd	Apex Business Park, Off Mombasa Road
4.	AutoXpress	AutoXpress Building, Limuru Rd, Nairobi
5.	Bavaria Auto	Mombasa Road, Nairobi
6.	Car & General (K) Ltd	Cargen Hse - Uhuru Highway
7.	CMC Motors Group Ltd	Lusaka Road, Industrial Area
8.	DT Dobie & Co (Kenya) Ltd	Lusaka Road, Industrial Area
9.	Foton East Africa Ltd	Shimo la Tewa Road, Nairobi
10.	General Motors East Africa	Enterprise/ Mombasa Road
11.	Hyundai (E.A) Holdings	Mombasa Road
12.	Kenya Coach Industries	Enterprise/ Mombasa Road
13.	Grange Vehicle Industries (K) Ltd	Kitui Road, off Kampala Rd.
14.	KIA Motors	Koinange Street
15.	Kingsway Tyres Limited	Kingsway House, University Way
16.	Marshalls (EA) Ltd	Koinange Street
17.	Oriel Ltd / ECTA Group	Mombasa Road
18.	Porsche Centre Nairobi Limited	Sameer Industrial Park, Mombasa Road
19.	RMA Motors Kenya	Autolitho Ltd, Enterprise Road
20.	RT (East Africa) Limited	Rangwe Road, off Lunga Lunga Road
21.	Ryce Motors	Koinange street & Kampala Rd

22. Sairaj Limited	Baba Dogo Road, Ruaraka
23. Sameer Africa	Mombasa Road, Nairobi
24. Silverstone Tyres (K) Ltd	Road A, Off Enterprise Road
25. Simba Corporation Ltd	Mombasa Road
26. Stantech Motors Limited	Shimo la Tewa Road, off Mombasa Road
27. Stenorette Radio Services	Koinange Street
28. Subaru Kenya / ECTA Group	Mombasa Road/Addis Ababa Road
29. TATA Africa Holdings	Mombasa Road, Nairobi
30. TOTAL Group	Regal Plaza, Limuru Road
31. Toyota East Africa Limited	Uhuru Highway
32. Trans Africa Motors	Kampala Road, Nairobi
33. Transport and Lifting Services Ltd	TNL Centre, Bandari Road 04, off Dunga Road
34. Xylon Motors	ICD Road, Off Mombasa Road
35. Zonda E.A. Ltd	Kimathi Street Nairobi, Nairobi, Kenya

(Kenya Motor Industry Association, 2017)