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

BY

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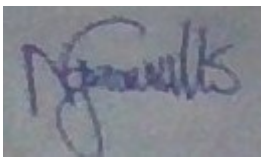
DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any institution or university other than the University of Nairobi for examination.



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DEDICATION

This research paper is devoted to my lovely wife and kids. I thank them for the care and motivation they rendered to me throughout this MBA course, for this guided me to achieve my level best. I thank God for many blessings.

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ABBREVIATIONS AND ACCRONYMS

CI	Continuous Improvement
JIT	Just in Time
KAM	Kenya Association of Manufacturers
LM	Lean Manufacturing
LMP	Lean Manufacturing Practices
LSMF	Large Scale Manufacturing Firms
OMP	Operations Management Practice
RBV	Resource Based View Theory
SME	Small and Medium Sized Enterprises
TOC	Theory of Constraints
TQM	Total Quality Management

ABSTRACT

Lean manufacturing practices (LMP) facilitates the firms' ability to increase the level of productivity in a firm and cut on wastes in the production process. Minimal cost of operation, smaller lead times, and higher quality product are all advantages of lean manufacturing. This study was set to examine extent of LMP application on LSMF in Nairobi, for purpose of ascertainitseffect on LMP and operational performance of LSMF; to examine the shortcoming of LSMFimplimentation. The rsearch was guided by the following study objectives; to examine the extent of LMP application in Nairobi LSMF for purposes of ascertain its effect on LMP, LSMF operational performance and to establish the challenges faced in the implementation of LSMF. In the conceptual framework, the independent variables were LMP which include: JIT, Kaizen TQM, Five S's and Poka-Yoke while the dependent variable was Operational Performance measured by cost, time and quality. The study adopted a descriptive research design and data collection was done using questionnaires from respondents which was adopted in the research methodology. The primary tool for collecting data was a questionnaire, which was administered by the researchers dropped and picked the questionnaire later. Data analysis adopted methos for the research were descriptive statistics, regression and correlation analysis. The study findings indicate that on a moderate extent, LMP have been implemented by LSMF's in Nairobi County. These findings show that a positive relationship exists between the LMP and operational performance. In the model summary, fifty four percent of quality and fifty five percent of both cost and timeliness as measures of operational performance were affected by implementation of LMP. Inadequate resources, high capital need poor organizational culture among other challenges. Further studies need to focus on the solutions to the challenges facing the implementation of LMP. The researchers therefore recommend trainings on LMP and their roles, government support in resource mobilization, collaborations with relevant stakeholders among others. The study was limited to LMF's in Nairobi County; therefore, the results might not be conclusive for other sectors other than the LMF's. More research can be undertaken on the variables outside the study. In second objective this study ascertained that fifty four percent of quality, fifty nine percent of both cost and timeliness is affected by implementation of LMP. To achieve the best out of any practice in an organization, there is need for full or almost 100% implementation of that particular practice. This study ascertained that LMP implimentation was moderate within Nairobi LSMF. To achieve full or almost full implementation, there is need for more training of the LSMF's staff in Nairobi on LMP and the role it plays in improving their performance. There is need for employee involvement, top management commitment, favorable culture in the implementation of LMP. Besides the management needs to avail adequate resources that will help facilitate implementation of LMP to achieve better levels of performance. Policies need to be put in place to help implement LMP to the fullest in the firm. Besides, there is need for the LSMF to ascertain the other LMP that can be adopted to enhance better levels of operational performance. Other variables need to be included in the future research since they were not included within this research.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

High competition experienced within market have caused companies to realize the fact that traditional practices like mass production have to be integrated with modern practices to remain competitive (Mohamed, 2012). Manufacturing firms are faced with challenges that range from waste management to achieving the set operational performance standards. Manufacturing firm's performance is highly affected by the manufacturing practices adopted. To achieve high performance through provision of quality goods, wastes in the production process have to be eliminated (Openda, 2013). Implementation of lean manufacturing practices helps in cutting down costs, proper space utilization, quality production of goods and services and high flexibility in production (Liker, 2014).

Lean manufacturing entails being responsive to change through elimination of wastes and focusing on quality during production process. Implementation of Lean Manufacturing Practices has a key impact on attaining improved performance since it helps manufacturing firms manage their internal operations (Schiraldi, 2013). Operational performance is a measure that is established by evaluating the level of effectiveness and efficiency through use of a set standard for success (Flynn, 2010). Manufacturing companies engage in such a saturated environment with a wide variety of products and sub-brands dominating the lowest and top tiers of the pricing spectrum. Kenya, with its diversified population, variety of natural assets, and highly valuable and accessible resource elements, offers a potential to enhance the profit potential of the products to shareholders and equity partners (KAM, 2020).

The theory of constraints (TOC) proposed by Eliyahu (2000), as well as the resource-based view (RBV) proposed by Barney in 1999, elucidates the framework for detecting the most substantial bottleneck (i.e., constraint) that exists in the way of progress and then sequentially enhancing that restriction until it is no longer the constraint.

1.1.1 Lean Manufacturing Practices

Lean production is the approach grounded on the principle of increasing productivity while aiming at waste reduction in production lines. Lean concept defines Watseas anything that don't have value which clients are prepared and eager to buy. operational costs, shorter lead times, and higher product quality are all advantages of lean manufacturing.

Sustainable production is the procedure of simplifying processes and techniques in order to reduce waste and increase efficiency. Womack and Jones (1996) characterize lean as a strategy of doing more with less - physical interaction, machinery, duration, and facility - while edging closer to offering customers exactly what they want. Previously referred as the Toyota Production System (TPS), and it was created with the goal of reducing waste and increasing production (Openda, 2013). Process Improvement Procedures are a set of practices meant to produce high production volumes by using the correct measurement of inputs (Lewis,2000). Lean Manufacturing Practices, according to Chase (2006), result in high performance in world-class manufacturing. Just-in-time (JIT), Total Quality Management (TQM), Kaizen, 5S, and Poka-Yoke are some of the lean manufacturing practices that can be used in Lean Manufacturing Practices.

1.1.2 Operational Performance

Operational performance measures of a firm through use of evaluations on aspects of how timely goods and services are offered, levels of productivity, how flexible the firm is and the levels of leanness (Schoenherr*et al.*, 2012). Operational performance refers to a metric showing how a company generates income by utilizing its resources effectively, such as assets of the company. The structured approach of characterizing notions and action in businesses is known as performance evaluation (Neely, 1997). Performance appraisal makes it easier for supply chain partners to work together. Short-term objectives, such as facilitating productivity, reducing wastes, reducing inventory costs, and reducing latency, and lengthy aims, such as strategic partnerships and increasing market share, constitute the foundation of performance measurement in a corporation (LI, 2006; Lyons 2004).

Operational performance in manufacturing firms is measured in a number of ways: Use of costs where a firm measures the manufacturing costs incurred from ordering of raw materials, production, storage and the transportation of goods to their desired customers. The other measure of operational performance is use of time (Elliot, 2015). Timeliness in delivery of goods to the final customers, order cycle time, lead time and time between production runs. For a firm to achieve customer satisfaction there is need for timeliness in delivery of goods since the shorter the cycle time the more favorable it is to the customers. Quality is also a measure of operational

performance that is gauged from the number of product returns, warranties, defects, customer complaints among others. To achieve the required levels of performance, a firm needs to ensure that the right quality products are produced as per the customer specifications. Flexibility is defined as a company's ability to respond to changing consumer demands and change product specifications to satisfy those demands (Schoenher, 2012).

The capability and efficacy of management in resource distribution and growth are measured by service quality (Chan, 2005). Cost, quality, flexibility, timeliness, and speed are all examples of operational management performance measures. The following are the precise key parameters that will be employed in this study: Costs, punctuality, and quality are all factors to consider.

1.1.3 Large Scale Manufacturing Firms

Large scale Manufucturing firms are attributed to have large production of goods that supplies bigger market, mechanisactionand division of labour. The industrial revolution laid the basis for all factories. Currently factories usemachincery vastly and have embraced recent practices within its labour practices to enhance large scale production. Large scale manufacturing companies in kenya have seen a stagnation of 10 percent of GDP (Gross Domestic product) as a result of numerous reasons. This is in accordance to a report by the KAM (Kenya Association of Manufucturers). Though there hav been transformation within the sector as a result of Big 4 Agenda, the sector aims to increase manufacturing input so that its contribution by the year 2022 contribute 15% to the GDP.

The Kenyan Big 4 Agenda aims at 4^{th} industrial revolution which is perceives at a greater future for manufucturers driven by automations within both traditional and lean manufacturing practices. According to a report issues out in the year 2020 by competitive industrial performance, kenya was ranked being in position one hundred and fiftenn out of one hundred and fifity two which shows its bility to produce manufactured goods and exports within the competitive markets.

In over two thousand manufacturing companies in kenya around one thousans companies operate wuthih Nairobi county. They are given the obligation to ensure the are globally competitive and innovative for purpose of adopting to the current practices.

According to Okumu (2018), industrial production is a key segment in Kenya since it creates jobs, contributes significantly to the economy's GDP, and provides considerably to the state's economic progress. It has the capacity to diversify the country's economy and produce foreign exchange revenues through exports. In the year 2016, Kenyan economy Kenya's economy increased by 6.25 percent in accordance to the Economic Survey 2019, with remarkable development in the agriculture, manufacturing, and transportation sectors. This was an improvement over the 4.7 percent growth rate in 2017, which was the lowest in five years. In 2018, the manufacturing sector grew by 4.2 percent, a significant improvement from the 0.5 percent rise in 2017. However, because of the COVID-19 pandemic in 2020, manufacturing growth has slowed to 0.5 percent (KAM, 2020). In our revitalized effort to develop the manufacturing sector, the need to promote the competitiveness of local industries should be highlighted, (KAM, 2020).

1.2 Research Problem

Over the years, challenges like high competition from the international brands and suppliers from international markets, which are now operational in Kenya, China as an example. This has led to inadequate market for the locally produced products, high costs of production attributed to by high cost of energy, expensive raw materials and use of obsolete technology (Klassen,2013). High competition in the market coupled with entry of international brands has resulted to firms rethinking of their strategies. Hence there is need for implementation of Lean Manufacturing Practices by Large Scale Manufacturing Firms in Kenya to attain improved levels of performance (Lwiki, 2013).

Lean manufacturing practices are keys to attaining the required levels of firm performance. They give firms competitiveness in the market by being able to help firms deliver products on time, over variety of products as per the customer needs, offer quality goods and efficiently (Schroeder, 2004).Agile production strategies can provide improvements in the performance of

manufacturing organizations. Sajanand Saini (2020) investigated the effect of lean manufacturing approaches on long-term viability within Indian SMEs. However, focus for this study was on the effect of Lean manufacturing procedures on long-term sustainability rather than operational performance. Apart from that, the study environment was small and medium-sized firms in India, which differs from the Kenyan context in Large Scale Manufacturing Firms.

Locally, Wainaina (2014) investigated Unga group ltd's Lean industrial methods and strategic positioning. The findings revealed that the Unga group ltd had integrated Lean production to a great level in their processes, and that there was also a positive association between Lean manufacturing application apporaches and operating performance. This was however a case study and the results would not be applicable to other study contexts. Odwaro (2018) researched on management operating approaches and organizational performance of steel manufacturing in Kenyan companies. The results indicated that implementation of OMP led to improved organizational performance. Besides challenges, there was lack of inadequate resources and skills, absence of commitment by the management were among the challenges faced in implementation. This research however was based on operations management practices as a whole yet the current study has narrowed down to one type of operations manufacturing practices which is Lean manufacturing practices.

From the studies above it is evident that there is a gap in knowledge in that, to the best knowledge of the researchers, very few studies have been done on the LMP and performance of production entities in Nairobi. This research hence aim at answering the following study questions: what extent are the lean manufacturing practices implemented by Large Scale Manufacturing companies in Nairobi County? What is the effect of lean manufacturing practices on the operating performance of Large Scale Manufacturing companies in Nairobi County? What are the restrainrs in application of lean manufacturing practices in Large Scale Manufacturing companies Nairobi County?

1.3 Objectives

i. To determine the extent which the lean manufacturing practices implemented by Large Scale Manufacturing companies in Nairobi County, Kenya?
ii. Establish the effect of lean manufacturing practices on the operating performance of Large Scale Manufacturing companies in Nairobi County, Kenya?
iii. To investigate on the challenges encountered in the application of lean manufacturing practices on operational performance in large scale manufacturing companies in Nairobi County, Kenya.

1.4 Study Significance

Large scale manufacturing entities will gain from the findings of this research by getting to acknowledge the contributions of Lean Management practices to operational performance to attain competitiveness. They will understand the benefits of implementing Lean Management practices to attain improved operational performance. Heavy industrial production lines will be able to establish and understand the challenges they are likely to experience while implementing Lean Management practices and come up with amicable solutions. The results can also be replicated by other Kenyan organizations which may not necessarily be Large Scale Manufacturing Firms in nature.

The Kenyan government and other stakeholders will benefit from this study in terms of creating and changing policies to enhance the expansion and sustainability of Large-Scale Manufacturing companies in Kenya. The study findings will be used by the government to develop policies to manage Large Scale Manufacturing Firms as well as policies to support the development of Lean Manufacturing methods in other industries.

The study aims at supplementing to the existing literature on Lean Manufacturing practices and operating performance of Large-Scale Manufacturing Firms, according to other scholars and intellectuals. Future research on Lean Manufacturing methods and operational performance will be grounded on the research findings. The research will contribute to existing hypothesis by confirming or refuting it through research findings.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The study's literature, theorieslinked with Modern Production technologies and a literature evaluation on Lean Manufacturing practices are all included in this chapter. This chapter also contained impact of Lean Manufacturing practices on operating performance, conceptual framework and literature review summary.

2.2 Theoretical Review

Resource Based View Theory and Transactional Cost Economics Theory has been used to better understand this investigation. The Resource Based View Theory is the most applicable theory, as it is based on the concept that adopting Lean Manufacturing methods aids the firm's ability to reduce lead time in purchasing goods while maintaining quality. This helps to cut down on unneeded costs and reliance on the outside world.

2.2.1 Resource Based View Theory (RBVT)

Barney postulated RBVT for the first time in 1991. It asserts that an enterprise's long-term competitiveness is the result of the firm's outstanding resource base (Lynch, Keller &Ozment, 2000). The RBV emphasizes that an organization's performance is influenced not only by its outer world, but also by internal factors (Barney, 1991; Thompson, 2001). Enhanced results, according to Barney (1991), are measured by the usage of high-value, hard-to-find resources that are difficult to replicate and cannot be easily substituted.

As for this approach, the volume of revenue growth in a corporation is governed by asset infrastructure, which are attained by ensuring that the resources are limited, making finding alternatives difficult. As a result, a firm's success is influenced by its own resources and competencies, resulting in an uneven allocation of resources across the setting (Warnier, Weppe, &Lecocq, 2013). A valuable resource allows a company to take advantage of current opportunities in the environment while minimizing hazards from both the extrinsic and institutional environment (Barney, 1991). Unique resources and competencies are required for a company to achieve long-term competitive advantage (Lynch, 2000).

This theory is essential because it explains how companies implement lean manufacturing strategies to overcome resource acquisition dependencies and increase organizational performance. Most firms are not self-sufficient, necessitating tactics such as LMP adoption to enable good performance for purposes of meeting market request and hence client satisfaction by carrying out activities in a cost-effective manner.

2.2.2TransactionCost Economics Theory

Production economics determine transactions, according to transaction cost economics theory (TCET). Firms, according to this idea, are economic entities that use the most efficient transaction mechanism (Williamson, 1981). This theory provides a framework for analyzing the differences between outsourcing and internal services (Lacity&Hirschheim, 1995). This notion makes determining outsourcing success in terms of financial advantages much easier. TCET provides significant decision-making basis to assist businesses in deciding what to outsource and making the necessary preparations. The scale of transaction cost is determined by the frequency of contracting, as well as environmental and relational uncertainties, which offers a foundation for the evaluation of outsourcing decision-making.

TCET helps in making decisions on the cost implications on decisions on whether to implement Lean Manufacturing Practice or not. When firms make decisions on whether to carry out operations in - house or use an external service provider, they have to evaluate the cost implications involved.

2.3 Lean Manufacturing Practices and Performance

Lean production is a concept or a strategy that is based on a collection of techniques that are used to reduce waste and improve the efficiency of the business (Womack and Roos 1990). The Toyota production system inspired lean production, which has been implemented by many large corporations globally inorder to stay at a competitive edge within the global market (Perez &S anche., 2000). The Lean Manufacturing Practice includes:

Just In Time (JIT) refers to the manufacturing of the appropriate things, in the right amount and quality, at the right time, in the specific location (Paneru, 2011). This is predicated on the idea

that inventories are worthless and should be discarded. As a result, units should only be available when needed. In a manufacturing firm, spare parts and packaging materials can represent use of JIT where they are ordered only when needed. The use of JIT in a company helps to reduce wastes such as work-in-process inventories and unnecessarily long flow times during manufacturing (waiting).By elimination of these wastes the overall costs of production are minimalized since JIT specifically cuts on inventory costs (Hosseini&Nasab, 2012). The Resource Base View Theory (RBVT) by Barney in 1991 is important to Just in Time as it explains ways that firms adopt lean manufacturing practices that enables them to overcome dependencies in terms of resource acquisition and enhance efficiency. Because most firms are not self-sustained, methods for instance the adoption of Lean Manufacturing Practices are required to facilitate good performance in order to fulfill market demand and, as a result, customer satisfaction by carrying out activities in a cost-effective manner to avoid delays.

Kaizen is a lean manufacturing tool that helps in continuous improvement of quality, reduction in costs related to design, production and ensures that the firm achieves better operational performance (Bhyiyan&Baghel, 2000).It is viewed as a culture of sustained improvement in the production processes which helps in waste elimination and long-term improved performance due to cutting on costs. Implementation of Kaizen requires involvement of all employees in the design and production process to achieve the best performance. Kaizen refers to gradual, ongoing improvements by all (Salem et al., 2006). Developing expectations and then consistently improving those norms is what Kaizen is all about. According to Parker (2012), Kaizen helps a company improve its performance by providing employees with the training, materials, and supervision they need to attain higher standards and sustain their capacity to fulfill those goals over time.

TQM is a quality management practice that, according to Sharma (2012), is an approach that enhances the quality of goods produced by a firm through continuous quality improvement of products and services of all processes, output without deficiencies, quality driven by the customer, and a focus on improvement. When TQM is used in an operations system, it aids in the elimination of waste and flaws.

5S whose origin is from the Toyota production system is also a major tool used in waste elimination which is explained based on the 5 S's. The first S stands for the word separate which entails elimination of everything that is seen as a hindrance to be in a position to complete the tasks and configure. The second S, Sort involves assessing the aspects of processing as well as all of the elements required for each stage's successful performance. Seaton-Sort is the process of pinpoitniing production stages and elements required to complete the stages chores, which are then grouped in an efficient way possible to prevent spending time on handling, organize and classify. The third S entails, Seiso- Sweep and shine- states that there should be cleanliness within the production and scraps and waste ought to be removed. The fourth S, Seiketsu- Standardize ascertains entails putting a system in place in order to identify abnormal conditions in an easy manner that there is need for standardized equipment processes and programs to enhance extreme efficiencies, conformity and consistency. The fifth S, Shitsuke- Sustain. The last phase entail daily cleanliness as customs and practices. Implementation of the 5S program helps in improving the discipline of the workers, reduction of time taken in production which in the long run helps in cost minimization.

Poka-yoke refers to mechanisms that once implemented reduces the rate at which errors occur in the firm by the fact that once implemented staff are in a position to avoid errors. The major aim of poka-yoke is elimination of defects through prevention, correction and drawing attention to errors that occur due to human negligence. As a result of Poka-belief yoke's that staff cannot always be guaranteed to produce high-quality products, it is possible to minimize the element of human mistake from the network.

2.4 Empirical Literature Review

Various researches on the concept of Lean Manufacturing Practice have been conducted. In his research, Kim (2006) looked at the role of supply chain management approaches including collaboration and competitiveness capacity on global efficiency. As a result of the investigation, it was discovered that SCM integration, SC level integration and competition capabilities had a different interconnections. Questionnaires were usedin data collection from a sample of 244 Korean businesses and 379 Japanese professionals. The data show that SC integration has a greater influence on performance in small businesses than in large businesses. SCM and

competitiveness capabilities have a higher impact on performance in large-scale enterprises because of their close association. Furthermore, the interaction between SC practices and competition competence has a greater influence on performance.

In Turkey, Demibarg (2007) looked into the effective management in supply chain methods on performances within SMEs'. The study's goal was to see if there were any links between SCM, performance operation,& SC-associatedinstitutionalperformance in Turkish SMEs. In their analysis, the researchers looked at 203 companies. Outsourcing, supplier relationships, and the electronic supply chain all improve performance. The study's main flaw was its exclusive emphasis on Turkish SMEs.

Hamister (2011) investigated small retailer supply chain management practices. The study used a survey design with a sample size of 79 people. The study's goals were to learn about practices in supply chain within the small retailers to see the techniques they use for better performance, and to see how widely these practices have been implemented. According to the findings, showed a link between methos used in supply chain management and performance. The study only looked at small stores, therefore it couldn't be used to draw conclusions about other industries.

Wickramasinghe and Wickramasinghe (2017) in their research on the role that lean duration has on the implementation of LMP and its impact on manufacturing performance. The goal of the study wasestablishng the impact that LMP has on manufacturing performance by focusing on lean duration aspect of it. The study adopted use of survey from a total of 1189 respondents in Sri Lanka. From the results it was concluded that implementation of LMP has a positive role on the manufacturing performance of the textile firms in Sri Lanka. Besides lean duration is a major factor in the achievement of improved manufacturing performance. This study however used a survey as the research design which is different from the use of descriptive statics which will be used in this study. Besides it was carried out in a different study context in Sri Lanka, not applicable to the Kenyan situation.

Sajan and Saini (2020) investigated the impact of LM on SME sustainability performance in India. The aim of the study was to determine the impact of LM on SME sustainability

performance in India. According to the findings of the study, LM implementation leads to enhanced performance sustianbility within the Indian SMEs. This study used a multi-case study approach in its methodology, which was carried out across five SME manufacturing enterprises.However, this research focused on the impact of LMP on long-term sustainability rather than operational performance. Apart from that, the study context was SME's in India, which differed from the Kenyan situation in LSMF.

Mwilu (2013) conducted a local study on strategies used in management of supply chain and performance within Kenyan research organizations. The study's objectives were to determine the extent to which SCM was being implemented at Kenyan public research institutes, to determine the impact of these practices on performance, and to identify impediments to SCM adoption in these institutions. Data was gathered via questionnaires. The data was analyzed using descriptive statics with a sample size of 36 businesses. When compared to other approaches, logistics, outsourcing, leanness, and information technology all have a high link to performance. Apart from that, the majority of these businesses have implemented SCM to some level. The fact that this study is limited to Kenyan state research institutions is a major disadvantage.

In Nairobi, Kenya, Owiti (2014) evaluated the supply chain management techniques within medium and small office supplies entreprises. The study's goal was to learn about the SCM techniques used by office supply companies in Nairobi, as well as the benefits they gained from doing so. It also wanted to learn about the problems these companies had in putting these principles into practice. A descriptive survey design was utilized to collect data from a sample size of 125 organizations using self-administered questionnaires. According to the statistics, the majority of SMEs have adopted these methods. The implementation of SCMP in SMEs was considered as a big difficulty due to the high interest rate. The study's drawback was that it was based solely on companies supplying office equipment within the Nairobi CBD.

Wainaina (2014) carried a research on Unga group ltd’s LMP and operational performance. The goal of the research was determining to which extent does LMP impliementationimpactedUnga's operational performance. In terms of research technique, here case study was used. The findings revealed that the Unga Group Ltd had applied the LMP to a

great extent in their operations indicating a good correlation between LMP implementation and operational performance. However, due to limitations of case study, it could not be applied to other research situations.

Mahulo (2015) studied Kenyan cement manufacturers' supply chain management practices and performance. The study's goal was to figure out why there was a link between SCM and the success of Kenyan cement producers. A total of six cement production businesses were used in the investigation. The findings revealed that cost-driven outsourcing and the usage of inventory management strategies such as VMI, among other things, have a great impact on cement manufacturing companies' operational performance. Furthermore, almost 80% of these businesses have used SCM .The survey's fundamental drawback was its limited scope, which only included cement manufacturing companies.

Owuor (2016) researched on LMP and operational performance of brewing companies in kenya with special interest Kenya breweries ltd where he examined to what extent and the results LMP had on operational performance of Kenya breweries Ltd. The results ascertained that Kenya breweries ltd had implemented the various LMP in their operations and this had a positive impact on quality, timeliness, and flexibility and cost reduction as operational performance measures used. This study however, was narrowly based in one sector, the breweries and more specifically Kenya breweries ltd.

Yala (2016) conducted study on Kenyan manufacturing enterprises' lean supply chain management techniques and operational success. The study's goal was to find out whether lean SCM methods are implemented in manufacturing organizations, to determine the influence of lean SCM on Kenyan manufacturing companies' operating performance, and to identify problems in implementing their practices. A total of 137 businesses were included in the survey. As data kinds, primary and secondary data were employed. According to the statistics, the majority of businesses have implemented lean SCM. Furthermore, the findings showed a link between lean SCM and the operating performance of Kenyan manufacturing enterprises. The majority of the secondary data included was obsolete and unrelated to the study.

Odwaro (2018) investigated OMP and organizational performance in Kenyan steel manufacturing enterprises. The study's goal was to assess the impact of OMP on organizational performance of steel manufacturing enterprises in Kenya, as well as the obstacles that came with implementing OMP. The research was conducted using a descriptive research approach. Questionnaires were utilized to collect data from a total of 165 businesses. The findings showed that implementing OMP improved organizational performance. Besides challenges, there was lack of inadequate resources and skills, lack of top management commitment were some of the challenges faced in the implementation. This research however was based on OMP as a whole yet the current study has narrowed down to one type of operations management practices which are LMP.

2.5 Setbacks in the Execution of Lean Manufacturing Practices in Large Scale Manufacturing Firms.

Konstantinos and Christos (2016) found out that resistance to change by the employees is a major setback to the execution of lean manufacturing processes. Resistance can be caused by the fear of failure among other reasons. Implementation of lean requires change management (Longward et al., 2016). Lean should be identified with the firm’s strategic plan so as to foster the will to change. This will determine its competitiveness or failure during implementation (Cinite et al., 2009). The strategic plan when clearly outlined will give the employees the support they require and ensure justification and clarity of the process (Dick et al., 2006).

Lack of valuable resources creates barrier for the implementation of lean manufacturing practices (Konstantinos& Christos, 2016). According to Kumar and Soni (2017) lean implementation requires vital resources such as expertise, time and fund. Most firms rely on experts to introduce lean and incases whereby the experts are of poor quality and staff lack implementation practice; lean implementation will fail. According to Konstantinos and Christos (2016), in the case of finances, organizations generally incur high investment costs during implementation of lean practices. They therefore need enough funds to support the change.

Shrimali (2017) note that various institutions have been faced with difficulties during the implementation of lean practices. Many factors have contributed to the success of lean

manufacturing practices implementation process thereby hindering the organization from achieving their objectives. Radnor et al.(2006) simplified the challenges that firms face as that of sustainability, people and processes. Below are the challenges to the implementation of lean practices. Lack of top management commitment, lack of Government support and involvement. According to Konstantinos and Christos (2016), lean practices implementation automatically fails when top management lacks focus for supporting lean manufacturing initiatives, lacks proper communication networks, fails to create the sense of urgency and lacks a long-term vision. Managers who strongly support lean practices play an active role of facilitating lean implementation in the institution. This is in terms of resource allocation (Steed 2011). These resources include time and finances. Good management further influences creation of knowledge, awareness and skills amongst the employees (Lodgaard et al., 2016). They also note that lean implementation is likely to fail where there is lack of a visible and active top management support.

2.6 Summary

This section summarizes the Empirical Literature Review in table 2.1. It consists of the Author (s), the study topic, objectives of the study, research methodology, findings, knowledge gap (s) and the focus of current study.

Table 2.1: Summary of the Literature Review

Author (s)	Study Topic	Objectives	Research Methodology	Findings	Knowledge Gap (s)	Focus of Current Study
Kim (2006)	Effect of supply chain management practices integration and competition capability on performance.	To reveal the existence of a link connecting SCM assimilation, SC level incorporation, and Korean competition capability.	Qualitative approach	SCM integration increases performances, competition capability which brings greater outcome to the firms	It only focused on Koreans firms	The study should focus on more international industries.
Demibarg (2007)	SCM Practices on performance of SMEs in Turkey.		Case analysis	Outsourcing, supplier relationship and e – supply chain have a positive effect to performance.	Narrow focus of SMEs in Turkey	Apart from SME`s the researcher should do more on other sectors.
Hamister (2011)	SCM Practices in small retailer sectors.	To determine whether supply chain methods improve small store performance and, if so, to what extent these practices have been implemented.	Cross – sectional survey	SCM contributes to performance of SMEs.	SCM contributes to performance of SMEs.	The researcher should also focus on other practices ike lean management, TQM among others.
Wickramasinghe and Wickramasinghe (2017)	The implementation of LMP and it's impact on manufacturing performance	To establish the implementation of LMP and it's impact on manufacturing performance	Survey	LMP has a positive result in operational performnce	It was only focused on the Sri Lanka textile industries	Should focus on other industries not only in Sri Lanka but to other parts of the world.

Author (s)	Study Topic	Objectives	Research Methodology	Findings	Knowledge Gap (s)	Focus of Current Study
Sajan and Saini (2020)	The effect of LM in sustainability performance in Indian SME`s	To establish the effect of LM in sustainability performance in Indian SME's	Case study	implementation of LM results to related improbved sustainability performance of Indian SME's	Only focused in Indian SME`s. It was based on the effect of LMP on sustainability performance and not operational performance	The study should not only be based on SME`s but also in other Manufacturing firms.
Sahoo (2020)	The role that social and technical factors of LMP on performance.	To establish the role that social and technical factors of LMP have on performance.	Questionnaires	LMP have a positive impact on performance	It was only based on Indian firms.	The study should use other research methodologies and also focus in many industries in the market.
Mwilu (2013)	Kenya's adoption of SCM in public research institutions.	To determine the extent to which SCM is being implemented at Kenya's public research institutions. To determine the advantages gained by these companies as a result of their use of SCM.	Explanatory research	When compared to other approaches, operations, outsourcing, leanness, and information technology all have a high link to performance.	It is limited to public research institution in Kenya only.	The study should not only be based in Kenyan industries but should diversify to cover other parts of the world.

Author (s)	Study Topic	Objectives	Research Methodology	Findings	Knowledge Gap (s)	Focus of Current Study
Owiti (2014)	The adoption of SCM by supplies firms in Nairobi.	To learn about the SCM practices used by Nairobi office supply companies.	Descriptive research	These approaches have been adopted by the majority of SMEs.	Only office equipment and supplies mentioned in Nairobi are used.	The study should be based on the entire firm not only in office equipments since many firms can be operating on an online.
Wainaina (2014)	The implementation of LMP and the role on operational performance at Unga ltd.	To establish the extent of implementation of LMP and the role it has on operational performance at Unga group	Case study	There was a positive relationship between implementation of LMP and operational performance	This was however a case study and the results would not be applicable to other study contexts.	Apart from using case study the researcher should use other methods to improve skills and ideas.
Mahulo (2015)	The correlation involving SCM and the success of Kenyan cement manufacturers.	To explain the correlation between SCM and performance of cement manufacturing companies in Kenya.	Casual research	Cement manufacturing companies benefit from efficiency outsourcing, inventory management, and other techniques.	It uses a small number of cement manufacturing companies for the study.	A larger number of manufacturing firms should be used.

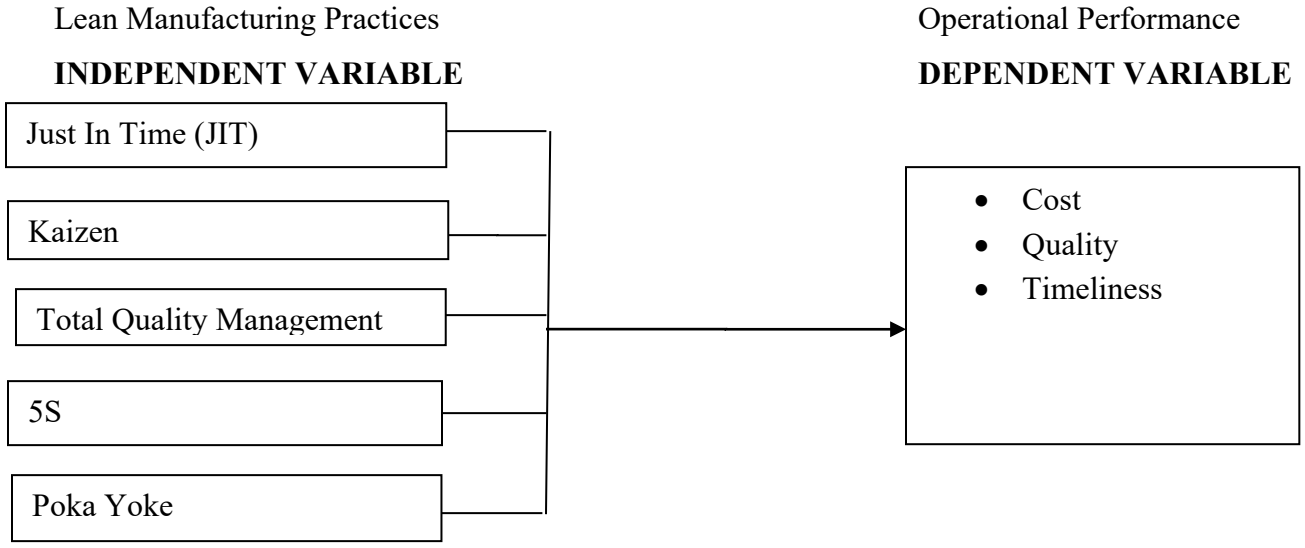
Author (s)	Study Topic	Objectives	Research Methodology	Findings	Knowledge Gap (s)	Focus of Current Study
Owuor (2016)	The implementation and effect of LMP on operational performance of Kenya bereweris ltd.	To establish to what extent LMP had been implemented and effect that the implementation of LMP had on operational performance of Kenya breweries ltd.	Case study	The results ascertained that Kenya breweries ltd had implemented the various LMP in their operations and this had a positive impact	This study however, was narrowly based in one sector, the bereweries and more specifically Kenya bereweries ltd.	The study captured fewer bereweries and therefore it should be expanded to other parts of the world to be able have diverse knowledge.
Yala (2016)	The types of lean SCM used in the manufscturing companies in Kenya.	To determine which lean SCM are applied in Kenyan manufacturing firms. To determine the difficulties in putting these practices into effect.	Secondary and Primary data	Lean SCM increases the operational activities of the manufacturing firms.	Most of the secondary data used were outdated and not of relevant to the study.	The study should always focus on the current methods of collecting data.
Odwaro (2018)	The effect of OMP on organizational performance of Steel manufacturing firms in Kenya.	To establish the effect of OMP on organizational performance of steel manufacturing firms in Kenya and the challenges faced in the implementation of	Descriptive	The results indicated that implementation of OMP led to improved organizational performance.	It was based on OMP as a whole yet the current study has narrowed don to one type of operations management	Instead of OMP the researcher should use atleast two elements of OMP in his future studies.

		OMP.			practices which is LMP.	

2.7 Conceptual Framework

Under the conceptual model, the study will seek to investigate the relationship between the independent variable and the dependent variables. In this study the independent variables is the LMP which is operationalized by JIT, Kaizen, TQM, 5S's and Poka yoke. The dependent variable is operational performance which will be measured by cost, quality and timeliness. This is as shown in figure 2.1 below;

Figure 2.1: Conceptual Model



Source: (Researcher, 2021)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The approach that was used in this study has been discussed in this chapter. The research design came first, followed by the study's populace, sampling and sample size, sampling methods, means of data collection and data processing.

3.2 Research Design

A descriptive research method was used in this investigation. Descriptive research aids the researcher in collecting data from a population by observing, describing, documenting, interpreting, and presenting the present circumstances (Cooper and Schindler, 2006). This design aids in describing the study's characteristics, behavior, attitudes, and concepts (Mugenda and Mugenda, 1999). It guarantees that data on LMP and operational performance is collected for the study.

3.3 Target Population

The study's target population was large-scale manufacturing firms in Nairobi County. According to the Kenya Association of Manufacturers, there are over 1000 large scale manufacturing firms are operating with Nairobi CountyManagement teams, inventory managers, store staff, or their equivalents were the study's respondents.

3.4 Sample Design

Stratified Sampling method was adopted in this study. This is a sampling technique where the researcher is required to divide the entire population into different subgroups known as strata and then randomly conduct a selection of the samples in each of the stratum. Stratified sampling was preferable because it ensured that the sample accurately reflects the entire population. In selection of sample size, the Cooper and Schindler (2008) formula concluded that “a sample of 10% is adequate and representative enough for the whole population if it is large”. Based on the homogeneity and the cost implication of surveying the whole population, a representative sample of 98 LSMF (Appendix III) acquired from PPOA.

Table 3.1 Summary of Large Scale Manufacturing Firms

This will contain the manufacturing sector (s), total population number and the sample size chosen for the study. The list of selected LSMFs is in Appendix IV (page 32)

Manufacturing Sector (s)	Population Number	10% Sample Size
Agro – Processing	86	9
Appliances and Components	27	3
Chemicals	70	7
Construction materials	81	8
Food and Beverages	143	14
Furniture and Related products	50	5
ICT and Computers	29	3
Iron and Steel	50	5
Leather	52	5
Metal and Paper	46	5
Oil and Mining	38	4
Plastics	201	20
Textiles and Clothing	74	7
Transportation	34	3
Total	**981**	**98**

Primary data, the main source of information was obtained using questionnaire forms that were dropped off and picked up later. Management teams, inventory managers, store staff, or their equivalents were the study's respondents. The research questionnaire was divided into three sections:

Section A: Included details about the Organization`s backgrounds, Section B: Contained the first aim, which is to understand the extent to which LMP have been executed in large production companies within Nairobi County, the second objective was to realize the extent which Lean Manufacturing Practices have been administered in large manufacturing firms in Nairobi C:Contained questions on the impact of Lean Manufacturing Practices on operating performance in Large Scale Manufacturing companies in Nairobi County and lastly section D: Contained the

drawbacks in the application of Lean Manufacturing Practices by Large Scale Manufacturing companies in Nairobi County.

3.6 Data Analysis

The survey results were checked for reliability and validity. The data for goal one, which is the extent of Lean Manufacturing Practices implementation in Nairobi County's Large Scale Manufacturing Firms, was evaluated using descriptive statistics. The data for the second objective was evaluated using correlation and regression analysis to see how Lean Manufacturing Practices affect operation performance in Large Scale Manufacturing Firms in Nairobi County.

Regression analysis equation will be as follows:

$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + €$

$Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + €$

$Y_3 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + €$

In that:

Y= Operational Performance

$\mathbf{Y_1}$=Quality, Y_2= Cost, Y_3= Timeliness

$\mathbf{X_1}$=Just in Time

$\mathbf{X_2}$= Kaizen

$\mathbf{X_3}$= Total Quality Management

$\mathbf{X_4}$=5S

$\mathbf{X_5}$=Poka yoke

€=Error term

$\boldsymbol{\beta_{ij}}$ =Regression Coefficients

CHAPTER FOUR:
DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This chapter started with data analysis, findings and finally discussion. This section containedfindings on the data sought on lean manufacturing practices and operationalperformance of LSMF in Nairobi. The research was directed by three objectives: to determine the extent of implementation of LMP in LSMF's in Nairobi, to establish the impact of adoption of LMP on operational performance of LSMF's in Nairobi and challenges faced in LMPimplimentation of LSMF`s within Nairobi. The study targeted respondents were the Management teams, inventory managers, store staff or their equivalents.

4.1.1. Response Rate

In this study, 98 questionnaires were dispersedwhere 71 were filled completely and hence usable for the study. This translates to 72% response rate and in accordance to (Mugenda&Mugenda, 2003) 70% and above respodent rate is very good and good for a detailed data analysis.

4.2 Demographic Information

Data was collected based on the background information of LMP in LSMF in Nairobi in order to evaluate the extent of implementation of LMP and how it affects Operational performance in LSMF in Nairobi. To establish more information got and knowledge about the study, background information of the firm collected was carried out as indicated below:

4.2.1 Experience

Based on the experience the responses are as shown in the table below.

Table 4.1 Experience

Years of Operation	Frequency	Percent
Less than 10 years	17	23.9
10-15 years	31	43.7
More than 15 years	23	32.4
Total	**71**	**100.0**

(Researcher, 2021)

From the outcomes indicated in the table 4.1 above, 23.9% of the firms had experience below 10 years, 43.7% of the firms had been in operation for 10-15 years while 32.4% of the companies were operational for more than 15 years. This is an implication that majority of the companieswere operational for a long period of time and hence had adequate experience and vast knowledge on the LMP used in their operations. This gives an implication that the responses which were given by the respondents in this firms hence was valuable in meeting the research objectives.

4.2.1 Sector

Based on the sector that the firms were in, the responses are presented the table below:

Table 4.2 Sector

Sector	Frequency	Percentage
Food	25	36.2
Textile	13	16.9
Petroleum and coal	16	23.9
Leather and allied products	12	15.5
Paper industry	5	7.0
Totals	**71**	**100.0**

(Researcher, 2021)

From the results above, 36.2 % of the firms were in the food sector, 16.9% of the firms were in the textile industry, 23.9 were in the petroleum and coal industry, 15.5% were in the leather and allied products industry, while 7% of the firms were in the paper industry. These results indicate the results will give a detailed conclusion on the data sought on LMP and operational performance in the LSMF in Nairobi.

4.3 Implementation of Lean Manufacturing Practices

In establishing to what extent LMP had been applied in LSMF within Nairobi. This study used 1-5 scale where 1- very small extent, 2- small extent, 3- moderate extent, 4- large extent and 5- very large extent. Results are as indicated below:

Below results shows the extent to which Just in time practices have been used within the manufacturing firms within Nairobi County.

Table 4.3 Implementation of Lean ManufacturingPractices

Kaizen Practices	4.5246	.75754
Five S's	4.38026	.70131
Total Quality Management Practices	4.1694	.71446
Just In Time (JIT)	3.9366	.75383
Poke Yoke Practices	3.5446	.89750

(Researcher, 2021)

From the findings LMP have been implemented in LSMF in Nairobi County based on the fact that the results indicated average mean value of 3 to 4. Kaizen has been implemented the highest with a mean of 4.5246, Five S 4.38026, TQM 4.1694, JIT 3.9366 and Poka Yoke practices with a mean of 3.5446. This means that all the LSMF in Nairobi Implemented the LMP to improve their productions and ensure that all their customers needs are satisfied in time.

These findings correspond to a study carried out by Owuor (2016) in his study on LMP in Kenya Breweries where they had been implemented to a moderate extent. Moreover the research in in accordance to Wainaina (2014) who ascertained that to a moderate extent Unga ltd had implemented the LMP in its operations and this resulted to improved performance.

4.4 Effect of Lean Manufacturing Practices on Quality as a measure of Operational Performance

In establishing the impact of implementating LMP on Operational performance in LSMF in Nairobi. The study used regression analysis as indicated in the table below:

Table 4.4 Coefficients on Effect of Lean Manufacturing Practices on Quality as a measure of Operational Performance

Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	**2.602**	**.894**		**2.911**	**.005**
JIT	.258	.096	.270	2.685	.009
Kaizen	.115	.017	.078	.883	.380
TQM	.172	.073	.217	2.347	.022
Five S's	.240	.079	.271	3.058	.003
Poka-Yoke	.478	.118	.421	4.036	.000

a. Dependent Variable: Quality

b. Predictors: JIT, Kaizen, TQM, Five S's and Poka-Yoke

Regression equation $Y = 2.602 + 0.258X_1 + 0.115X_2 + 0.172X_3 + 0.240 X_4 + 0.478X_5 + €$

The results of the regression analysis indicatesanexistenceof positive connection between JIT and Quality which is statistically mportant (t=0.258, p=0.009). An implication that whenever there is increased implimentation of JIT by a unit, the resulting effect is a related increase in the quality by 0.258. Besides JIT indicated a p-value of 0.009 hence it is statistically significant since it is less than 0.05.

The results of the regression analysis indicate an existenceof positive connection between Kaizen and quality which is not statistically important (t=0.015, p=0.380). An implication that whenever there is by a unitof Kaizen by a unit, the resulting effect is a related increase in the quality by 0.015. Besides Kaizen indicated a p-value of 0.380 hence it is statistically insignificant since it is more than 0.05.

The results of the regression analysis indicate an existence of positive connection between TQM and quality which is statistically significant. (t=0.172, p=0.022). An implication that whenever there is increased implimentation of cost driven TQM by a unit, the resulting effect is a related increase in the quality by 0.172. Besides TQM indicated a p-value of 0.011 hence it is statistically significant since it is less than 0.05.

The results of the regression analysis indicate an existence of positive connection between , Five S's and quality which is statistically significant (t=0.240, p=0.000). An implication that

whenever there is increased implimentation of Five S's by a unit, the resulting effect is a related increase in the quality by 0.240. Besides Five S's indicated a p-value of 0.000 hence it is statically significant since it is less than 0.05.

The results of the regression analysis indicate an existence of positive connection between , Poka-Yoke and quality which is statistically significant (t=0.478, p=0.000). An implication that whenever there is increased imlimentation of Poka -Yoke by a unit, the resulting effect is a related increase in the quality by 0.478. Besides Poka-Yoke indicated a p-value of 0.478 hence it is not statically significant since it is more than 0.05.

Table 4.5 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.740[a]	.548	.513	.47447

a) Dependent Variable: Quality
b) Predictors: JIT, Kaizen, TQM, Five S's and Poka-Yoke

The findings indicated a correlation coefficient value of 0.740 and R value of 0.548.R squared value is 55%. An indication that 74% of the variations in OP are explained by the variation in the

independent variables: JIT, Kaizen, TQM, Five S's and Poka-Yoke. Hence the LMP are good indicators of quality.

Table 4.6ANOVAa

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	17.733	5	3.547	15.754	.000[b]
Residual	14.633	65	.225		
Total	**32.366**	**70**			

a. Dependent Variable: Quality
b. Predictors: (Conctant), JIT, Kaizen, TQM, Five S`s and Poka yoke

Lean Manufacturing Practices which include JIT, Kaizen, TQM, Five S's and Poka-Yoke contribute significantly to Operational Performance since the p-value of 0.000 is less than 0.05 at 95% confidence level.

4.4.1 Effect of Lean Manufacturing Practices on Cost as a measure of Operational Performance

Based on cost as a measure of operational performance, the study findings indicate;

Table 4.7Coefficientsa

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	**3.348**	**.723**		**4.631**	**.000**
JIT	.245	.063	.310	3.898	.000
Kaizen	.395	.079	.413	4.996	.000
TQM	.367	.074	.402	4.971	.000
Five S's	.271	.071	.325	3.837	.000
Poka-Yoke	.056	.074	.066	.756	.452

a. Dependent Variable: Cost

b. Predictors: JIT, Kaizen, TQM, Five S's and Poka-Yoke

Regression equation $Y = 3.348 + 0.245X1 + 0.395X2 + 0.367X_3 + 0.271 X_4 + 0.056X5 + €$

The results of the regression analysis indicates an existence of positive connection between JIT and cost reduction which is statistically important (t=0.245, p=0.000). An implication that whenever there is increased implimentation of JIT by a unit, the resulting effect is a related increase in the cost reduction by 0.245. Besides JIT indicated a p-value of 0.000 hence it is statistically significant since it is less than 0.05.

The results of the regression analysis indicate an existence of positive connection between Kaizen and cost reduction which is statistically significant. (t=0.395, p=0.000). It implicates that whenever there is increased implimentation of Kaizen by one unit, the resulting effect is a related

increase in the cost reduction by 0.015. Besides Kaizen indicated a p-value of 0.000 hence it is statistically significant since it is less than 0.05.

The results of the regression analysis indicate an existence of positive connection between TQM and cost reduction which is statistically significant. (t=0.172, p=0.022). An implication that whenever there is increased implimentation of TQM by a unit, the resulting effect is a related increase in the cost reduction by 0.172. Besides TQM indicated a p-value of 0.011 hence it is statistically significant since it is less than 0.05.

The results of the regression analysis indicate an existence of positive connection between , Five S's and cost reduction which is statistically significant (t=0.240, p=0.000). An implication that whenever there is increased implimentation of Five S's by a unit, the resulting effect is a related increase in the cost reduction by 0.240. Besides Five S's indicated a p-value of 0.000 hence it is statistically significant since it is less than 0.05.

The results of the regression analysis indicate an existence of positive connection between , Poka-Yoke and cost reduction which is statistically significant (t=0.478, p=0.000). An implication that whenever there is increased implimentationofPoka -Yoke by a unit, the resulting effect is a related increase in the cost reduction by 0.478. Besides Poka-Yoke indicated a p-value of 0.478 hence it is not statically significant since it is more than 0.05.

Table 4.8 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.771[a]	.595	.563	.44928

a. Dependent Variable: (Constant), Cost

b. Predictors: JIT, Kaizen, TQM, Five S's and Poka-Yoke

The findings indicated a correlation coefficient value of 0.771 and R value of 77%. R squared value is 59.5%. An indication that 60% of the variations in cost reduction are explained by the

variation in the independent variables: JIT, Kaizen, TQM, Five S's and Poka-Yoke. Hence the LMP are good indicators of cost reduction.

Table 4.9ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	19.246	5	3.849	19.070	.000[b]
Residual	13.120	65	.202		
Total	**32.366**	**70**			

a. Dependent Variable: (Constant), Cost

b. Predictors: JIT, Kaizen, TQM, Five S`s and Poka yoke

Lean manufacturing practices which include JIT, Kaizen, TQM, Five S's and Poka-Yoke contribute significantly to OP since the p-value of 0.000 is less than 0.05 at 95% confidence level.

4.4.1 Effect of Lean Manufacturing Practices on Timeliness as a measure of Operational Performance

Table 4.10CoefficientsaBased on use of timeliness as a measure of operational performance, the results indicate'

Model	Unstandardized	Coefficients	Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	**3.640**	**.576**		**6.316**	**.000**
JIT	.134	.015	.038	.461	.646
Kaizen	.254	.064	.321	3.996	.000
TQM	.409	.077	.427	5.294	.000
Five S's	.156	.074	.066	.756	.452
Poka-Yoke	.253	.066	.303	3.826	.000

a. Dependent Variable: Timeliness

b. Predictors: JIT, Kaizen, TQM, Five S's and Poka-Yoke

Regression equation $Y = 3.640 + 0.134X_1 + 0.254X_2 + 0.409X_3 + 0.156 X_4 + 0.253X_5 + €$

The results of the regression analysis indicate an existence of positive connection between JIT and timeliness which is statistically insignificant (t=0.134, p=0.646). An implication that whenever there is increased implimentation of JIT by a unit, the resulting effect is a related increase in the timeliness by 0.258. Besides JIT indicated a p-value of 0.646 and Five S's and timeliness which is statistically insignificant (t=0.156 p=0.452) hence theyare statistically insignificant since it is more than 0.05.

The results of the regression analysis indicate an existence of positive connection between Kaizen and timeliness which is not statistically significant. (t=0.254, p=0.000). An implication that whenever there is increased implimentation of Kaizen by a unit, the resulting effect is a related increase in the timeliness by 0.254. Besides Kaizen indicated a p-value of 0.000 hence it is statistically significant since it is less than 0.05.

The results of the regression analysis indicate an existence of positive connection between TQM and timeliness which is statistically significant. (t=0.409, p=0.000). An implication that whenever there is increased implimentation of cost driven TQM by a unit, the resulting effect is a related increase in the timeliness by 0.409. Besides TQM indicated a p-value of 0.000 hence it is statistically significant since it is less than 0.05.

The results of the regression analysis indicate an existence of positive connection between , Poka-Yoke and timeliness which is statistically significant (t=0.253, p=0.000). An implication that whenever there is increased implimentationofPoka -Yoke by a unit, the resulting effect is a related increase in the timeliness by 0.253. Besides Poka-Yoke indicated a p-value of 0.478 hence it is statically significant since it is less than 0.05.

Table 4.11 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.770[a]	.592	.561	.45051

a. Dependent Variable: Timeliness

b. Predictors: JIT, Kaizen, TQM, Five S's and Poka-Yoke

The findings indicated a correlation coefficient value of 0.770 and R value of 59%. R squared value is 0.561. An indication that56% of the variations in timeliness are explained by the variation in the independent variables: JIT, Kaizen, TQM, Five S's and Poka-Yoke. Hence the LMP are good indicators of timeliness.

Table 4.12ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	19.174	5	3.835	18.894	.000[b]
Residual	13.193	65	.203		
Total	**32.366**	**70**			

a. Dependent Variable: Timeliness

b. Predictors: JIT, Kaizen, TQM, Five S's and Poka-Yoke

Lean manufacturing practices which include JIT, Kaizen, TQM, Five S's and Poka-Yoke contribute significantly to timeliness since the p-value of 0.000 is less than 0.05 at 95% confidence level.

These results are in line with the study by Wainaina (2016) on effect of LMP implementation on performance at Unga limited where the studies indicated that there exists a positive relationship between implementation of LMP and Operational Performance.

4.4 Challenges Facing Implementation of Lean Manufacturing Firms in Nairobi

Based on the third objective the findings are as indicated below;

Table 4.13 Challenges of LMP Implementation

Challenges	Mean	Std. Deviation
Lack of confidentiality	4.5775	3.62792
Poor communication within and outside the firm	4.2958	.61862
Resistance to change from internal employees	4.1528	.62031
Resistance to change from internal employees	3.9437	.86002
Lack of funds for use	3.8028	.70952
Inadequate resources	3.6056	1.21278
Poor organizational structures in the firm	3.5775	.87279
Lack of Government support	3.4507	.90694

From the results to moderate extent various challenges were experienced in the implementation of LMP in LSMF in Nairobi: resistance from employees indicated a mean of: 3.9437, lack of funds: 3.8028, lack of Government support showed a mean value of 3.4507; lack of adequate resources showed a mean value of 3.6056. Besides, poor organizational structures showed a mean value of 4.5775, loss of confidentiality showed a mean value of 4.2958 and lack of cooperation from respondents indicated a mean value of 4.1528.

These findings are in line with a study carried out by Kumar (2017) and Shimura (2017) who all established that the implementation of LMP is faced with a number of challenges like resistance to change, lack of top management commitment and inadequate resistances were faced to a moderate extent. Sajan (2016) in his study on LMP and SME's sustainability in India ascertained that the implementation of the LMP is faced with a number of barriers which includes; high cost of implementation, inadequate resources and poor organization culture.Wickramasinghe (2017) also established that implementation of LMP is also faced with various challenges which hinder full implementation of LMP in SME's which include high costs, poor Government regulations, lack of top management support and inadequate resources.

CHAPTER FIVE:
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This is the final chapter of this project and contains summary, conclusions, recommendations and concludes with study restrains. This study aim was to establish to which extent of LMP application in LSMF within Nairobi County and establish its impact on Lean Manufacturing Practices on Operating Performance of LSMF and the challenges faced in the implementation of LMP in Nairobi.

5.2 Summary

This study was on Lean Manufacturing Practices and Operational Performance of LSMF in Nairobi. One of the objectives of this research was establishing the extent to which LMP had been adopted and used by the LSMF in Nairobi. The other purpose was establishing what effect LMP has on Operational Performance of LSMF in Nairobi. In the research methodology, use of descriptive research design was used & questionnaires were used as data collection tools. Descriptive statistics and regression analysis were used as data analysis tools.

Response rate was 72% where out of the ninety-eight questionnaires that were issued, 71 questionnaires were completed for analysis. From the information on the background of the respondents, all the respondents had good experience and thus had enough information on data needed concerning LMP. Besides the companies were operational for over ten year thus an indication that they understood information needed on LMP.

One of the study objectives was to examine to what extent LMP have been adopted by LSMF in Nairobi. Another study objectivewas ascertaining the effect of LMP on Operational performance of LSMF's in Nairobi which was measured by costs, quality and timeliness. From the findings it was established that moderate to large extents in Nairobi have adopted the various LMP in their quest to improve their operational performance by ensuring they provide quality goods and services. It was implied as indicated by mean values of three and above. By these results they indicated that LSMF in Nairobi have adopted LMP to minimize on wastes and ensure that

customer needs and specifications are met by adhering to the quality specifications set by the customer needs. By implementation of these practices there is timeliness in the production and delivery of goods to customers. This has a long-term effect of ensuring that the performance of the firm improves through high-cost savings.

On establishing the impact of implementation of LMP on Operational performance measured by cost, quality and timeliness. The results showed a positive relation between LMP implimentation in operations management and Operational Performance exists. This was implied through positive coefficient values from the multiple regression analysis results for quality, cost and timeliness. An implication that implementation of LMP had the great impact on operational performance of LSMF in Nairobi County. Besides fifty five percent of quality, fifty-nine percent of both cost reduction and of LSMF in Nairobi were affected by implementation of LMP. This implies that LMP are in a position to cut down costs of operation, ensure that they provide quality products to their customers and are in a position to manufacture quality products and ensure they deliver the products to customers on-time due to adoption of LMP in their operation which has a positive impact on operational performance.

The last study objectives which was on stury restrain in LMP implimentationLSMFwithin Nairobi. The results indicated that from a moderate extent to large extent, LSMF in Nairobi face a number of challenges in the implementation of LMP to a moderate extent. These are; inadequate resources, poor organizational culture, resistance to change, inadequate capital among others. To achieve the best out of implementation of LMP, there is need for a close look at the challenges facing implementation of LMP to achieve improved performance. There is need for setting aside the required resources to ensure that these challenges are managed.

5.3 Conclusion

Lean manufacturing practices are very crucial in the improvement of operational performance of firms. Implementation of LMP helps in the production of quality goods, minimization of wastes in the production process, timeliness in production of goods, helps in cutting on waiting times, helps in the reduction of defects and errors in the products produced and in the long run improve the firm’s productivity. Implementation of LMP helps a firm attain the desired outcomes of

quality in the finished goods and the long run required levels of performance. The implementation of LMP has a positive impact on Operational Performance of the LSMF in Nairobi. It helps in high-cost savings through timely deliveries of goods and services to the customers. It helps a firm focus on its core activities and get experts to perform activities that are non-core and the firm has no required expertise to produce it.

Every LSMF is set to meet customer needs better than their competitors in the same market. Through implementation of LMP, LSMFs are in position of ensuring that they provide lowest for quality products. They are in a position to attain continuous improvement of their processes and produce quality products. Besides through the LMP these firms are in a position to prevent errors and defects from arising through set systems that are able to manage the demands on time. They are able to set up the working space, sort out the inputs of a production line and set up the production processes.

From the results of the study, to a moderate extent, LMP have been adopted by LSMF in Nairobi County. The result from descriptive statistics showed that all practices were implemented and and hence LSMF are positioned to produce quality goods and services with no defects and hence cut on costs. This facilitates their ability to meet varying customer needs at low costs. These findings indicated that there is a positive relation between LMP and Operational performance. Hence whenever the LSMF implement the various LMP, they are in a position to meet quality requirements of the customers, provide services and goods at low cost and in the long run achieve the required levels of performance. In addition, the LSMF face a number of challenges in the implementation of LMP in LSMF in Nairobi to a moderate extent.

5.4 Recommendations for Policy and Practice

In second objective this study ascertained that fifty four percent of quality, fifty nine percent of both cost and timeliness is affected by implementation of LMP. To achieve the best out of any practice in an organization, there is need for full or almost 100% implementation of that particular practice. This study ascertained that LMPimplimentation was moderate within NairobiLSMF. To achieve full or almost full implementation, there is need for more training of the LSMF's staff in Nairobi on LMP and the role it plays in improving their performance.

There is need for employee involvement, top management commitment, favorable culture in the implementation of LMP. Besides the management needs to avail adequate resources that will help facilitate implementation of LMP to achieve better levels of performance. Policies need to be put in place to help implement LMP to the fullest in the firm. Besides, there is need for the LSMF to ascertain the other LMP that can be adopted to enhance better levels of operational performance. Other variables need to be included in the future research since they were not included within this research.

5.5 Limitations of the Study

This study's major limitation is that it was based on a narrow concept of LMP and not manufacturing practices as a whole. Besides, this study had a narrow scope of the LSMF in Nairobi County. There was need for a holistic view of all the manufacturing firms both small and big in Kenya to get the best out of this study. The study context was LSMF's in Nairobi and hence this is a small section of the whole population of the manufacturing firms in Kenya. The study needed to focus on other sectors other than the LSMF for example: Universities among others. This study failed to bring out the solutions to challenges facing LSMF in Nairobi in the implementation of LMP and the benefits within the implementation.

5.6 Suggestions for Further Research

There is need for further research for purposes of establishing the impact of LMP on organizational performance as a whole. A wider area of study needs to be done on the role that LMP has on Operational performance in the LSMF in Kenya. Further, a research need to be conducted that explain other variables and their management strategies within companies to enhance increased operating performance within Nairobi LSMF. The results of the model summary indicated that there are unexplained variables in the study. Hence, further study needs to be carried out to establish these variables that need to be tackled to achieve the full level of performance. There is is need for more research on othercapacitites rather than LSMF's.

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APPENDICES

Appendix I: Letter of Introduction

TO WHOM IT MAY CONCERN.

Dear Sir/Madam,

I **Osumo Michael Ngao: D61/27453/2019,** Master in Business Administration (Operations Management Option) student at the University of Nairobi conducting research study titled **"*Lean Manufacturing Practices and Operational Performance of Large Scale Manufacturing Firms in Nairobi, Kenya"*** I'd like to ask for your help in filling out the questionnaire to aid in the completion of my studies.

Thank you for your consideration.

Sincerely,

D61/27453/2019
OSUMO MICHAEL NGAO

Appendix II: Research Questionnaire

The goal of this study was to learn more about the Lean Manufacturing Practices used by large-scale food and beverage manufacturing companies, the challenges they have in implementing them, and the impact they have on operational performance. The information gathered will only be used for academic reasons and will be kept in strict confidence.

SECTION A: BIO DATA

1. Why type of manufacturing sector is your organization?

( ) Food ( ) Textile ( ) Petroleum and Coal ( ) Leather and Allied Product ( ) Paper Industry

Any other……

2. How long has your organization been on Market?

Less than 10 years ( ) 10 -15 years ( ) two decades ( ) 20 – 25 years ( )

Other …….....

3. Where do your organizations recruit her employees?

( ) External ( ) Internal ( ) on hire

4. How often does your organization carryout employees appraisals

( ) Quarterly ( ) Semi – Annually ( ) Annually ( ) Quarterly basis

5. Can you demonstrate briefly explain how the customers rates your organization currently

SECTION B: THE EXTENT OF IMPLEMENTATION OF LEAN MANUFACTURING PRACTICES BY LARGE SCALE MANUFACTURING FIRMS IN NAIROBI, KENYA

Please indicate how far the entity has implemented the indicated practices. **(VSE) Very small extent (SE) Small extent (ME) Moderate extent (GE) Great extent (VE) Very great extent**

Just in Time	**VSE**	**SE**	**ME**	**GE**	**VE**
The firm ensures that the right inventory is held at any time by the firm					
The firm ensures that stock item are available whenever they are needed					
The firm produces the exact number of products as per the demand					
The firm maintains minimum inventory					

Kaizen					
Your firm ensures there is sustained continuous improvement to achieve improved performance					
There is continuous improvement of quality, reduction in costs related to design, production and ensures that the firm achieves better operational performance					
Your firm trains employees to ensure that there is sustained improvement in performance					
Your firm involves all employees in the design and production process to achieve the best performance.					
Your firm Kaizen sets standards and then continually improving those standards.					
Total Quality Management					
Your firm improves the quality of goods produced by a firm through enhancement of products and services on a constant basis					
Your firm removes all defects in all processes					
Your firm ensures defect-free output, customer-driven quality, and continued progress, therefore eliminating flaws from an operation system					
Five S's					
Your firm eliminates everything that is seen as a hindrance to complete the tasks and configure.					

Your firm carries out identification of the stages of production and all the elements that are needed for that stage's effective performance.					
Poka-Yoke					
Your firm has mechanisms that once implemented reduces the rate at which errors occur in the firm by the fact that once implemented staff are in a position to avoid errors					
Your firm eliminates defects through prevention, correction and drawing attention to errors that occur due to human negligence					
Your firm has a manufacturing system that prevents and eliminates errors that can be caused due to human error.					

SECTION C: EFFECT OF LEAN MANUFACTURING IMPLEMENTATION ON OPERATIONAL PERFORMANCE

Please rank the extent to which the issues below concerning operational performance have been made possible by lean practices in this Firm.

1= Very small extent, 2= Small extent, 3= Moderate extent, 4= High extent, 5= Very high extent

Operational performance	**1**	**2**	**3**	**4**	**5**
Quality					
The organization always strive for quality					
Organization always makes quality as part of its culture					
Organization always perform product and market testing					
The firm has implemented a quality management system					
Cost					
The organization always audit their facilities					
Organization always restructure their products					
The organization always evaluates their production processes					
The organization always reduces their direct costs					
Timeliness					

Raw materials are made available for use in time					
Customers' needs are met and dealt with quickly					
Customers complaints are solved quicky					
Goods are always available in market ate the right time					

SECTION D: CHALLENGES OF IMPLEMENTING LEAN MANUFACTURING PRACTICES FACED BY LARGE MANUFACTURING FIRMS IN NAIROBI

Please indicate the level of agreement to which the following challenges of implementing Lean manufacturing management practices have been faced by your firm.

Key:

(1) Very small extent (2) Small extent (3) Moderate extent (4) Great extent (5) Very great extent

(2)

Challenges	**1**	**2**	**3**	**4**	**5**
There is resistance to change from internal employees?					
Do you lack of funds for use?					
Is there lack of Government support?					
There are inadequate resources?					
There is a poor organizational structure in the firm?					
There is lack of confidentiality?					
There is poor communication within and outside the firm?					

THANK YOU

Appendix III: Registered Large Manufacturing Firms in Nairobi, Kenya

1. Abu Engineering Ltd
2. African Cotton Industries Ltd
50. Goods Chemistry Practice& Allied Cert. Corp Ltd
51. Ramco Printing Works Limited

3. Agni Enterprises Ltd
4. Ali Glaziers Ltd
5. Alpha Dairy Products Ltd
6. Athi River Mining Ltd
7. Atlas Copco Eastern Africa Ltd
8. Bamburi Special Products Ltd
9. Beta HealthCare
10. BIDCO Oil Refineries Limited
11. Blowplast Limited
12. Blue Triangle Cement
13. British American Tobacco Kenya
14. Chandaria Industries Limited
15. Chevron Kenya Ltd
16. Chloride Exide Kenya Limited
17. Cuma Refrigeration EA Limited
18. Doshi Group of Companies
19. East Africa Glassware Mart Ltd
20. East African Breweries Limited
21. East African Cables Ltd.
22. East African Portland Cement
23. Eastern Chemical Industries Ltd
24. Eco Consult LTD
25. Ecolab East Africa (K) Ltd
26. Ecotech Ltd
27. Energy Pak (K) Ltd
28. Equatorial Tea Ltd
29. Eveready East Africa Limited
30. Excel Chemical Ltd.
31. Fairdeal, Aluminium& Glass Ltd
32. Famiar Generating Systems Ltd
33. Farmers Choice Ltd
52. Raghad Enterprises
53. Quad cypher systems
54. PZ Cussons East Africa Ltd.
55. Pudlo Cement Company (PCC)
56. Protocols Microcomputer Applications
57. Print Fast Kenya Ltd.
58. Polythene Industries Ltd
59. Pelican Signs Ltd
60. Patco Industries Ltd
61. Packaging Industries Ltd
62. Orpower 4, Inc
63. Orbit Chemical Industries Ltd
64. Octagon Express (Kenya) Limited
65. Njoro Canning Factory Ltd
66. New World Stainless Steel Ltd
67. New RuarakaHardwares
68. Ndugu Transport Co Ltd
69. Mombasa Canvas Ltd
70. Mohajan Trade International
71. Mjengo Limited
72. MGS International (K) Ltd
73. Metsec Ltd.
74. Metal Crown Ltd
75. Mellech Engineering & Construction Ltd.
76. KingSource Plastic Machinery Co.,Ltd.
77. Kim-Fay E.A Limited
78. Kiesta Industrial Technical Services Ltd
79. Kenya Solar
80. Kenya Grange Vehicle Industries Ltd
81. Kenya Fluorspar Company Ltd (KFC)
82. Kenya Electricity Generating Company Limited.

34. Flexoworld Ltd
35. Foam Mattress Ltd.
36. Furmart furnishers
37. Gahir Engineering Works Ltd
38. Goldrock international enterprises
39. Heluk International Limited
40. Redsea Chemist
41. Reesi Hospitality Ventures
42. Reliable Concrete Works Ltd
43. Renscope Scientific Kenya
44. Rhino Special Products Ltd
45. Rock Plant Kenya Ltd.
46. ROM East Africa Limited
47. Rosewood Office Systems Ltd
48. Rotam Sub-Saharan Africa
49. Rupa Cotton Mills EPZ Ltd
83. Kenbro Industries
84. Kapa Oil Refineries Limited
85. JET Chemicals (Kenya) Ltd
86. Imani Workshops
87. Hydraulic Hose & Pipe Manufacturers Ltd
88.Hills Converters [K] Ltd
89. Shamas Motor Spares
90. Shankan Enterprises Ltd
91. Slumberland Kenya Ltd
92. Solarworks East Africa
93. South Hill Motor Spares Ltd
94. Stainless Steel Products Ltd
95. Stamet Products (K) Ltd
96. Statpack Industries Limited
97. Rural Electrification Authority
98. Sameer Group

Source: Small Business in Nairobi, PPOA (2018). (www.ppoa.go.ke) Accessed on 11th August, 2021