

**LEAN PRACTICES AND OPERATIONAL
PERFORMANCE OF AUTOMOTIVE FIRMS'S
WORKSHOPS IN NAIROBI**

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DECLARATION

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This project is my original work and has not been submitted for a degree in any other university.

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DEDICATION

This study is dedicated to my wife Ceciliah, our children Ruth and Lisa for the sacrifices they made while I was studying. To my late father Gedion Walukwe, may his Saul rest in peace. To my mother Melenia Agunda and the entire Walukwe family for their encouragement and prayers throughout my studies.

ABSTRACT

This study is about lean practices and operational performance carried out in various workshops in Nairobi operated by selected automotive firms to establish the use of selected lean practices and to find out if the lean practices applied actually lead to operational performance. The study looked at the various lean practices as applied by the various organizations and went further to look at the effect of these lean practices on the operational performance of these organizations. On operational performance, the study went past the mere fact of looking at performance in terms of profits alone and looked into issues like customer satisfaction, talent retention, throughputs and accident levels. These lean practices are therefore highly recommended and the performance measurement measures must be applied so that they are not applied blindly for the sake of using them. In general, lean practices are widely applied in most automotive industries in Kenya. The commonly used practices include service booking, inventory control and use of supply contracts or use of one reliable supplier. The least applied lean practices are in issues like ensuring service parts availability, talent retention activities and ensuring that on vehicles in work in progress are in the workshops. The study also observes that lean practices affect the operational performance of these organizations. Notably, when applied, the practices highly increased the profits, sales while reducing the training costs. On the other hand these practices were to have little influence on talent retention, workshop accident level and customer complains. The study further recommends cross training of all workers in this organizations on the use of the lean practices. This will ensure good results from every member of the organization. Since lean practices as observed are so many, the study recommends further studies on each and every practice for elaborate and more meaningful results.

TABLE OF CONTENTS

Declaration.....	II
Acknowledgement.....	III
Dedication.....	IV
Abstact.....	V
List of Tables and Charts.....	IX
Abbreviations.....	X
Chapter 1: Introduction.....	1
1.1 Background.....	1
1.1.1 Lean Practices.....	1
1.1.2 Operational Performance.....	4
1.1.3 Automotive Industry in Kenya.....	5
1.2 Statement of the problem.....	7
1.3 Objectives of the study.....	10
1.4 Value of the study.....	10
Chapter 2: Literature Review.....	11
2.0 Introduction.....	11
2.2 Theoretical framework.....	11
2.3 Lean thinking.....	12
2.4 Performance measurement.....	13
2.5 Lean and Performance.....	13
2.6 Empirical studies on Lean and Performance.....	14
2.7 Conceptual framework.....	16

Chapter 3: Research Methodology.....	20
3.1 Research Design.....	20
3.2 Population.....	20
3.3 Data Collection.....	21
3.5 Data Analysis.....	21
Chapter 4: Data Analysis, Findings and Discussions.....	22
4.1 Introduction.....	22
4.2 General information.....	22
4.3 Application of lean practices.....	24
4.4 Performance Measurement.....	26
4.8 Lean Practices and Operational Performance	27
Chapter 5: Summary, Conclusion and Recommendations	33
5.1 Introduction.....	33
5.2 Summary of the findings.....	33
5.3 Conclusions.....	34
5.4 Recommenations.....	34
5.5 Limitations of the study.....	34
5.6 Suggestions for further study.....	35
References.....	36
Appendix I: Introduction Letter.....	37
Appendix II: Questionnaires	39
Appendix III: Automotive firms in Kenya.....	45

LIST OF TABLES AND CHARTS

Table 1: Statistical data on quarter 1 from KMI 2016.....	6
Chart 1: A hypothetical analysis to show if lean practices improves performance.....	12
Table 2: Lean practices	19
Table 3 Respondents Positions	23
Table 4: Employment Duration	23
Table 5: Lean Practices applied by automotive firms in Kenya.....	25
Table 6: Performance Measurement	26
Table 7: Effects of lean practices on operational performance.....	28
Table 8: Lean practices Contributions.....	29
Chart 2: Contributions of lean practices on Performance.....	30
Table 9: Effects of lean practices on performance.....	30
Chart 3: Effects of lean Practices on performance.....	31

ABBREVIATIONS

KMI- Kenya Motor Industries

WIP- Work in Progress

PDCA-Plan Do Check Act

KPI-Key Performance

TQM-Total Quality Management

JIT-Just In Time

TPS-Toyota Production System

TOC-Theory of Constraints

PMS-Performance measurement systems

SPSS-Statistical packages for social sciences

SD- Standard deviation

CHAPTER 1: INTRODUCTION

1.1 Background

Organizations operate with a key goal of adding value in all their processes. In such cases, they try to eliminate all other processes that do not contribute to the value addition factor. As studied by Womack and Jones (1996), the impact of all the activities with that mindset can be considered in form of the output of the organization thus regarded as its performance. All the processes aimed at eliminating waste in the production system will be regarded as lean practices (Walters, 2006).

The study, therefore, looks at lean practices and how best they can be used to enhance performance. According to Porter (1996), low cost production can only be achieved by eliminating wastes. Cost reduction and lean operation are therefore viewed as the same in Porter's thinking.

Ford Motors (1984) in America measured performance by the quality of the job done, the market share, profits achieved and the annual operating costs (Walters, 1996). For example in the same year, the warranty repairs dropped by 45%, faults dropped by 50%, market share rose by £ 4.3 billion, annual operating costs fell by £ 4.5 billion. We will, therefore, think of our performance in this direction

When waste builds up in a process it can be difficult to identify and remove it (Waters, 2006). In all our processes therefore we should concentrate on designing services that customers value, making the best processes that enable a value stream, creating efficient flow of materials through supply chain (value flow), creating services only where they are demanded (pull) and looking for improvements to get closer to perfect operations (aim of perfection) (Womack And Jones, 1996)

1.1.1 Lean Practices

Lean practices are all things done in an organization with a clear goal of eliminating waste (Walters, 2006). Waste is any process or people of which the attainment of the end result is inconsequential to the desired result either in a production, process service or a manufacturing industry (Benson and Kulkarni, 2011). They continue to argue that, lean

thinking and practices are concepts aimed at satisfying customer needs at the lowest possible cost using the minimal available resources at your disposal. It is therefore paramount that organization which observes these practices will only direct all their energies in aspects that put more on their table. Once this is achieved then the focus of all people will be in improving it further without creating a new process. This is commonly referred as continuous improvement in modern management (Walters, 2006). What is important therefore is to have a situation in your production system where the outcome gives more meaning to all stakeholders in the organization. The idea the must be shared and be the responsibility of every member of the organization. This is a common practice in ensuring total quality management (TQM) so that everyone owns the idea meant at ensuring that the organization achieves more with less factors of production. If all this is done then in our operation there should be no build up to work in process (WIP) and inventory (Shewhart, 2006)

When we develop the two basic concepts of lean operations as studied by Murman(2002) and Emiliani (1998) of first removing all the wastes and then having a positive outcome for the input in so many activities in the operation process then we end up with what we can simply categorize as value stream. In analyzing this we look at features like supplier integration, service delivery time to customers, distribution times and networks. In this therefore you come up with what is really needed and then eliminate all the unnecessary factors and conditions so that you only have limited input that create end results which are fruitful and have impact on the organization and customers. (Murman, 2002).

There are various lean practices in various studies. However for this study we will concentrate on; continuous improvement or as commonly known as *Kemba Keizen* in Japanese, the Kanban system of production and workshop flow, the 5s practices, workshop planning, inventory and WIP management, JIT practices, using reliable suppliers and Total quality management (TQM). This having been discussed earlier but will now form the basis of our study to see how they impact on performance (Perez, 2001).

Lean practices aim at eliminating six main wastes (Womack and Jones, 1996); Transportation, Inventory, Motion, Waiting, Overproduction, Over-processing, Defects,

and Skills. This is, however, major attributes in the manufacturing sector. The study will, therefore, reveal how these wastes also affect the service industry.

When a process builds up it's very difficult to remove it (Walters, 2006). In most organizational setup, there is always a creation of a process that would help in the attainment of a given organizational goal (Wallace, 1996). This, therefore, creates a challenge when in the process of their operation you request them to remove some of their functions simply because they do not add value to the same organization that designed them. It is important that before you create a new process you develop a forward thinking on what waste it may build in future. This is better stated as lean thinking and focus in all we do (Thomson and Wallace, 1996). Once this is in place, a new creation in processes will be easy as no waste will build (Grutter, 2002). It's also important to analyze the impact of your process as you continue (Sohal, 1996).

The second thing Womack and Jones (1996) argue is the creation of a continuous flow systems. In this argument, they advocate for the creation of seamless processes that help in building a transformative output in all the process. It disagrees with the batch system of production in order to reduce the changeover wastages that arise at the end of one batch. In a continuous flow even if the work is done in shifts there will be no delays as all shifts operate as a single module. This is highly recommended for the service and manufacturing industries that try to adopt lean principles.

Thirdly, Womack and Jones (1996) also consider customer pull as a major lean practice. They define customer pull as a creation of value in the products and services offered by an organization. This will ensure that you will minimize on advertisement costs since the products and services will advertise on itself through the pull. This concept always works best with the Just in time (JIT) principle since if not managed properly it leads to customer overflow. (Schonberer and Knod, 1991). The value of the product and services will pull them and sometimes they may come in numbers that you may not sustain leading to them looking for other options. If in a production system you may have to apply the Kanban system (Peterson, 2015) just to ensure that your stock is always in place and there is plan for next production.

Lastly, the two gentlemen also support continuous improvement. Any good effort made must be maintained and something better done on it as time goes. This reduces the changing costs like in training on a new lean practice. You practice continuous improvement by updating and upgrading on the current process before embarking on another lean process (kaizen) (Shewhart, 1891-1967). This helps in building confidence in every process you develop and even the people will have strong faith in all they do. The only challenge with continuous improvement is how to determine if a process is not working so that you abandon it and focus on a more valuable process.

All this are simple lean practices that once mixed with other simple philosophies like the Plan Do Check and Action PDCA circles (Deming, 1950) always brings out the results we desire. It's commonly referred as the Deming circle and is a common tool used in the continuous improvement process.

1.1.2 Operational Performance

There are various definitions of Performance. Samson and Terziovski (1999) offer the most accepted definition as the fulfillment of given roles and duties with the given set parameters to be met. The common levels of determination may include, budgets set, cost implication, time factors or duration of certain operations. It may then be simply stated as the fulfillment of set obligations in which case the binding terms must be stated before the start must all be met or there must be a way to gauge the extent of satisfaction. (Zhu and Sarkis, 2004). In employment industry, the concept can be determined by the Key performance indicators (KPIs) that are given to each employee and the results determined based on the set values.

In the manufacturing sector (Perez, 2001) which is the origin of lean practices, performance is determined by; Units manufactured, Total cost of production, Facility utilization rate, Manufacturing cycle time, Defects or recall rate, Inventory turnover ratio, Safety incidents per employee, Scrap rate or amount of scrap produced, Average productivity downtime and Customer satisfaction. However most organization emphasis more on financial figures to gauge performance yet they to explore other broad analysis of performance. Performance should, therefore, be analyzed holistically and clear

understanding of lean principles and the total quality management (TQM) approach (Stewart, 1997). This will help in appreciating that every sector of the organization is important and must be appreciated for the overall good of the company.

1.1.3 Automotive Industry in Kenya

Automotive industries in Kenya are generally facing stiff competition in trying to control the market share. According to the data from the Kenya Motor Industries (KMI 2016 data) association for the first quarter of the year, 2016 majority of the dealerships have dropped in their bid to fully control the market share. They are therefore experiencing a swing in demand. Swings in demand can greatly affect capacity issues (Sconberger and Knod, 1991).

According to the data from the Kenya motor Industries (KMI) association, automotive industries in Kenya have experienced a very stable business operations conditions for almost half of the past decade (KMI 2016). This has been mostly attributed to the brand identity and franchise holding which they have always enjoyed on any acquisition. However, lately, a trend is emerging whereby vehicle brands and franchise continuously shift from one dealer to the other (Business daily 2014, KMI 2014). This has been occasioned by the main shift in the shareholding of the parent companies, the new acquisition by others or and a demand for high profits.

The Kenyan vehicles market during the first quarter of the year 2016 had a great drop in performance across all the motor dealers with an impressive loss in sales volume paying any expectations of the strong 2015 performance. However, the still robust economic growth leaves expectations for a recovery during the rest of the year.

As released by the Kenya Motor Industry, KMI(2016 First quarter report) the worst month of the first quarter was January with only 1287 units sold down by 34.0%, followed by two months just as negative with only 942 units sold in February and 1304 units in March resulting down to 30.2% and 29.5% respectively. The total local vehicle sold in Q1 of the year 2016 was 3533 units down by 31.4% compared to the same period the previous year.

In the first quarter of 2016, the market leader was Isuzu with 1117 units controlling 31.6% of the market share. Mitsubishi was second with 698 units at 19.8% of the market share ahead of Toyota with 636 units controlling 18.0% of the market share then Tata with 160 controlling 4.5% of the market and finally Nissan closing the best five with 149 units controlling 4.2% of the market share.

The statistics above depict a stiff competition and a struggle to control the market share. This may force some of them to shift focus on after sales to realize better margins.

To ensure survival especially for new entrants who may not have the luxury of having bigger facilities, there is the need to apply principles of lean operations (Porter, 1996). A keen look shows that it's only Toyota Kenya which applies it by the virtue of extension from the parent company. The lean principles and practices were first used in Toyota Production Services TPS (Ohno, 1988). Nissan Kenya is the latest entrant in the very competitive market (Business Daily, 2014) has many challenges such as space, adequate personnel to carry out all functions of its dealership countrywide and full countrywide dealership network to support its operation throughout the country.

The table below shows the performance of various franchises in the first quarter of 2016

Table 1: Statistical data on Quarter1 2016 motor vehicle brand performance

Quarter	Brand	Units Sold	Market Share	Quarter 1 Variation
1	Isuzu	1,117	31.6%	-25.1%
2	Mitsubishi	698	19.8%	-28.6%
3	Toyota	636	18.0%	-43.6%
4	Tata	160	4.5%	-34.4%
5	Nissan	149	4.2%	7.2%
6	Hino	114	3.2%	58.3%
7	Ford	91	2.6%	-73.5%
8	Man	68	1.9%	61.9%
9	Landrover	61	1.7%	-35.1%
10	Scania	60	1.7%	-28.6%

Source KMI Data 2016

1.2 Statement of the Problem

If you are well versed with the principles and practices of lean management and operation then you find it as a must use tool in all your operation. Several studies have been developed in analyzing lean practices and their contribution to operational performance. The main goals of applying lean strategies must always be clear otherwise the initiatives will always face bigger stumbling blocks in bid to operationalize these concepts (Denton and Hogson, 1997). According to Womack and Jones (1996), lean activities should focus mainly on value adding activities. This is critical because in this creation you may end up eliminating even the key functions in your efforts to remain lean.

In most cases an integration of the processes always works better. Hines (2004), supports this idea but sees a better outcome if you don't do away with what you were working on but rather find ways of integrating the two systems together to work as a unit. In both studies it is now clear that lean practices are widely accepted and in places like the United States of America (USA), it was like a revolution where all manufacturing companies were all striving to remove waste and thus applying all these principles (Blanchard, 2007)

This study, therefore, did find out how automotive firms can remain profitable even if they experience a sudden drop in capacity (Thomson, 1996). The study focuses on the use of lean principles of management that will, in turn, ensure performance levels remain relevant to the organization's survival in the competitive market. It focuses on how best they will maintain their stocks properly by good inventory management (Wild 2002) so that even if the demand is low but they will still have something to sell and remain profitable.

Zayko (1997), looks at lean practices as anything that can help in reducing human effort by over fifty percent (50%). He argues that waste burdens employees and slows down their efficiency and effectiveness in the production system. When you apply the principles like the just in time (JIT), in your production process, then there are chances that all who are in the production line will always get the necessary parameters for production thus improving on overall efficiency. This thus qualifies JIT as a key factor in lean production (Hines, 2006). When this is achieved then the performance will be best

defined in this scenario as meeting the contractual obligations (Hacker, 2005). Any activity within the contract that may happen and seem important but may not help in the achievement of the actual result is therefore regarded as waste. Waste in a manner that it adds no value to the achievement of the final result (Ohno, 1998). When you eliminate such your output increases (Motwani, 2003).

A lean process is majorly applied in the manufacturing industry and traces its origin in the automotive industries (Ohno, 1988). This has really helped the organizations reduce wastes and this increase performance in terms of units in the production line (Tapping, 2006). With this in mind, if we apply the same in their service industry i.e. parts and service distribution then we critically view what could be the impact in the market?(Krafcik, 1998). We view if it could even lead to more sales since the best interaction time between producers and consumers is at the after sales level.

We find out how best we can serve them at the minimal cost (Hacker, 2005). Quality service is not expensive (Walters, 2006). It only becomes expensive if we do so many things that don't add value to the customer (Ohno, 1988) and transfer the costs to the customer. If we eliminate this through a keen look at the lean processes (Porter, 1996) then we formulate a process that is affordable and faster.

It is therefore in this context that a study is important to be carried out in an automotive industry to analyze their processes and find out which are lean practices and which are not. Then we formulate other lean processes that they can apply to improve their performance (Stewart, 1997).

Another study in support of lean is the survey by Coyle-Shapiro (2002). In this survey he concentrates the two major aspects of lean, continuous improvement and total quality management (TQM). His main focus on performance is through the application of these practices is to achieve perfect customer satisfaction and hence have a positive response. This is better in application for the service industry (Voss and Rytter, 2001). Coyle also accepts the time based focus in production though he doesn't dig deeper into it. TQM and time based manufacturing or JIT go hand in hand since they all require a strong change in organizational culture for them to be properly embraced (Done, 2011)

The last international study on lean and performance is on lean ports performance by Marlow (2003). This is captured in volume 1 of issue 4 in the International Journal of transport management. Ports just like any other logistics service industry gives more of a quantitative approach rather than a qualitative approach to performance measurement. In this study, Marlow tries to measure the qualitative aspect of port performance. He find out that it can work but only if all ports are converted to Agile ports. In Agile ports you will be able to integrate both external and internal factors that determine port performance (Karlsson and Ahlstrom, 1996). Although it doesn't bring out clearly the aspects of lean but it actually brings out the two aspects of analyzing performance in the service industry; qualitatively and quantitatively. This was majorly in the United States of America (USA) but the concepts may be developed worldwide.

In Kenya, various studies have been done in relation to lean and performance. In 2013, Onyango studied the relation between Lean enterprise and supply chain performance of Pharmaceutical companies in Kenya. In this study, she tries to verify how the various aspects of a supply chain can be improved by simply looking at the various ways of eliminating waste. This is a service industry and she tries to identify ways in which waste accumulate (Cooper, Lambert and Pagh, 2012).

Kimani (2013) looked at the various lean supply chain Management in manufacturing firms in Kenya. In this study, Wanjiku stresses the need to eliminate waste (Manrodt and Vitasek, 2008) in the various aspects of supply chain management in order to boost the outcome of the manufacturing process.

Malonza (2014) did analyze the lean manufacturing and operational performance of Mumias Sugar Company Limited. In this study, Malonza finds the various ways in which the sugar miller can eliminate waste in the various manufacturing processes.

In both cases above both Malonza (2014) and Kimani(2013) are manufacturing cases of lean practices and though they offer the same insight into these practices our case on automotive industry is majorly on service industry except for the few assembly cases like In General Motors EA and Motor Vehicle Assemblers in Mombasa (KMA, 2016).

This study was carried out to know which lean practices are applied in automotive firms in the case of various workshops in Nairobi, how these lean practices affect the performance of these organizations and possibly recommend to these workshops how to improve its performance through the application of lean practices.

1.3 Objectives Of The Study

The research was to fulfill the following objectives:

1. To establish the lean practices applied by automotive firms' Nairobi workshops;
2. To determine the impact of the lean practices on performance of automotive firms' Nairobi workshops.

1.4 Value of the Study

Lean practices help organizations like the automotive industries in Kenya to eliminate waste. The practices like inventory management or proper control of the work in progress (Wild, 2002) are very significant for the performance of any organization. This can only be achieved if a culture is developed in every stakeholder in the organization. This can only be achieved by use of the Total Quality management (TQM) ways (Waters, 2006). It cannot be left to the management alone. It must be everybody's concern for the attainment of tangible results.

The study, therefore, was done to enable the engagement of everybody in the organization (Walters, 2006) in a way to awaken them in their various roles so that they carry them out with a lean mindset.

The study will also assist in building the knowledge gap experienced in the use of lean principles in the service industry since most lean practices have always been directed in the manufacturing sector (Porter, 1996). This, therefore, is a mind opener for other scholars to take a look on their application to the service industry like in this case where we look at the automotive firms in with a keen interest in their Nairobi workshops.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

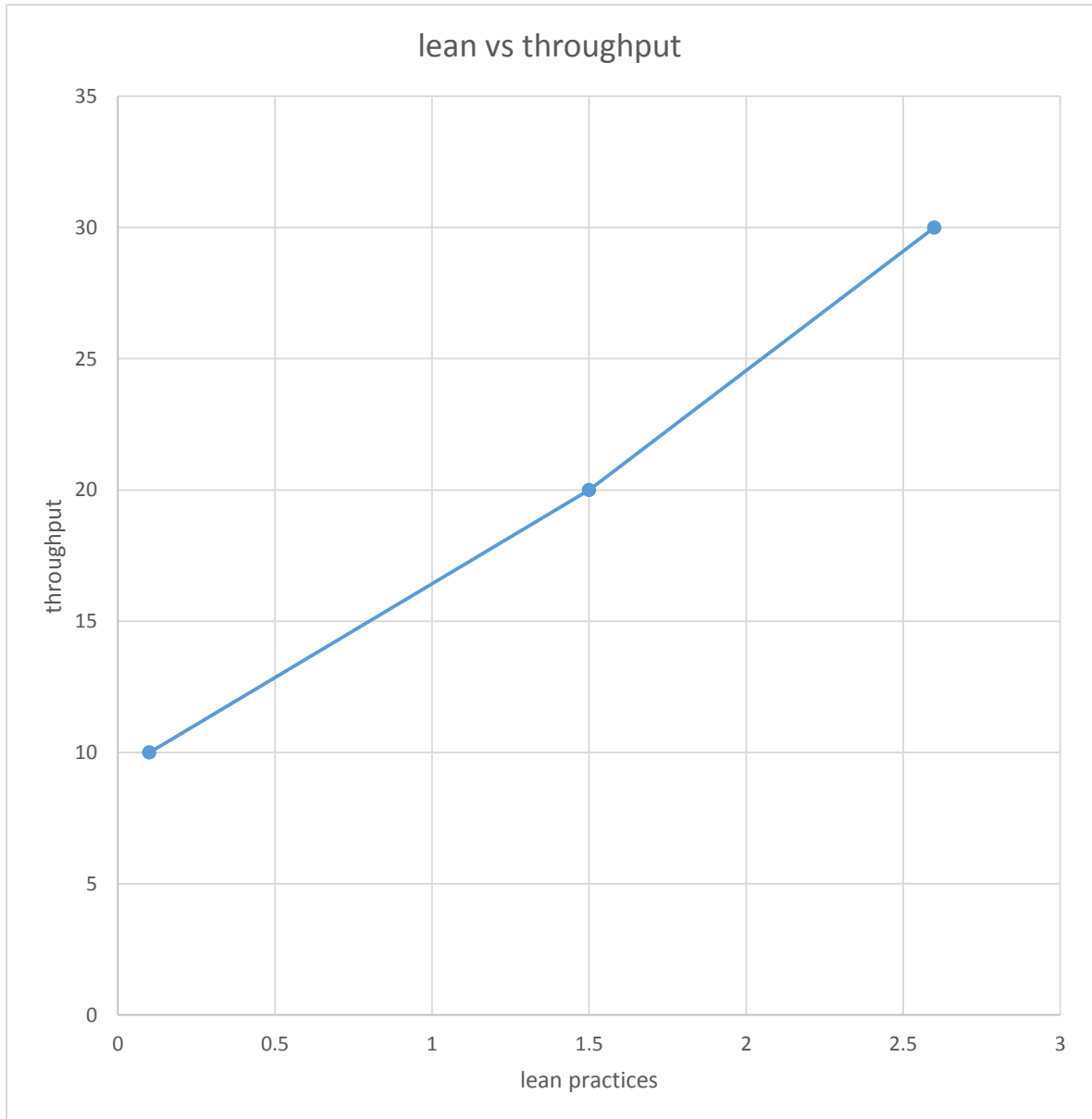
In this chapter we analyze the conceptual framework, theoretical framework and also look at the reasons why we use lean principles in day to day operations. It's an insight into the application of this practices and the justification for their use in any organization and with a keen interest in automotive firms.

2.2 Theoretical Framework

This research was basically based on the theoretical aspects as derived in the theory of constraints based on the development by Goldrath (1984). Most organization develops the lean thinking when a constraint has developed in terms of few resources to manage a bigger production. In this case then you will be having certain limiting factors as you try to achieve a certain output level. The theory of constraint therefore requires that you take a keen analysis of all your processes. You have two issues at hand, your systems and processes and the desired output levels.

It is therefore required that you remove the constraints by removing all activities that don't add any value to the desired output. For example in manufacturing you will analyze all the bottlenecks in the production process and then remove one after the other. The only difference is that you do it with a lean thinking in mind in that it should not result to more output and at the same time causing wastages. It should add value to the organization. The five basic steps in ensuring the successful application of this theory is to apply its five steps. First, identify the main limiting factors of your processes and tabulate these factors properly. Secondly, exploit options of having the constraint or removing it completely. Thirdly, find ways of doing away with the constraint. Fourthly, improve on your fourth step in working on your constraint elimination. Lastly, repeat the circle to ensure full compliance. This can better achieve when use the Plan Do Check and Action approach commonly referred to as the Deming circle (Deming, 1950).

Chart 1: A hypothetical analysis to show if lean practices improve performance



(Source, Author 2016)

2.3 Lean thinking

All organizations strive to excel in whatever they are doing with the resources they have at hand. In most cases, the resources are always minimal. A situation, therefore, emerges that you have to keep afloat in your production process with very minimal resources at hand (Movahedi, Lavassani & Kumar, 2009). A constraint, therefore, develops in which

you have to work with. In order to meet your set targets you have to come up with various theoretical foundations that will help you be in business.

Just in time (JIT) production is one of the ways that will ensure that you minimize your inventory levels and ensure that all that is produced is directed to the market (Simchi-Lev and Kaminsky, 2007). In this case, you ensure that you get your returns on investment (ROI) immediately and at the same time minimize your inventory costs and damages that might arise during the storage process.

This study, therefore, was based on the theory of constraint whereby in whatever was done, a bottleneck was identified and a practice that will help you solve it in time developed to ensure you remain afloat in business (Movahedi, Lavassani and Kumar, 2009).

2.4 Performance Measurement

Most organizations base performance measurement mainly on the Return on investment (ROI) which is analyzed at the end of a given accounting period (Revelles, 2006). This is very important but there are other performance measurements which have been long ignored and in the end affect the ROI. This study was, therefore, elaborate on the other performance measurement indicators like throughputs, profits, market share levels, employee talent retention, workplace accident levels, repeat jobs, warranty claims and the customer complains (Field and Faull, 2002).

Most of this occurs on a daily basis and most organizations don't find any need to quantify their levels not knowing that they contribute to the overall performance level. It's also easier to control what happens on a daily basis than to wait and determine what will happen at the end of your accounting period (Kearney, 2002).

2.5 Lean and Performance

Lean practices are only carried out with an aim of improving performance (Stewart, 1997). You only eliminate waste in order to increase the profits you declare at the end of your accounting period. This, therefore, depicts a clear relationship between lean and

performance (Ward, 2003). Its, therefore, common knowledge that whatever the lean practice we develop it must be able to yield given performance results.

If you apply the kanban system for your inventory management, you should be able to maintain a continuous flow of your materials for production and therefore at no particular time will you stop production due to lack of raw materials. This, therefore, helps you to practice JIT (Hoek, 2008) and meet customer demands.

2.6 Empirical Studies on Lean and Performance

Lean and performance have been widely studied empirically. According to Neely, (1995), there is a need to look at performance by quantifying everything. He analyses everything in terms of performance measurement system (PMS) which is developed parameter with a set of nine measurement metrics that give a guideline in what is measured at the end of a production activity. In such a scenario, an organization is divided into sections, divisions or department. Each section then has a set target depending on the uniqueness of their activities.

The performance measurement System (PMS) then has nine set of metrics that helps in clearly defining the efficiency and effectiveness of a given section. The same can be narrowed down to individuals in the given sections (Moreira, 1996). As much as this study tries to quantify performance up to individual level it fails to account for performance of group work and in cases where team work is required. It fails to highlight cases like in a football match where the team can lose a match but still you have individual brilliant performance from the team. Its therefore more of a generalization practice and can only operate well in cases where individual performance is required.

This study, despite the setbacks, has been widely applied in areas of accounting, financial management, human resource management and continuous improvement management activities (Neely, 1999). Despite the fact that it majorly narrows on financial gains or losses in defining the performance of an organization, it still helps in really defining why organizations exists. Without monetary gains most organizations will collapse and therefore they score high on this since most organizations are defined to be performing with profit levels. This study experienced changes in the 20th century when

most organization felt the need to look at a more modern approach in analyzing performance and widen the scope of determining the performance measurement parameters. Organizations have gone further to use measurement factors like talent retention, accident levels, employee happiness and customer satisfaction. This has led to most organization engaging in non-profit activities in form of customer satisfaction initiatives (CSI) just to ensure that they get a feedback and their customers are happy. In his argument, Neely (1999) still believes that the tradition has to change and a broad application be made in analyzing performance so as to give it a bigger picture and also consider the practices that make it occur. This will ensure that you don't just think of performance at the end of the accounting period but make it a routine in all activities.

Lenox (2001) looks at the environmental perspective in analyzing his lean practices. He looks at preserving the environment in a way that any practice developed must be sustainable. He holds a Ph. D. in technology management from Massachusetts institute of technology. He also has a Bachelor of Science degree and Master of Science degree in systems engineering from the University of Virginia. His argument is quite elaborate and seen as long term solution to narrowing down to performance measurement. He says that when you think business, think of sustainability. Think of tomorrow in any practice you develop. This has had a good impact especially in the manufacturing sector who would not think of environment. This has made organization to think on safety issues without any legislation. It has changed the thinking and its now not profit alone but we also consider other aspects like employee welfare and the sustainability of our business models.

The concepts of Lenox (2009) have been widely accepted and have also experienced legislative support and most organizations emphasize on going green in all their operation. It is therefore a performance measurement in most organization on how well you conserve your environment (Business Daily, 2016). In Kenya, organization like Total Kenya Limited have come up with activities like the eco-challenge to preserve the environment by simply planting a billion trees every year (Total Kenya, 2016). In this case they know that if their product is widely used it possess a challenge to the

environment and therefore for them to continue performing tomorrow they have to go green.

2.7 Conceptual framework

The concept of lean has to be argued in a case combining both the independent variables and the dependent variables. When you develop processes and practices that eliminate waste, the end result must not just be no waste but like as in this study, it must lead to operational performance of an organization. You therefore integrate the principles like using reliable supplies with certain outcome like quantity discounts on supplies thus lowering operating costs and thus increasing profits (Shah and Ward, 2007).

Just as in the manufacturing industry, lean practices are all activities aimed at eliminating wastes in the flow process. This is a Japanese invention and commonly uses its words like 'muda' to mean waste, 'Muri' to mean over processing and 'Muri' meaning workloads. The main aim while applying these principles is mainly to eliminate waste. (Liker, 1998)

In lean thinking, therefore, you aim at eliminating waste and at the same time ensuring quality. The principles are therefore close to TQM principles since once you identify one process that helps you eliminate waste then you should be able to improve on it continuously. Continuous improvement or as commonly referred in Japanese as 'Kemba Keizen' therefore works closely with lean (Karlsson and Ahlstrom, 1996).

The principles of Just In time (JIT) processes are also applied since you have to develop seamless processes that don't waste time. This, therefore, calls for the need to have reliable suppliers in working environment (Simchi-Lev and Kaminsky, 2007). This will ensure that you keep a small inventory but at the same time, you are in the position to acquire anything you want at the required time.

The philosophy of lean was first introduced by Ford (1910) in the automotive industry, and in particular in his Ford Motor Industry and continued on as the main manufacturing focus of Toyota's vehicle production system TPS, to deliver orders as quickly as possible, and achieve a perfect workflow. The practices were improved by Taiichi Ohno and Shigeo Shingo in Japan while for Toyota Motor Company as they tried

to adopt the lean strategy in 1950's (Ohno, 1988) Toyota's goal of Lean is to reduce waste in the form of "non-value-adding work," "overburden" and "unevenness," which, in turn, will expose systematic weaknesses. Additionally, Lean can be seen as the set of tools used to assist waste reduction, which can be in the form of staffing, recruiting or outsourcing services which necessarily need not to be done internally. When you outsource you always do away with so many unnecessary administrative costs.

When an organization adopts the lean focus it strives to basically eliminate any form of waste which in turn may lead to increase in lead time between customer demand and satisfaction (Walters, 2006). When you adopt this focus then you have to constantly be identifying and removing all other activities that don't contribute to the overall goal. This will leave you with clarity of purpose in whatever you do and thus improve your accuracy if in manufacturing, quality of production and improvement in customer service (Womack and Jones, 2006).

Lean practices and principles also go hand in hand with the principles of six sigma (Juran, 2007). Both Lean and Six sigma also identify eight types of wastes that should be targeted and thus eliminated (StratForm, 2004). The wastes include, inventory, waiting, transportation, motion, overproduction, over-processing, quality defects and misappropriation and misuse of talents. In inventory, it's a case when you have a big work in progress (WIP) that you cannot easily identify. Very common with automotive industries where so many units will always be in WIP because of waiting one part or a given approval.

In waiting, this is when so much is always queuing for the next cause of activity or action point. This always results when there is slight brake down or systems are slow. It always results in customer loss in a service industry where physical appearance is necessary. In transportation, this is where movement has to be done for the next cause of action. Always unavoidable but most focus should be in establishing one stop shops. In overproduction, this is a case when you produce what is more than the market demand. The excess always goes as wastes like in cases of perishable goods if you produce more than the required amounts then you have to dispose the remaining without any returns. In over-processing, is when you perform an operation more than necessary in a given

production process. If in a production line then there will be wastage in manpower, energy and any other resources used in the process. In misuse of talent, it's common in human resource capital and mostly occur in a way that people are deployed in wrong areas of their qualification. The danger is that they take long to learn and understand what is expected of them. This results in wastages in training or in resources which result from wrong production. And finally in quality defects, you will always have to do a repeat and thus incur unnecessary costs as waste. These eight form wastes discussed above are common but if clearly stated they can be avoided (Ward, 2003)


It is therefore clear and as Tapping (2006) states that the main goal of lean is thus to remove waste through the creation of principles and practices. Tapping in his study advocates for the creation of lean companies that eliminate all non-value adding activities which will in turn reduce process lead times, provide excellence in customer service and make something big out of scarce resources available as efficiently as possible. This can only be achieved if there an internal standardization of internal processes and this is seen as one of the 5S practices of standardization (Emiliani, 1998).

It's not easy to carry out lean practices in isolation of the 5s principles (Ketchen and Hult, 2006) of operation. These practices were originally done in Japanese language as in the Toyota production system (TPS) but had to be translated in other languages mainly English due to their wide relevance and demand for application. It is therefore considered as a philosophy and observes certain application rules. As in lean practices, they also go hand in hand with rules of total quality management (TQM). The elements of 5S include sorting, straightening, shining, standardization and Sustaining (Juran, 2007). In sorting you have to choose from among your process which is applicable for which operation to avoid confusion and application of a wrong process in a given operation. In straightening, you align the chosen process with all your operation to limit any conflicts that may arise. In shining, you ensure that you observe cleanliness and most important you observe clarity in all your processes. In standardization, once you have an accepted process then you document it so that it has a clear procedure followed by everybody in the organization. And finally in sustaining, you make your process a way of life. Don't rush to create a new process before the current is internalized and bears results.

Once they are in application, 5S have so produced very significant output (Revelle, 2004). This include a reduction in operating costs, lower defects rate in the final production line, a highly motivated and spirited workforce, an improved ownership of the organization by customers, suppliers, employees and management, better utilization of the organization’s assets and a good outlook image of the organization. All this is only applicable if properly applied and in line with the principles of lean practices (Juran, 2007).

The illustration below is on the various lean practices as independent variables and how they determine performance i.e. the dependent variables.

Table 2: Lean practices and some performance measures

Independent variables		Dependent variables
1. Using reliable single suppliers		1. Market share
2. Using 5s practices		2. Revenue
3. Applying TQM in your organization		3. Repeat jobs
4. Continuous improvement		4. Employee turnover
5. Kanban system		5. Warranty claims
6. Inventory/WIP control		6. Customer response/complains

Source Author 2016

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research Design

This research was designed and conducted in a multi-case study (Hyer and Zimmerman, 1999). This allowed for the study to be done in different firm each with unique operating conditions. This therefore brings out the multiplicity factors of the different areas of the study but still stick to the main subject of study (Yin, 2009). It is therefore a case study but carried in different scenarios but analyzing the same parameters. As in this case we look at the lean practices in the five organizations and similarly operational performance as a result of these practices in the same organizations. The case study will provide the benefit so as to observe and record non-verbal as well verbal behavior (Cooper and Schindler, 2003)

There was also the aspect of survey in the undertaking of the study. According to Shah and Ward (2003), there was use of the twenty one identified management operating practices which are classified and mainly associated with lean systems. Six out all the identified were actually found relevant for this particular study and therefore given a keen look at (Rahman and Bullock, 2005). This included the aspects of total quality management (TQM), quality management, Minimal inventory levels commonly referred in the automotive industry as work in progress (WIP), using Kanban system especially in the parts section, application of the 5S principles and practices to eliminate waste and using single and reliable suppliers. Proactive approach in all operations was also considered majorly in aspects of preventive maintenance to ensure minimal breakdown. (Shah and Ward, 2003).

3.2 Population

The research was conducted as a multi-case study in five different automotive workshops in Nairobi with twenty questionnaires administered in each of the five selected automotive workshops among the twenty-seven automotive firms in Kenya. In total, we expected one hundred respondents. We only managed 76 respondents back for analysis. This represented a 76% response.

3.3 Data Collection

The research was bracketed in people's thoughts; perception about the topic (Polit, 2001) will describe this as the process of identifying, holding in abeyance any perceived belief and opinion. The main source of data was primary from the questionnaires although there was also application of secondary data which looked at the current performance data from dashboard sheets. In the collection process there was need to ensure that the respondents cut across all the levels in the organization from top level management to support staff and customers. Out of the twenty questionnaires, ten were therefore distributed to those staff in the management level and the balance ten distributed to staff at the operational level comprising of technicians, support staff and customers. Mostly quantitative data was collected. The research instrument was divided into three parts. The first part was used to collect the biographic data of respondent and some information about the firm. The second part was used to collect information on the extent to which lean practices was being implemented in firms and how it influences performance while the third part collected data on general opinion on lean practices and operational performance.

3.4 Data Analysis

To ensure that data collected was complete and consistent, all the questionnaires were edited (Keasworth & Harding, 1992). There was checking for errors and omissions and coding for filling purposes Data analysis was done using descriptive statistics methods which make use of percentages, mean and standard deviation. This helped in satisfying the first objective of establishing the first objective of determining the lean practices applied by automotive firms in Nairobi. In the second objective, descriptive statistics combining frequencies, mean, variance, standard deviation and percentages were also used to ascertain if this lean practices actually lead to performance.

CHAPTER 4: DATA ANALYSIS, FINDINGS, AND DISCUSSIONS

4.1 Introduction

In this chapter we look at the data analysis, the findings from the research done and hold brief discussions after each finding. The arrangement is that the analysis is done based on the flow in the questionnaires since they contain the leading lines towards achieving our objectives. This was therefore done extensively across the data collected from the five automotive firm's Nairobi workshops. It is basically a summary of the results of this study.

4.2 General Information

In order to ensure accuracy of data gathered, a team of researchers were distributed to five automotive firms in Nairobi. Each automotive firm was allocated twenty questionnaires totaling our collection to one hundred collections target. They were to administer the questionnaires themselves for any clarification in the filling process and thus reduce time wastage in data collection. The achieved total collection was seventy six and this represented 76% of the target. It was considered sufficient in terms of response rate and thus considered for our study analysis.

The respondents comprised of mostly technicians with a percentage of 59%. Customers were the least respondents with 4% mostly arguing that they were visitors and not part of the organization. However, a few accepted our request and filled the questionnaires. The distribution was random and not to specific individuals. However in specific cases selected individuals in specific areas like top management were approached to give a management perspective to the objectives as stated in our questionnaires. The overall position was as follows;

Table 3: Positions held by various respondents

Position Analysis		
Position	Frequency	Percentage
Senior Level Management	5	7
Middle Level Management	13	17
Technician	45	59
Support Staff	10	13
Customer	3	4
Total	76	100

Source: Research data

The majority of our respondents were new in the industry with a percentage of 54% and those who have stayed for over five years and therefore were well conversant with the operations was 29%. This was a balanced population to learn from as depicted below.

Table 4: Employment duration

Duration In Automotive Industry		
Period	Frequency	Percentage
0-2 Years	41	54
3-5 Years	13	17
Over 5 Years	22	29
Total	76	100

Source: Research data

The majority of this firms where the study was carried received and released 10-20 units a day with a convincing percentage of 51%. The least was 7 % receiving 0-10 units a day. No firm received over 50 units on a daily basis.

It was observed that majority of these employees were aged 26-35 years with a percentage of 59%. 7% were between 46-55 and this means that the population is very youthful.

4.3 Application of lean practices

Most automotive workshops in Nairobi applied lean practices in their activities on a daily basis in different application levels as shown by the study. Booking for service was the commonly used (Mean 4.58, SD 0.58). They appreciated that indeed booking helped them to plan for service and thus reduce the time wasted when the customer has already arrived. All the instructions for the repair will be available and therefore concentration will be on the actual work to be carried out. Seeking repair approvals was also well applied (mean 3.75, SD 0.90). This ensured that what the customer approved is what is done to minimize conflicts. Preventive maintenance also was well covered (Mean 3.75, SD 0.99) and this ensured minimal breakdown in their equipment that would, in turn, minimize customer waiting time.

Proper arrangement of tools and equipment was also highly applied (Mean 4.04, SD 0.86). This ensured that everything was always at the desired position when there was need to use it. This was indeed a good time-saving practice. Generally, lean practices were applied across the five automotive firms (Mean 2.99, SD 1.29) thus satisfying the first objective to establish the lean practices applied in automotive firms' Nairobi workshops. The least applied lean practice was in ensuring that only vehicles on WIP were in the workshops (Mean 1.96, SD 1.43). This could even be seen as some workshops appeared like parking lots and went against the principles of lean through the creation of unnecessary inventory.

These findings are similar to what was done by Malonza (2013) where it was also observed that Mumias Sugar factory in Kenya, applied various lean practices in its manufacturing. The two might not be similar since Mumias sugar is a manufacturing industry while the automotive firms are in the service industry, but the application of these practices makes the findings similar.

The findings also concur with those of Kimani (2013). In her findings, Kimani points out on various lean supply chain management practices as applied by manufacturing firms in Kenya. The table below summarizes the lean practices as applied by various automotive firms in Nairobi, Kenya.

Table 5: Lean practices applied by automotive firms in Kenya

Lean practices	Application levels	
	MEAN	SD
Booking for service	4.58	0.58
Timely staff arrival at workstations	4.13	1.08
Proper arrangement of equipment and tools	4.04	0.86
Team work	4	0.93
Seeking repair approvals	3.75	0.9
Preventive maintenance	3.75	0.99
Minimal waiting time	3.71	0.95
Performance reports display	3.54	0.98
Owner collection of vehicles	3.46	0.88
Labeling	3.38	1.79
Tagging repair parts	3.38	1.41
Using reliable suppliers	3.25	1.07
Sorting/work segregation	3.13	1.12
Processes standardization	3.08	1.59
Proper filling/record keeping	3.08	1.38
Cleaning	3.08	1.67
Using repair charts	3.08	1.41
Vehicle repair follow up	3.04	0.86
Standardization of work for employees	3.04	1.37
Just in time service delivery	2.96	1.2
Supply contracts	2.92	1.1
Valuing employee time	2.79	1.79
Just in time supply delivery	2.67	0.92
Work measure/clocking	2.67	1.81
Observing workshop layout	2.63	1.71
Equipment standardization	2.63	1.44
Timely WIP closures	2.63	1.24
Frequent audits	2.58	1.41
Minimum waiting time	2.54	1.41
Workshop walk around	2.54	0.83
Quality reminder to customers	2.5	1.22
Sensitization on quality	2.42	1.64
Service reminders	2.25	1.7
New employee orientation	2.21	1.84
Accident reporting	2.17	1.66
Ensuring service parts availability	2.17	1.09
Talent retention Activities	2.04	1.65
Only WIP vehicles in workshop	1.96	1.43

Source: research data

4.4 Performance Measurement

Most of the organization mostly regarded increased profits (Mean 3.83, SD 0.92) as the sure way of determining their performance. An increased sale, (Mean 3.38, SD 0.88) also was used by many organizations to gauge performance. The least applied was customer complain minimization (Mean 1.83, SD 0.92). This is because most of the organization valued the customer concern as a way to improve their service delivery and gauge what competitors are doing.

In general, performance scored poorly (Mean 2.86, SD 1.19) since only the management was concerned with the performance yet it should be everybody's concern in an organization.

The table below summarizes the performance measurement means as applied by various automotive firms.

Table 6: Performance Measurement

performance measurement	Application levels	
	MEAN	SD
Increased profits	3.83	0.92
Increased sales	3.38	0.88
Reduced training costs	3.38	1.24
Increased throughputs	3.17	0.87
Happy employees	3.13	0.95
Happy customer responses	3.13	0.95
Minimal inventory	3.08	1.21
Minimal warranty claims	2.96	1.27
Innovative employees	2.79	1.18
Bigger market share	2.54	1.32
Increased employee transparency	2.5	1.5
Minimal repeat jobs	2.46	1.67
High talent retention	2.38	1.44
Minimal workshop accident levels	2.29	1.57
Less customer complains	1.83	0.92

Source: Research data

4.5 Lean practices and operational performance

The study established that most lean practices influence the operational performance of an organization in all the automotive industries the study was carried. Booking had the biggest weight (Mean 4.42, SD 0.93). It helped create familiarity and one on one contact. Customers also don't like queuing and therefore booking ensure faster service and therefore ensuring a bigger output. Quality reminder on customers (Mean 3.79, SD, 0.88) also was an important lean practice that ensured that all the customers' expectations were always met. Valuing employee time (Mean 3.83, SD 0.96) also ensured good performance as when their time is valued they also give their best. Timely WIP closures (Mean 3.63, SD 0.97) also ensured that they invoiced all the work done and get their money in good time. In general, lean practices influenced operational performance (Mean 3.3, SD 1.38). This thus satisfied our second objective of the study. The least practice was supply contracts (Mean 2.92, SD 1.32) because most employees were not aware of the various supply contracts in their organization and their benefits.

The main reason of using lean practices is to eliminate waste (47%) and this study also revealed that lean practices do not help in minimizing competition. Majority of the stakeholders in the automotive firms felt that lean practices affect performance only when properly applied (58%)

The table 10, 11 and 12 below summarizes the effect of lean practices on operational performance. Charts 1 and 2 also provide an insight into the effects of lean on performance. These are clear parameters that define clearly why we should apply this practice and make them part of our daily routine. It's practical and there is a clear indication that indeed they affect performance. Chart 1 is an elaboration of table 11 and chart 2 is an elaboration of table 12.

These findings are similar to those of Onyango (2013) where she looked at the lean enterprise and supply chain performance of pharmaceutical companies in Kenya. In her findings she came out with key lean practices which affect performance like preventive maintenance and just in time production. Although there was no breakdown to the actual practices like in Just in Time practice but issues like supplier contracts always go in hand.

Table 7: Effects of lean practices on operational performance

lean practices	Effect on performance	
	MEAN	SD
Booking for service	4.42	0.93
Valuing employee time	3.83	0.96
Quality reminder to customers	3.79	0.88
Just in time supply delivery	3.75	1.22
Equipment standardization	3.71	1.16
Timely staff arrival at workstations	3.67	1.63
Minimal waiting time	3.63	1.38
Just in time service delivery	3.63	1.28
Timely WIP closures	3.63	0.97
Performance reports display	3.58	1.38
Sensitization on quality	3.5	1.1
Observing workshop layout	3.46	1.25
Standardization of work for employees	3.42	1.21
Seeking repair approvals	3.33	1.79
Team work	3.33	1.74
Workshop walk around	3.33	1.09
Vehicle repair follow up	3.29	1.65
Proper filling/record keeping	3.29	1.33
Talent retention Activities	3.29	1.71
Accident reporting	3.25	1.07
Minimum waiting time	3.25	1.15
Preventive maintenance	3.21	1.67
Owner collection of vehicles	3.21	1.41
Work measure/clocking	3.21	1.59
Frequent audits	3.21	1.06
Processes standardization	3.17	1.61
Using reliable suppliers	3.08	1.56
Using repair charts	3.04	1.57
Sorting/work segregation	3.04	1.33
Proper arrangement of equipment and tools	3.04	0.95
New employee orientation	3	1.74
Ensuring service parts availability	3	1.35
Cleaning	2.96	1.57
Supply contracts	2.92	1.32
Labeling	2.83	1.55
Tagging repair parts	2.79	1.5
Service reminders	2.71	1.85
Only WIP vehicles in workshop	2.71	1.78

Source: Research data

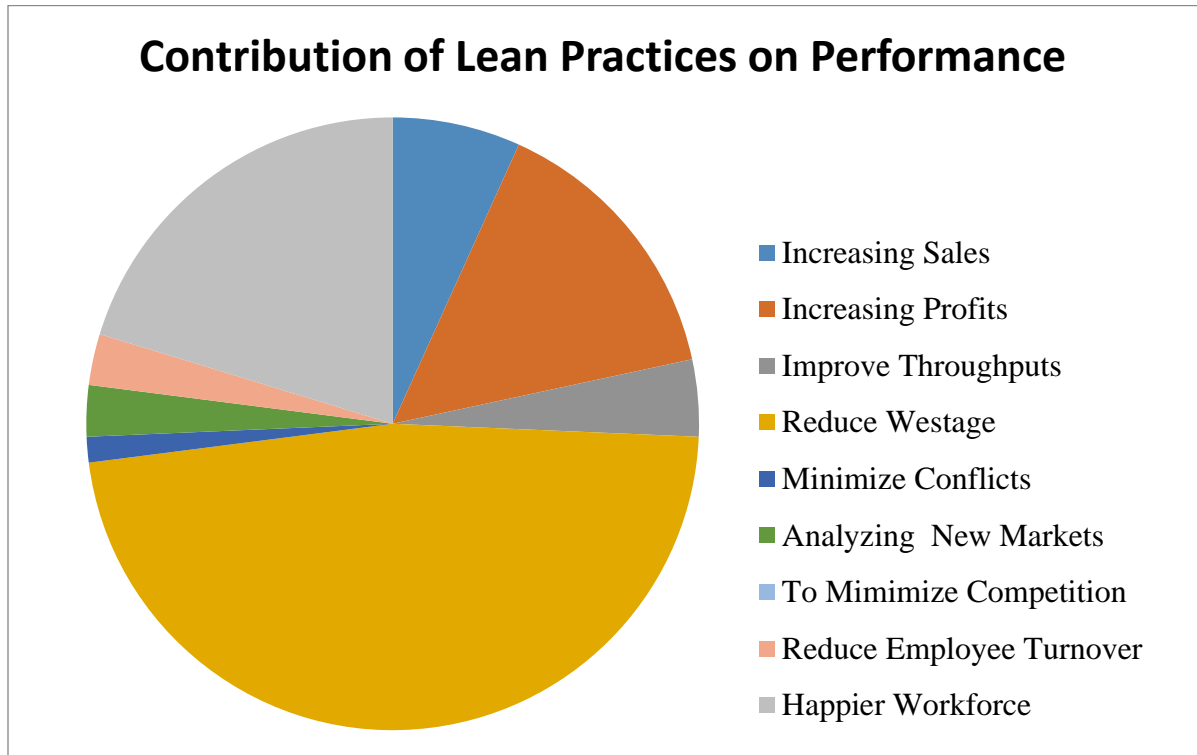
Table 8: Lean practices contributions

Contribution Of Lean Practices		
Contribution	Frequency	Percentage
Reduce Wastage	35	47
Happier Workforce	15	20
Increasing Profits	11	15
Increasing Sales	5	7
Improve Throughputs	3	4
Analyzing New Markets	2	3
Reduce Employee Turnover	2	3
Minimize Conflicts	1	1
To Minimize Competition	0	0
Total	74	100

Source: Research data

The findings in this study clearly shows as depicted in the above tables that lean practices that affect performance highly are booking (Mean 4.42, SD 0.93) and valuing employee time (Mean 3.83, SD 0.96) and the effects are clear as Reducing waste (47%), happier workforce (20%) and Increasing profits (15%). It's interesting that this study brings out that increasing profits is not even a priority of applying lean practices. This is in similarity to a study done by Malonza (2014) on lean manufacturing in Mumias Sugar Company which depicted that lean manufacturing improved quality, reduced wastages, and bottlenecks. The studies might be different as one is manufacturing and the other is service but the concept of lean practices cuts the same equally.

Chart 2: Contributions of lean practices to performance



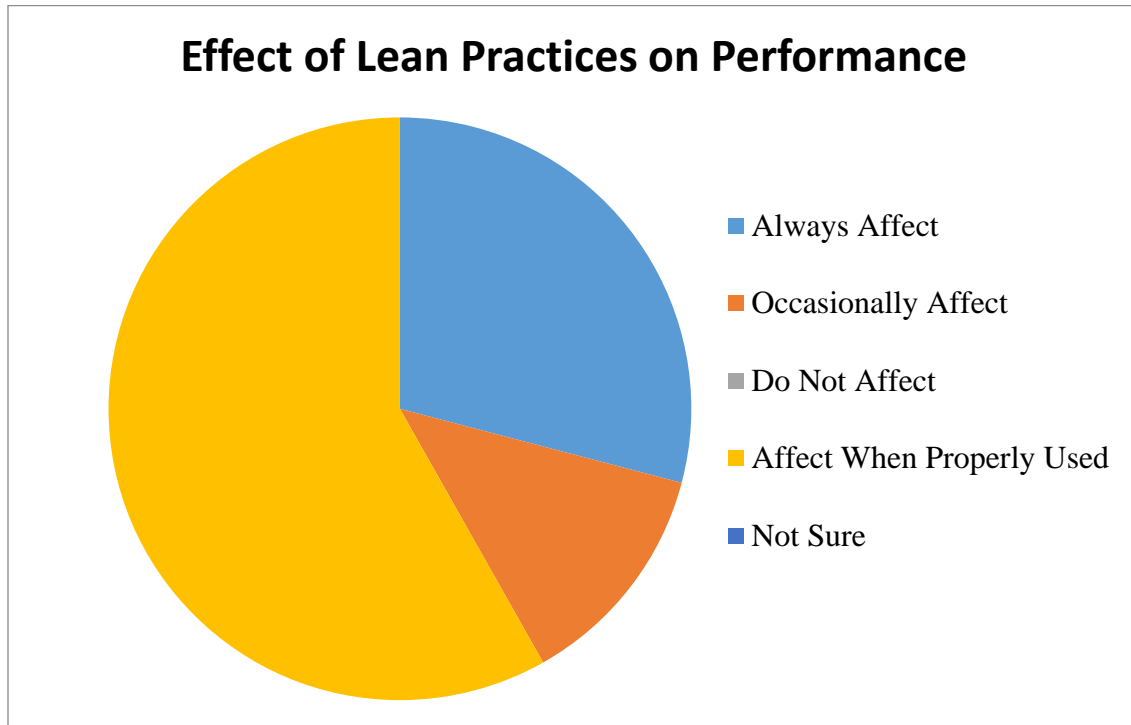
Source: Research data

Table 9: Effects of lean practices on performance

Effect Of Lean Practices On Performance		
Effect	Frequency	Percentage
Always Affect	16	29
Occasionally Affect	7	13
Do Not Affect	0	0
Affect When Properly Used	32	58
Not Sure	0	0
Total	55	100

Source: Research data

Chart 3: Effects of Lean Practices on Performance



Source: Research data

In this study, we discover that lean practices when applied properly affect the performance of an organization (58%). These findings tend to concur with the study of Kimani (2013). In her study, Kimani agrees that most organizations apply lean supply chain practices to improve organizational performance. She analyses her performance in terms of reducing the operational costs (Mean 4.67, SD 0.64) and elimination of defects (Mean 4.40, SD 0.63). These are clear indicators of performance because once you reduce your operational costs and eliminate defects then your profit margins will generally improve.

The study further identifies waste reduction as a major contribution of lean practices (47%) and a happier workforce (20%). These are all clear pointers of better figures in terms of profits if all is narrowed down to Monetary value. These findings point in the same direction with those of Kimani (2013) in her analysis of lean supply chain in Pharmaceutical firms. Waste reduction thus is a major reason for applying lean practices in both cases. The main reason thus is to remove any activity in the supply chain that

does not add value to the end results. Similarly, in the automotive industry, they are keen on eliminating waste as seen in examples when they strive to reduce customer waiting time. The only confusion that must be avoided is the risk of creating so many process which may in turn be the waste in themselves.

CHAPTER 5: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

In this chapter we look at the findings in the previous chapter four. It also has the discussions, conclusions and recommendations as obtained and guided from the objective of the study. This is done to ascertain if the two issues being addressed were actually driven to conclusion in that we fully satisfy that we can easily establish the lean practices applied by automotive firms in Kenya and subsequently show their effects on operational performance of the organization. Where not satisfactory, there is suggestion on what is to be done to achieve it fully in future.

5.2 Summary of the Findings

The study used well-structured questionnaires which were simplified from the conceptual framework so as to establish the lean practices and in turn show their impact on performance. The questionnaires were well structured to ensure that they cut across the board from lower to upper levels operations. The findings depict a clear picture of an extent of application of the lean practices in the automotive industry and the results achieved through this application.

The main lean practices as applied by automotive firms include booking for service, timely arrival of employees at work stations, proper arrangement of tools and equipment and team work. In performance measurement, most of the automotive firms observed issues like increased profits, increased sales, reduced training costs, increased throughputs and happier workforce.

It also brings a clear awareness by automotive firms understand performance, not by the obvious indicators like revenues and profits but also go to the extent of analyzing issues like talent retention, customer response, and accident levels to gauge their operational performance. It is therefore a common phenomenon that when lean practices are applied by an automotive firm, performance is clearly depicted in the end results.

5.3 Conclusions

Most automotive industries apply lean practices with a clear goal of improving their operational performance. Lean practices when applied do have an impact on the operational performance of these organizations.

Organizations which want to thrive well in a highly competitive market environment must strive to eliminate any form of waste. Lean practices ensure that these organizations eliminate waste and only do what add value to their organizational goal. The process doesn't just end at doing the practice; they should also analyze which practices help to improve their performance so that they are given priority.

This study, therefore, makes a clear statement that organization which wants to strive better must embrace these lean practices to ensure sustainable performance not only for today but also for the future. For successful implementations and for good results on these practices everyone in the organization must be involved.

5.4 Recommendations

There is a serious need to train automotive employees on the benefits of lean practices so that they always come up with projects that add value to their organization. The value needs to be seen in the performance of the organization. It's easy to create a process but once it starts operating and without clear direction, it may act as an accumulator of waste. Once accumulated it becomes an additional cost in finding ways to remove the process.

This, therefore, requires everyone in any organization from cleaners to the top directors to always act with lean practices in mind so that whatever they create does not end up becoming a waste accumulator. Two factors must, therefore, be the driving force; one, let the creation observe the principles of lean practices and two, let it contribute to organizational performance.

5.5 Limitation of the Study

The major problem encountered during the study was the unwillingness of some respondents to provide some information. This was compounded by the fact that the

respondents who were required to fill some information were not accessible. These organizations are always very busy and accessing people like the senior managers proved challenging as most were engaged in meetings or had gone out in business search.

The study was also limited in scope as it only covered automotive firms operating in Nairobi. Ideally in a study of this kind, one would wish to conduct a survey of all automotive firms in Kenya but such a procedure was not possible owing to time and financial constraints. In this kind of scenario we could not go to all their branches and dealerships across the country to ascertain if what is applied at their head offices is also replicated at the branch level. This would really help in determining the application in the entire organization and not just at the branch level.

5.6 Suggestions for Further Study

In order to achieve more meaningful results in such a study there is need to look at two critical issues; one is to ensure that what is studied is confirmed and the sampling widened across the entire industry to ensure sample sufficiency and for greater generalization. Secondly, the study was only done in the automotive sector, the same can be done in a transport or banking sector. There is also need to assess the impact of each individual lean practice on a given key performance indicator as opposed to overall operational performance. In this regard it will help in digging deeper to major key areas and address the uniqueness of every industry.

It's also important in future for scholars to narrow down on individual lean practices like booking and expand with an aim of finding out how such practices on their own affect the performance of an organization. Lean practices are so many and a general study on them may not necessarily bring solutions to organizations. Narrowing down on one practice is thus therefore important since it will be easy to apply instead of lean practices as blanket.

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APPENDIX I: INTRODUCTION LETTER



**UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS**

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Telegrams: "Varsity", Nairobi
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P.O. Box 30197
Nairobi, Kenya

DATE 04.10.2016

TO WHOM IT MAY CONCERN


The bearer of this letter BENARD ODUMA WALUKUG
Registration No. D6J / 67142 / 2011

is a bona fide continuing student in the Master of Business Administration (MBA) degree program in this University.

He/she is required to submit as part of his/her coursework assessment a research project report on a management problem. We would like the students to do their projects on real problems affecting firms in Kenya. We would, therefore, appreciate your assistance to enable him/her collect data in your organization.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.


**PATRICK NYABUTO
SENIOR ADMINISTRATIVE ASSISTANT
SCHOOL OF BUSINESS**



APPENDIX II: QUESTIONNAIRES

General Information (Your identity will be safeguarded)

Sign.....Date.....

Department.....

- 1) What position do you hold in the organization
 - i) Senior level management
 - ii) Middle-level management
 - iii) Technician
 - iv) Support staff
 - v) Customer
- 2) How long have been with the organization
 - i) 0-2 years
 - ii) 3-4 years
 - iii) More than 5 years
- 3) How long have you been in the automotive industry
 - i) 0-2 years
 - ii) 3-5 years
 - iii) More than 5 years
- 4) What is your organization throughput on a daily basis
 - i) 0-10 units
 - ii) 10-20 units
 - iii) 20-30 units
 - iv) More than 50 units
- 5) Age bracket
 - i. 18-25 years
 - ii. 26-35 years
 - iii. 36-45 years
 - iv. 46-55 year
 - v. Over 55

i) Lean Practices

a) Which of the lean practices are applied in your organization? In a scale of 0-5 where 0 is not applied and 5 is fully applied.

lean practices	Application levels					
	0	1	2	3	4	5
Booking for service						
Minimal waiting time						
Vehicle repair follow up						
Seeking repair approvals						
Service reminders						
Preventive maintenance						
Just in time supply delivery						
Just in time service delivery						
Valuing employee time						
Timely staff arrival at workstations						
Standardization of work for employees						
Processes standardization						
Proper filling/record keeping						
Owner collection of vehicles						
Performance reports display						
Team work						
Talent retention Activities						
New employee orientation						
Work measure/clocking						
Accident reporting						
Cleaning						
Labeling						
Tagging repair parts						

Using repair charts						
Observing workshop layout						
Sorting/work segregation						
Equipment standardization						
Timely WIP closures						
Only WIP vehicles in workshop						
Minimum waiting time						
Sensitization on quality						
Workshop walk around						
Frequent audits						
Supply contracts						
Using reliable suppliers						
Ensuring service parts availability						
Quality reminder to customers						
Proper arrangement of equipment and tools						

ii) Performance

a) Which of the performance measurement are applied in your organization? In a scale of 0-5 with 0 being not applied and 5 being fully applied

performance measurement	Application levels					
	0	1	2	3	4	5
Increased profits						
Happy employees						
Happy customer responses						
Increased sales						
Increased throughputs						
Innovative employees						

Minimal inventory						
Increased employee transparency						
Reduced training costs						
Bigger market share						
High talent retention						
Minimal workshop accident levels						
Minimal repeat jobs						
Minimal warranty claims						
Less customer complaints						

iii) Lean Practices and Performance

- a) Which of these lean practices helps your organization in improving performance?
 In a scale of 0-5 with 0 being it doesn't affect performance and 5 being it highly affect performance

lean practices	Effect on performance					
	0	1	2	3	4	5
Booking for service						
Minimal waiting time						
Vehicle repair follow up						
Seeking repair approvals						
Service reminders						
Preventive maintenance						
Just in time supply delivery						
Just in time service delivery						
Valuing employee time						
Timely staff arrival at workstations						
Standardization of work for employees						

Processes standardization						
Proper filling/record keeping						
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Supply contracts						
Using reliable suppliers						
Ensuring service parts availability						
Quality reminder to customers						
Proper arrangement of equipment and tools						

b) What are the contributions of adopting lean practices to your organization?

- i. Increasing sales
- ii. Increase profits
- iii. Improve throughputs
- iv. Reduce wastage
- v. Minimize conflicts
- vi. Analyzing new markets
- vii. To minimize competition
- viii. Reduce employee turnover
- ix. Happier workforce

c) In general do lean practices affect performance? Tick appropriate

- i. Always affect
- ii. Occasionally affect
- iii. Do not affect
- iv. Affect when properly applied
- v. Not sure

Thank you

Appendix III: AUTOMOTIVE FIRMS IN KENYA

1. AMITY EQUIPMENT LTD
2. ASHOK LEYLAND LIMITED
3. ASSOCIATED VEHICLE ASSEMBLERS
4. MOTOR VEHICLE ASSEMBLER
5. AUTOXPRESS LTD
6. BAVARIA AUTO LTD
7. CMC MOTORS GROUP LTD / CMC HOLDINGS LTD
8. CROWN MOTORS GROUP LIMITED.
9. DT DOBIE & CO (KENYA) LTD (CFAO)
10. FOTON EAST AFRICA LTD
11. GENERAL MOTORS EAST AFRICA / GENERAL MOTORS CORPORATION
12. HYUNDAI (E.A) HOLDINGS
13. KINGSWAY TYRES LIMITED
14. ORIEL LTD / ECTA GROUP
15. PORSCHE CENTRE NAIROBI LIMITED
16. RT (EAST AFRICA) LIMITED
17. RYCE MOTORS LTD
18. SAIRAJ LIMITED
19. SAMEER AFRICA –AUTOMOTIVE DIVISION
20. SILVERSTONE TYRES (K) LTD
21. SIMBA CORPORATION LTD
22. STANTECH MOTORS LIMITED
23. STENORETTE RADIO SERVICES
24. SUBARU KENYA / ECTA GROUP
25. TATA AFRICA HOLDINGS
26. TOYOTA EAST AFRICA LIMITED / TOYOTA MOTOR CORPORATION
27. TRANSAFRICA MOTORS