LEAN MANUFACTURING PRACTICES AND PERFORMANCE OF TEA PROCESSING FIRMS IN KISII, KENYA

MAGUTU ALBERT ONDEGO

D61/76538/2014

A RESEARCH PROJECT SUBMITTED TO THE BOARD OF POSTGRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A MASTERS DEGREE IN BUSINESS ADMINISTRATION UNIVERSITY OF NAIROBI

NOVEMBER 2016

DECLARATION AND RECOMMENDATION

DECLARATION

This Research Project is my original work and has not been presented for award of any degree University for examination.

Signature…… **Date……**

Albert Ondego Magutu

D61/76538/2014

RECOMMENDATION AND APPROVAL

I confirm that this Research Project has been submitted for examination with my approval as the student supervisor

Signature …… **Date ……**

Mr. Gerald Ondiek

Lecturer school of business operations management department,

University of Nairobi

DEDICATION

This research is dedicated to my father John Magutu, my wife Milkah and my children; Catherine, Robert and Charles for their tireless support when I was developing this research project. Thanks a lot.

ACKNOWLEDGEMT

First of all I would like to pass my sincere appreciation to my supervisor for his tireless enlightenment as I was developing the Research project. Secondly I would like to acknowledge my brother Dr. Peterson Obara for mentoring me all along in my studies up to this far.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

CEO	-Chief Executive Officer
JIT	-Just in Time
KTDA	-Kenya Tea Development Agency
LM	-Lean manufacturing
OEE	-Overall Equipment Effectiveness
TOC	-Theory of Constraints
TPM	-Total Productive Maintenance
WIP	-Work in Progress
BNA	-Bottleneck Analysis
SW	-Standardized Work
SD	- Standard Deviation
MCA	-Management Accounting and Control

LIST OF TABLES

LISTOF FIGURES

ABSTRACT

Lean manufacturing was invented with an aim of improving competitiveness and market share for the manufacturing firms. Tea is one of the major cash crops in Kenya and also in Kisii County and before it reaches in the market for consumption it should be processed. Therefore the study was carried out to find out the relationship between lean manufacturing practices and firm performance. Hence the research aimed at answering the following research questions; what is the relationship between lean manufacturing practices and the way tea processing factories perform in Kisii County? And to what extent is the relationship between lean manufacturing practices and performance of tea processing firms in Kisii, Kenya? The study also aimed at meeting the following objectives; to establish the relationship between lean manufacturing practices and performance of tea processing firms in Kisii, Kenya and to establish the extent of the relationship between LM practices and the way tea processing firms perform in kisii county Kenya. Equally the findings of this study was useful in the following aspects; provided both corporate and operations decisions maker with a basis of making informed strategy and investment decisions in the light of increasing global competition, to the operations management profession**,** the findings from the study will help them to identify opportunities derived from implementing Lean Manufacturing practices that enhance acquisition of capabilities that could result in competitive advantage, the study will also have a practical significance to the Manufacturers which help them to enhance the improvement of costing and pricing strategies and the outcomes of this study will give adequate knowledge to scholars and researchers who may be interested in studying lean manufacturing practices and firm performance. The study adopted census survey research design where both cross sectional and longitudinal research design were adopted. The target population was all the 12 tea factories company limited companies in Kisii region. Descriptive analysis was used to analyze the collected data and this was done using SPSS and regression model was employed to determine link between lean manufacturing practices and performance of tea manufacturing firms in Kisii Kenya and also the extent of the relation. The findings of the study indicated automation was the most used lean manufacturing practices in all the tea processing firms in Kisii region together other practices like kaizen, total productive maintenance, and standardized work and bottleneck analysis. High electricity bills were the major challenge in implementing lean manufacturing practices among others. There was a strong relationship between lean manufacturing practices and performance of tea processing firms in Kisii Kenya.

CHAPTER ONE: INTRODUCTION

1.1 Background

Manufacturing firms today are being faced with so many challenges related to waste minimization and also improving the firm performance. Corporate management has to focus on revealing and solving problems. Due to these, various researches have been conducted to ascertain the various criterions to be used to reduce the cost of production at various stages of production. Based on the above the concept of lean manufacturing has been invented and it has been glorified in the world of manufacturing in previous tears. Lean manufacturing is a sequential process of establishing waste through consistent improvement, movement of inventory and services in order to meet the client's needs and wants the first time. This was invented with an aim of improving competitiveness and market share for the manufacturing firms (Womack, 2003). According to Oscar Olsen (2014), processing firms are categorized in lean and non lean based. In his study it was depicted that the classification was based on better aggregate and cash turnover, but it was measured against better or worse employees' or asset effectiveness. The study further indicated that lean oriented firms had inadequate margins as compared to non lean processing firms. The study also indicated in relation to business level performance firms the employee lean practices tend to have better returns on expenditure as compared to stock return and growth of sales.

The study was be anchored to the following theories and they included theory of constraint which takes a scientific approach to improvement and kaizen theory which focuses on continuous development. The theory of constraint is a method of

improvement in business which was developed from management of logistic perspective that is lean manufacturing and total quality. The theory was developed by Dr. Eliyahu Goldraft (1947-2011). The theory aims at reducing the throughput time. The impact of TOC has got much bigger impact than one shouldn't think regarding the relatively small number of companies which has chosen it as their main method for continuous development. The theory further connotes that sophisticated systems in manufacturing processes is composed of multiple linked tasks where each of them becomes a constraint of the other. It provides strong set of tools that assists to attain the set goal. It is comprised of several steps which include, establishing and eliminating the obstacles, problem analyzing and resolving tools. TOC appeals inherent improvement of the activities through prioritization. The order of priority as the theory indicates is as follows; the organization should start with the current constraint analysis, environmental improvement and creating rapid development. The theory has got various benefits which include increased profits, fast improvement, capacity improvement, lead time and inventory reduction (Mičietová, 2011). On the other hand Kaizen is a Japanese word which means "change for the better" and it forms the basis of the kaizen theory. The word was brought into being by Maasaki Imai in his book Kaizen. It was successfully implemented in the 1950s by Toyota Company which aimed at improving its quality, productivity in terms of technology and also measures of safety. Toyota production system was an innovative which came as a result of kaizen theory. After its development and successfully implemented in the western countries, now days several organizations have effectively implemented the same concept in their businesses. Currently kaizen focuses on people management

techniques which targets on consistence, process improvement where all levels of management in an organization are involved more so taking into consideration the employees' suggestions when making the corporate decisions (Imai, 1986). Kaizen is mainly concerned with three major notions which include; continuous, incremental and participative in nature which leads to development of internal satisfaction and quality of the work life for the organization's employees (Brunet and New, 2003). Kaizen was employed directly in MAC systems as well as in manufacturing firms. This was majorly implemented in automobile (Atkinson et al., 2007).

Tea is one of the major cash crops in Kenya and before it reaches in the market for consumption it should be processed. Kenya tea development agency factories are faced with so many challenges of reducing waste right from the buying centers up to the time it reaches the final consumers. On the side of firm performance the tea processing factories have various set of activities which are undertaken with an aim of adding value to the tea. To counter this, manufacturers should turn to their equipment vendors in order to help them produce and put in place processes that takes into consideration the benefits which comes as a result of implementing the lean manufacturing principles. Firms can be classified to be either lean or non-lean and the performance of the firms even if they are lean or non-lean can be either excellent or poor. It is from this argument that the study was aimed at studying on the link between lean manufacturing practices and performance of tea processing firms in Kisii Kenya.

1.1.1 Lean Manufacturing Practices

According to Abdulmalek (2007), lean manufacturing is an approach that has been implemented more often in discrete manufacturing as compared to continuous sector since it has quite a number of barriers that are caused by reluctant managers. Lean manufacturing is putting work in order and looking into appropriateness of the existing machines, stores and systems to fit lean process flow. The objectives of lean manufacturing are; reduction of production times and inventory levels, reducing of lead times, quality increment and improved customer responsiveness with limited resources (Porter 1990). But in most cases firms equate lean manufacturing to elimination of waste. Under its confined state lean manufacturing entails understanding of what customer value is and tailor the process to produce, deliver and meet customer's need. If the firm does not understand this then it produces goods and services that are unnecessary or unwanted by the customer (Ward, 2003). The main aim of firms implementing lean manufacturing practices is to attain competitive advantage but the majority attain (Anand et al., 2009; LEI 2004). This is challenged by creating supportive infrastructure and using the term in a broad (Koenigsaecker, 2005; Womack and Jones, 2003). In order to attain this there should be building social subsystem or work organization that fits lean processing or production (McDuffie, 1995). Some of the lean manufacturing practices include kaizen, bottleneck analysis, continuous flow, total productive maintenance, automation, just in time and standardized work

1.1.2 Firm Performance

According to Begam (2013), firm performance can be measured using different key performance indicators. Each of the activity leads to reduction of cost and bring about differentiation in the industry. Hence performing firm is the one with cost advantage which results from least cost of psychical distribution, assembling efficiency and superior sales utilization. Hence firm performance can be defined further as the degree at which an organization can be able to reduce its production cost with an aim of maximizing customer satisfaction through value addition which in turn leads to high returns to investment. This can be attained through casting out of unnecessary activities which may in turn lead to increased cost of production.

1.1.3 Lean Manufacturing Practices and Firm Performance

According to Fullerton (2014), most manufacturing firms are fleetly changing and combative markets have influenced continuous process development mindsets. The firms have devoted their efforts to developing quality, flexibility and responsiveness of the customers through the application of lean thinking principles. To achieve the high firm performance firms should adopt lean as abundant business strategy as compared to task based operations and other business functions. It was depicted from the study that operations performance is directly influenced by lean manufacturing practices.

1.1.4 Tea Processing in Kisii

According to Owour (2011); small scale tea holders under the control of Kenya Tea Development Agency produced up to 60% of Kenya tea over the previous decade. Currently Kenya is the leading tea producer which accounts for 14% of the world's

tea production and the huge exporter of tea which accounts to 23% of the exports. Through KTDA Kenya's tea industry has successfully continuously improved in terms of tea quality through upgrading and modernization of production systems and also use of modern agronomic recommendation. It has also lead to achievement of effectiveness in terms of cost and enabling frequent review of payments of farmers upwards irrespective of stagnation of the world tea prices. In the year 2010 crop KTDA paid farmers best prices per kilo of leaf which was 75% of the revenue from leaf went compared to all the tea producers.

Kisii Region is one of the key tea producing counties in Kenya where it produces 77,000 metric tons per year. Irrespective of the wideness and high production, the region is being served by only twelve tea processing firms and they include; Sang'anyi, Tombe, Gianchore, Nyansiongo, Kebirigo, Nyankoba, Rianyamwamu, Itumbe, Nyamache, Ogembo, Eberege and Kiamokama. Because of the small number of tea processing firms in Kisii region this leads to wider area of operation of the firms hence leading to many constraints in tea processing which in turn leads to high percentage of wastage until the products reaches the final consumer. On the issue of marketing the processed tea is auctioned in Mombasa and this leads to long supply chains or value chains. It is because of this that the tea processing firms need to put in place lean manufacturing practices which in turn will lead to good performance in manufacturing firms. This will equally lead to high customer satisfaction both the internal and external customers (KTDA website; factories-region/region 6-kisii highlands)

1.2 Research problem

In the recent years the majority of manufacturing and service industries have been put into task to increase focal point on quality products and satisfaction of the customers. Putting into perception global competition challenges most firms have been reduced to find ways of reducing costs, improving quality and meet the ever-changing needs of a more informed class of customers. Wheatley (2005), discussed the reasons why organizations are trying to apply Lean thinking in their own environments. In relation to the above reduced prices have been caused by the following five business factors; continued pressure to improve operational, price competitiveness, profit improvement and shorter order-cycle times. Womack and Jones (2003) underlined that there is need to have determined top management during the transformation process. They added there should be creation of crisis in order to make the organization to adopt lean thinking which should be a company strategy. The findings of the study depicted that lean thinking is first applied in a business unit which is troubled.

Tea processing in Kenya is faced with so many challenges one of them being that high cost of production which results from unnecessary activities within the value chain and also inability to identify waste within the process and eliminate. This starts right from the buying centres where tea is delivered by farmers, delivery of tea to the factory, during processing and marketing of the processed tea products. This leads to unsatisfied suppliers and customers (both internal and external) due low quality and due to high prices which comes as a result of high cost of production. All the above comes as a result of not implementing lean manufacturing practices or techniques (Towett, 2012).

A number of studies have been conducted in Kenya in relation to lean manufacturing practices in competitiveness of large manufacturing firms for example (Nyamwange, 2001). In his study he concluded that operational strategies applied for competitiveness include high quality, low cost and time/speed, innovativeness and flexibility which are ranked equally. On a study conducted by Osumo (2012), which was looking at lead time variability and supply chain performance in Kenya, established that lead time variability has got a great impact on supply chain performance.

On a study conducted by Ondiek and Kisombe (2013), which was looking at adoption of lean manufacturing tools and techniques in sugar processing industries in Kenya, established that not all lean manufacturing practices had influence on time efficiency but instead it depended on the level of implementation of the technique and this formed the basis of this research which sighted on establishing the relationship between lean manufacturing practices and performance in tea processing factories in Kisii Kenya as opposed to sugar processing industries in Kenya. According to Oscar Olsen (2014), processing firms are categorized in lean and non lean based. In his study it was depicted that the classification was based on sum and cash turnover, but it was measured against better or worse employees' or asset effectiveness. The study further indicated that lean oriented firms had inadequate margins as compared to non lean processing firms. The study also indicated in relation to business level performance firms the employee lean practices tend to have better returns on expenditure as compared to stock return and growth of sales.

There was a big knowledge gap since the studies didn't portray clearly the link between lean manufacturing practices and the overall performance of processing firms.

Hence this study was conducted to ascertain the link which existed between lean manufacturing and performance in tea manufacturing firms in Kisii Kenya. Therefore this study answered the following two Research Questions; what is the relationship between lean manufacturing processes and performance in tea processing factories in Kisii, Kenya? and What is the extent of the relationship between LM practices and performance of tea manufacturing factories in Kisii, Kenya?

1.3 Objectives of the study

1.3.1 Broad objectives

To establish the relationship between lean manufacturing practices and performance of tea processing firms in Kisii Kenya.

1.3.2 Specific Objectives

i. To establish the relationship between lean manufacturing practices and performance in tea processing factories in Kisii Kenya.
ii. To determine the extent of the relationship between lean manufacturing and performance of tea processing firms in Kisii Kenya.

1.4 Value of the Study

The findings of the study would provide knowledge for researchers and academicians who may be interested in studying lean manufacturing practices and the performance of processing firms

To policy makers and regulatory bodies the findings would form the basis of making informed decisions and strategies in the light of increasing global competitiveness.

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

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter deals with what other researchers and authors have talked about lean manufacturing practices, firm performance and this were in this order; the theories underlying the study, lean manufacturing practices, firm performance and conceptual framework.

2.2 Theory Underlying the Study

The study under lied under the following two theories and they include the theory of constraints and kaizen theory.

The theory of constraint is a method of improvement in business which was developed from management of logistic perspective that is lean manufacturing and total quality. The theory was developed by Dr. Eliyahu Goldraft (1947-2011). The theory aims at reducing the throughput time. The impact of TOC has got much bigger impact than one shouldn't think regarding the relatively small number of companies which has chosen it as their main method for continuous development. The theory further connotes that sophisticated systems in manufacturing processes is composed of multiple linked tasks where each of them becomes a constraint of the other. It provides strong set of tools that assists to attain the set goal. It is comprised of several steps which include, establishing and eliminating the obstacles, problem analyzing and resolving tools. TOC appeals inherent improvement of the activities through prioritization. The order of priority as the theory indicates is as follows; the organization should start with the current constraint analysis, environmental improvement and creating rapid development. The theory has got various benefits

which include increased profits, fast improvement, capacity improvement, lead time and inventory reduction (Mičietová, 2011).

On the other hand Kaizen is a Japanese word which means “change for the better” and it forms the basis of the kaizen theory. The word was brought into being by Maasaki Imai in his book Kaizen. It was successfully implemented in the 1950s by Toyota Company which aimed at improving its quality, productivity in terms of technology and also measures of safety. Toyota production system was an innovative which came as a result of kaizen theory. After its development and successfully implemented in the western countries, now days several organizations have effectively implemented the same concept in their businesses. Currently kaizen focuses on people management techniques which targets on consistence, process improvement where all levels of management in an organization are involved more so taking into consideration the employees’ suggestions when making the corporate decisions (Imai, 1986). Kaizen is mainly concerned with three major notions which include; continuous, incremental and participative in nature which leads to development of satisfaction of human psychological needs and improved quality of work life for the organization workers (Brunet and New, 2003). In Japan Kaizen was put in practice directly to MAC systems as well as in manufacturing firms. This was majorly implemented in automobile (Atkinson et al., 2007).

2.3. Lean Manufacturing Practices

The cornerstone of LM practices is to optimize customer value while minimizing the waste along the process. A firm which is lean based is that organization that understands customers’ value and builds on the key processes in order for it to have

perpetual existence. To comprehend this, lean rationale changes the locus of management from maximum utilization of other alternative techniques, flow of products, sales, assets and vertical integration to the horizontal integration of assets, technologies and departments to customers. Creating processes that require low space, not labour intensive and minimal time and capital to produce goods and services at minimum cost and with fewer defects compared with traditional business systems needs elimination of waste along the entire value streams. With very fast throughput times high quality variety and low cost companies can be at a position to respond to dynamic customer desires. On the other hand management of information becomes much supplier and more accurate (Womack et al, 2003).

Most firms embrace lean process practices in order to attain competitiveness, but most of them attains disappointment outcomes (Anand et al., 2009; LEI 2004). This is challenged by creating supportive infrastructure and using the term in a broad (Koenigsaecker, 2005; Womack and Jones, 2003). In order to attain this there should be building social subsystem or work organization that fits lean processing or production (McDuffie, 1995).

According to Cambridge advanced learners' dictionary a practice is the act of doing something regularly or repeatedly to improve your skill at doing it. Therefore lean manufacturing practices are those acts which are performed with an aim of improving efficiency and performance in an organization. There are various lean manufacturing practices which include kaizen, just in time, continuous flow, automation, total productive maintenance and standardize work.

2.3.1 Kaizen

Kaizen is a Japanese word which means improvement. When it comes to workplace and business kaizen simply means those activities that lead to continuous development of all functions and also involvement of workers in an organization starting from the top management to the operational level. Kaizen aims at eliminating waste through improved standards activities (Misiurek et al, 2016).

2.3.2 Just in Time

Just in time; the economy of the 21st century demands most of the processing firms to explore in various approaches which aims at reduction of costs involved in operations and offer prices that are competitive to enhance the survival and growth. For effective completion manufacturing firms and companies should be at a position to produce high quality products, minimize the costs and offer high class customer services (Talha, 2002). Just in time management approach is one of the long proven technique in manufacturing sector which has led to cost reduction, quality improvement, productivity efficiency and waste elimination (Musara Mazanai, 2012). For effective and efficient implementation of just in time inventory system affirm needs to have well established infrastructure in terms of transport, information network and reliable source of suppliers. According to Kaneko et al (200), JIT can be successfully implemented once there is good supplier buyer relationship where information is shared in a very reliable manner through electronic information network and this will be based on quality, low-costs and in time delivery. This will lead to maximizing profits for both suppliers and the manufacturing firms and also reducing transaction costs and developing technology together.

2.3.3 Continuous Flow

A continuous flow is a technique used in manufacturing which aims at moving a single unit in each step of a process rather than treating units as batches at each step. This may seem to take longer, but it can actually be much more time efficient, as long as the next unit is introduced to the process as soon as the first unit has completed step one. The process is called "continuous flow" because new products are being produced in a continuous manner. It is of great advantage to many manufacturing firms such as tea manufacturing firms where there is need to keep up with high demand (Rother et al, 2001). Flow entails the increment of the throughput of undertaken work in the process while improving quality and customers satisfaction. This concept originated from the Toyota production system and it can be used in any industry. This can be applied in any business which use flow techniques. Continuous flow has got several benefits if it is successfully implemented and they include great achievement, improvement in productivity for greater than 40%. Improvement of an individual productivity leads to increased processing capacity where more items are produced by the use of minimal resources. Equally on-time delivery improves customer service which in turn leads to satisfied customers. Satisfied customers leads to improved firm capacity and capability to turn work around quicker and this makes the manufacturing firm to have a competitive advantage hence increased market share. Lean flows is point centered to most efficient way to run a process using minimal resources and time from the start to the end while adding value in each and every step. This aims to making one product and move it on which is the most efficient option (Shah et al 2002).

2.3.4 Automation

Automation; is one of the techniques which challenges the global competitiveness of manufacturing firms which aims at seeking for efficiencies. Mass-customization and small-lot sizes deserve extremely rapid turnaround drive manufacturers to become much more flexible. The need to maximize manufacturing return on investment (ROI) has never been stronger; you need to get the most out of your processes, your systems, your equipment, and your people. To achieve this it needs an organization to make making decisions about how and when to use automation technology to become—and to stay—Lean. At its most elemental level, Lean manufacturing is "pull" production, which is driven by customer or market place demand (Winroth et al, 2006). Lean production optimizes all of your enterprise's flow in response to that demand: material flow, people flow, and information flow. Is it possible to use automation and still be "Lean"? Newly emerging manufacturing platforms that utilize mechatronics concepts; powerful, intelligent, connected controls; and even wireless technologies are changing the equation by creating an entirely new range of capabilities. These new capabilities add truly demand-driven flexibility to the traditional automation advantages of precision and speed, whether in semi-automated or fully automated production environments, and can even help to eliminate wasteful processes in assembly operations that are mostly manual. When automation is implemented to optimum it leads to emerging of new ways of reducing waste, energy and effort since they are used in the right way (Kevin Gingerich, 2015).

2.3.5 TPM (Total Productive Maintenance)

TPM (Total Productive Maintenance) is an all-inclusive technique which ensures that equipment maintenance is up to date in order to achieve perfect production. This ensures that there is no-stop over, breakdowns, slow running and defects. This technique also looks at a working environment with minimal risks or no accidents. TPM emphasizes on tending to initiate change rather than reacting to events in order to optimize equipment operational efficiency. More emphasize is placed at placing and empowering operators to help maintain the production equipment. The execution of a TPM program creates a shared responsibility for equipment that encourages greater involvement by plant floor workers. Total productive maintenance ensures safe-working environment which in turn leads to effective improvement of productivity that is reduction of cycle times, up time increment and defect elimination (Byrd, 2015).

2.3.6 Standardize Work

SW is one of the cornerstones of LM techniques. Minus standards all the efforts from flow production, continuous improvement will be only temporal. The implementation of the technique is not an easy task. This should take into consideration the new concerns and revealing questions. The technique time intensive and it is not famous on the plant floor. SW tasks are no longer accomplished. Lean manufacturing struggles, but it has no longer achieved perfection, but with every effort perfection work standardization keeps changing because of its dynamic nature. But all efforts and consistence struggling leads to improved worthwhile. Standardize work aims at

improving productivity, quality of the products, safety and satisfaction of the (Krichbaum, 2008).

2.4 Key Firm Performance Indicators (KPIs)

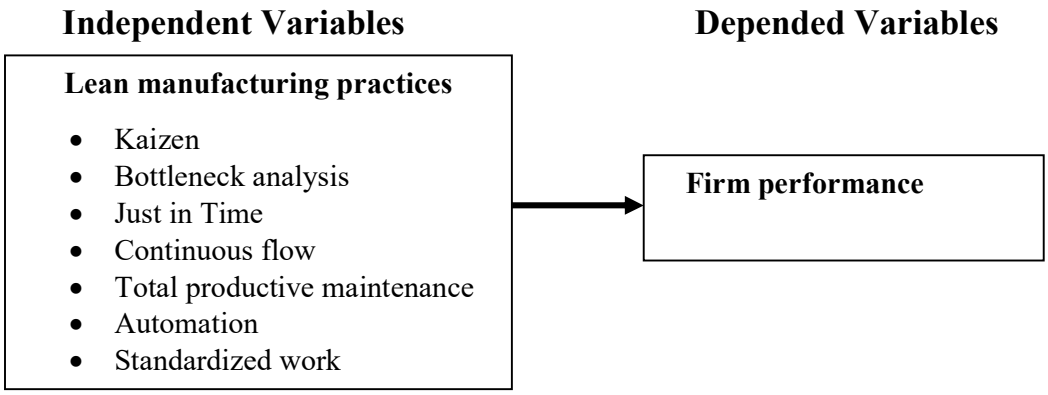
According to David (2007); KPIs are elements that firms use to evaluate, examine and monitor manufacturing system. These elements are usually put in use to assess success in relation to set aims and objectives. Some of the commonly used performance indicators worldwide include:-Count (Good or Bad); this is a crucial factory floor metric that establishes the amount of product produced. This appertains to a choice of product quality based on the last machine or production for the whole shift or week. In most firms individual worker is compared with the shift output in order to amusing the spirit of competitiveness among workers. Reject Ratio; this is an indicator where scrap in the production process is measured in terms of turn down ratio. Scrap minimization assists in maximization of profits and ensures minimum wastage. Rate; this is a performance indicator where there is the use of relative scale in relation to profits, speed and even holding in check of quality. That is the reason as to why operations speed should be ensured to be consistent and also have production targets well displayed including quantity and quality. This indicators improves the morale of workers which in turn leads to attaining the set targets which in turn leads to meeting specific performance targets; hence firm performance is determined using the following ways;

Takt Time; this is the time taken to complete a given task. This can be duration taken to process a good or sometimes termed as cycle time of a specific operation. This helps manufacturers to establish the obstacles that exist within the process. OEE is an

indicator which looks at resource utilization from the perspective of product availability and quality. In any production process OEE values should increase which will be a clear indication of efficient utilization of available personnel and machines. Money is not made when machines are not operating hence down time is an easy way to increase profitability.

2.5 Conceptual Framework

Fig 2 Conceptual Framework



Source; Field 2016

The above figure shows the relationship between variables under study and this indicates the independent variables that are lean manufacturing practices and the dependent variables which was firm performance.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with research design, population, data collection and data analysis and presentation

3.2 Research Design

This research adopted census survey where both the cross sectional and longitudinal study were used. This study design allowed the researcher to either choose the entire population or s subset of the population from which data is collected and helps the researcher to answer research questions of interest. According to Shuttle (2008), this design is suitable for the study since it has been used by many scientific disciplines, especially; social sciences to attain general overview of the subject in a particular portion of the entire population of study. It also allows for collection of information about people's feelings, opinions and thoughts which can be generalizable to the entire population.

3.3 Population

The target population was all the tea processing firms in both Kisii and Nyamira County. The factories will be the KTDA owned factories and they included Nyamache, Itumbe, Kiamokama, Rianyamwamu, Ogembo, Eberege, Sang'anyi, Tombe, Gianchore, Nyansiongo, Kebirigo and Nyankoba tea factories. The population frame was as shown in the appendix ii

3.4 Data Collection

Primary source of data was employed by the researcher where data collection was done using a questionnaire. The questionnaire contained both open and closed ended questions related to LM practices and performance of tea manufacturing factories in Kisii Kenya. A 5 point Likert scale was used in questions which need rating by the respondent. According to Mugenda and Mugenda (2003) are 10 questionnaires out of 12 were reasonable to attain useful information in relation to the population. Orodho (2004) said that this technique reaches a huge number of subjects able to read and write independently.

The questionnaire was self-administered. It comprised of four sections; Section one was designed to collect data which was described as general information of the respondent, Section two was designed to address the commonly used lean manufacturing practices in tea processing firms in Kisii county, section three was designed to gather data related to the challenges faced by the tea processing firms in their pursuit to put into practice LM practices, and section four addressed the relationship between LM practices and performance of tea processing farms in Kisii county.

A 5 and 3 point Likert scales were used to determine reasons for LM implementation and the relationship between lean manufacturing practices and performance of tea processing firm in Kisii region. The respondents who were interviewed during the study were CEOs, production managers and production assistants that was any one of them per factory.

3.5 Data Analysis

Data which was collected was edited to establish the accuracy, uniformity, consistency and completeness and arranged which enabled coding and tabulation of the data before final analysis.

Data was analyzed through descriptive statistics were an indication of Lean manufacturing practices in tea processing firms in Kisii County. The outcomes of the study were presented using tables, proportions and frequency distribution tables. Regression was used in determining the relationship between lean manufacturing practices and performance in tea processing factories in Kisii County

The following model was used to show the relationship between LM practices and the organizational performance:

$Y=a+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6+b_7x_7$;

Where Y=Organizational Performance, a = the Y intercept when x = zero;

b_1, b_2, b_3, b_4, b_5, b_6 and b_7 are the regression weights attached to the respective variables as stated below;

X_1=Total productive Maintenance, x_2 = JIT, x_3= Bottleneck Analysis, x_4 = Automation, x_5 = continuous flow, x_6= Kaizen, and x_7 = standardize work.

The model was used simply because it is one of the crucial techniques in statistics for business application. It's a statistical technique that assists to estimate the strength and direction of the relationship between two or more variables.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSIONS

4.1 Introduction

This chapter presents the data analysis, interpretation and presentation. The analyzed is presented using cumulative frequency tables, inferential statistics and also of regression model which established the relationship between lean manufacturing practices and performance in tea processing firms in Kisii region.

4.2 Questionnaire Return

Out of the twelve questionnaires which were given out, only 10 questionnaires were returned that meant that it was only data from ten tea factories which was used for data analysis. This translated to 83% of the total questionnaires which were given out and this was sufficient enough to represent the whole population which was targeted in this study.

4.3 Position of the Respondents

Table 4.1 below shows the analyzed data in relation to the position of the respondents

Table 4.1; Position of the Respondent

Position of the respondent	Frequency	Valid %	Cumulative %
Production assistant	2	20.0	20.0
Supervisor	1	10.0	30.0
Production manager	7	70.0	100.0
Total	**10**	**100.0**	

Source; Field 2016

Based on the above most of the respondents were production managers who were equivalent to the operation managers in the factories as kit was depicted by 70% of the respondents, followed by production assistants with 20% and supervisors 10%. This was a clear indication that the data which was collected was very much relevant and highly reliable for the study.

4.4 Level of Education of the Respondents

Table 4.2 below shows the response in relation to the education level of the respondent

Table 4.2; Level of Education of the Respondents

Education level	Frequency	Valid %	Cumulative %
Graduate	9	90.0	90.0
Under graduate	1	10.0	100.0
Total	**10**	**100.0**	

Source; Field 2016

As pertains to the table 4.2 it clearly indicated that most of the respondents were graduates as it was indicated by 90% as the other respondents were undergraduates as it was represented by 10%.

4.5 Gender of the Respondent

Table 4.3 illustrates the response as pertains to the gender of the respondents

Table 4.3; Gender of the Respondents

Gender	Frequency	Valid %	Cumulative %
Female	2	20.0	20.0
Male	8	80.0	100.0
Total	10	100.0	

Source: Field 2016

Table 4.3 above connoted that most of the respondents were males as it was demonstrated by 80% while the rest were females as it was attested by 20%. This revealed that there was gender disparity when it came to holding of senior positions in the tea factories.

4.6 Work Experience of the Respondents

Table 4.4 revealed the response in relation to the duration experience of the respondents

Table 4.4 Work Experience of the Respondent

Years of experience	Frequency	Valid %	Cumulative %
Above 15 years	2	20.0	20.0
10-15 years	2	20.0	40.0
5-10 years	4	40.0	80.0
1-4 years	2	20.0	100.0
Total	10	100.0	

Source; Field 2016

In relation to the above it clearly fingered out that those respondents who had an experience above 15 years, 10-15years and 1-4 years were few as it was illustrated by

20% each and the majority had between 5 and 10 years of experience as it was augured by 40%. This was an indicatory that the majority of the respondents had moderate experience in their area of work.

4.7 Most Commonly used Lean Manufacturing Practices in Tea Processing Firms in Kisii

The table 4.5 below shows the response in relation to most commonly used lean manufacturing practices in tea processing firms in Kisii region.

Table 4.5 Most Commonly used Lean Manufacturing Practices in tea processing Firms in Kisii

Option	Kaizen %	Just in time %	Continuous flow %	Automation %	Bottleneck analysis %	Total productive maintenance %	Standardized work %	aggregate percentage
No	40.0	40.0	20.0	0.0	50.0	30.0	20.0	**28.57**
Yes	60.0	60.0	80.0	100.0	50.0	70.0	80.0	**71.43**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100**

Source; Field 2016

To a great percentage (percentage ≥50%) the tea processing firms implemented the lean manufacturing practices in their firm. To a great percentage respondents agreed that most of the tea processing in Kisii region embraced automation since all respondents chose yes as it was indicated by 100% in yes option and 0.0% for the case of the option No. it was followed by both continuous flow and standardized work

with 80%, total productive maintenance followed by 70%, just in time and kaizen followed with 60% and lastly bottleneck analysis which scored 50%. On further probing it was found that the respondents were not at a position to relate route course analysis to bottleneck analysis since the factories used the term route course analysis. For the case of automation it was found that it was not fully implemented but instead it was partially implemented. Therefore it was a clear indication that all the listed lean manufacturing practices were used by majority of the tea processing firms in Kisii to a great percentage with an overall percentage (71.43%).

4.8 Challenges which faced the Implementation of Lean Manufacturing Practices in Tea Processing Firms in Kisii region

The table 4.6 below gives the overview on the response on the challenges which faced the implementation of lean manufacturing practices in tea processing firms in Kisii region Kenya

Table 4.6 Challenges facing the Implementation of Lean Manufacturing Practices

Challenges	N	Minimum	Maximum	Mean	Std.
High cost of electricity	10	4.00	5.00	4.4000	.51640
Poor information/data accuracy	10	1.00	5.00	3.8000	1.31656
Lack of vendor support	10	2.00	5.00	3.6000	1.07497
Poor infrastructure	10	2.00	5.00	3.6000	1.17379
Lack of top management commitment	10	1.00	5.00	3.5000	1.77951

Government policy	9	1.00	5.00	3.4444	1.42400
Power outages/black outs	10	1.00	5.00	3.2000	1.31656
Impact of lean manufacturing implementation	10	1.00	5.00	3.1000	1.66333
Employee resistance to change	10	1.00	5.00	3.1000	1.66333
Lack of appreciation of resulting benefits	10	1.00	5.00	2.5000	1.64992
Lack of internal expertise	10	1.00	5.00	2.5000	1.77951
Lack of interface with the existing systems	10	1.00	5.00	2.5000	1.43372
Overall mean				**3.27**	

Source: Field 2016

To a great agreement (mean ≥3.5) all the above factors were a challenge to the implementation of LM practices in tea manufacturing firms in Kisii region Kenya. The respondents to a great extent agreed that high electricity bills on the process of implementing LM practices as it was attested by with a mean of 4.4 with a standard deviation of 0.561640 from the maximum value, followed by poor information/data accuracy with a mean of 3.8 and SD of 1.31656, lack of vendor support and poor infrastructure came third challenge with a mean of 3.6 and standard deviation of 1.07497 and 3.6 with a SD of 1.17379 respectively, the fourth challenge was, the fourth ranked challenge was lack of top management support with a mean of 3.5 with a standard deviation of 1.71951, government policy emerged the fifth challenge with a mean of 3.4 and a standard deviation of 1.42400, the sixth ranked challenge was power outage/blackouts which had a mean of 3.2 and SD of 1.31656 and lastly lack of

appreciation of resulting benefits, lack of internal expertise and lack of interface with existing systems were ranked last with a mean of 2.5 and standard deviations of 1.64992,1.77951 and 1.43372 respectively. On further probing it was established power was a common challenge to all factories and this was justified by high electricity bills.

Hence this means that not all the above factors greatly affects the implementation of LM practices in tea manufacturing firms in Kisii region Kenya as it was indicated by the overall mean(3.27).

4.9 Impact of Lean Manufacturing Practices 0n Performance of Tea Processing Firms in Kisii Region

The table 4.7 below shows the response in relation to the influence of lean manufacturing practices on performance of tea processing firms in Kisii region

Table 4.7 Impact of Lean Manufacturing Practices on Performance of Tea Processing

Firm Performance Indicator	Kaizen mean	JIT mean	CF mean	Automation mean	BNA mean	TPM mean	SW mean	overall mean
Quality of product	3.0000	3.0000	2.7500	2.8000	2.6250	2.7500	2.6667	**2.80**
Cost reduction	3.0000	3.0000	2.7500	2.7778	2.7500	2.7143	2.6667	**2.81**
Product variety	1.7500	1.2500	1.7500	1.6000	1.7500	1.8750	1.3333	**1.62**
Satisfied	3.0000	3.0000	2.7500	2.8000	2.7500	2.7500	2.6667	**2.82**

customers								
Final product distribution reliability	2.7500	2.7500	2.7500	2.7000	2.5000	2.6250	2.5000	**2.65**
Increased profits	3.0000	3.0000	2.7500	2.8000	2.7500	2.7143	2.6667	**2.81**
Maximization of stakeholders interest	3.0000	3.0000	2.7500	2.6667	2.6250	2.7500	2.6667	**2.78**
Innovation	2.7500	2.7500	2.7500	2.8000	2.6250	2.7500	2.5000	**2.70**
Waste elimination	2.5000	2.5000	2.5000	2.6667	2.5000	2.5000	2.3333	**2.5**
Overall mean	**2.75**	**2.69**	**2.61**	**2.62**	**2.54**	**2.60**	**2.44**	**2.61**

Source: Field 2016

To a great improvement (mean ≥2.5) there was a substantial link between LM practices and firm performance, the respondents agreed that kaizen had a greater impact on the performance of the tea processing firms this was clearly depicted by the overall mean of all key firm performance indicators of 2.75 which was almost approaching the maximum value of 3 which was indicating that there was improvement on firm performance after implementation of lean manufacturing practices. This then was followed by JIT (Just in Time) with an overall mean of 2.69, automation followed then with a mean of 2.62; the fourth practice which had an impact on firm performance was continuous flow which had an overall mean of 2.61, total productive maintenance (TPM) was ranked the fifth position with an overall mean 2.60, the sixth practice was bottleneck analysis (BNA) which had an aggregated

mean of 2.54 and lastly standardized work (SW) was ranked last with an overall mean of 2.44. on the other hand when the overall mean for all the practices was calculated against the maximum of 3 which indicated that there was improvement on firm performance, it was found that the mean was 2.607143 which was nearing the maximum value hence it was a clear indication that there was a substantial relationship between lean manufacturing practices and performance of tea processing firms in Kisii region. This means that lean manufacturing practices have a strong relationship with performance of tea processing firms to a great extent with an overall mean (2.607143).

4.10 Relationship between Lean Manufacturing Practices and Performance of Tea Processing Firms in Kisii Region

Table 4.8: Regression Results for the Relationship between Lean Manufacturing Practices and Performance of Tea Processing Firms in Kisii Region

Variables Entered/Removed[a]			
Model	**Variables Entered**	**Variables Removed**	**Method**
1	Standardized work, continuous flow, just in time, bottleneck analysis, kaizen, total Productive maintenance[b]	.	Enter
a. Dependent Variable: Performance Index			
b. All requested variables entered.			

On the relationship between LM Practices and Performance of Tea manufacturing Firms in Kisii Region, all the six Lean Manufacturing Practices were entered into the model as seen in the table above.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.873(a)	.762	.754	31.24033
a. Predictors: (Constant), standardized work, continuous flow, just in time, bottleneck analysis, kaizen, total productive maintenance				

Based on the model summary above, the six LM Practices (standardized work, continuous flow, just in time, bottleneck analysis, kaizen, total productive maintenance) explain 75.4% of the changes in the performance of tea processing firms in Kisii region. This means Lean Manufacturing Practices of standardized work, continuous flow, just in time, bottleneck analysis; kaizen and total productive maintenance are good predictors of firm performance. On the analysis of variance (ANOVA), the predicators are significant at 99.95% confidence interval as in the table below

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.488	6	91883.361	94.147	.000(a)
	Residual	2.529	3	.843		
	Total	3.017	9			
a. Dependent Variable: Performance Index						
b. Predictors: (Constant), standardized work, continuous flow, just in time, bottleneck analysis, kaizen, total productive maintenance						

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	2.800	2.053		1.364	.266

	kaizen	0.060	1.836	0.054	-.033	.976
	just in time	0.433	1.676	0.387	-.259	.813
	continuous flow	1.000E-013	1.298	0.000	.000	1.000
	bottleneck analysis	0.125	1.124	0.114	-.111	.919
	total productive maintenance	0.668	2.018	0.558	.331	.762
	standardized work	0.060	1.836	0.044	-.033	.976
a. Dependent Variable: Performance Index						

The explanatory power of standardized work, continuous flow, just in time, bottleneck analysis, kaizen and total productive maintenance on firm performance based on the coefficients above is given as follows:

Firm Performance = 2.800 + 0.060 *Kaizen* + 0.433 *Just In Time* + 1.000E-013 *Continuous Flow* + 0.125 *Bottleneck Analysis* + 0.668 *Total Productive Maintenance* + 0.060 *Standardized Work*

From the model above, the most significant predicators are Total Productive Maintenance, Just In Time and Bottleneck Analysis given their significant coefficients.

CHAPTER FIVE: SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATION

5.1 Summary of Major Findings.

The study aimed to establish the relationship between lean manufacturing practices and performance of tea processing firms in Kisii region. Based on this it was connoted that the most LM practices implemented or used by the tea processing firms in Kisii region starting from the most commonly used to the least commonly used were as follows; automation which was implanted by all the factories, continuous flow and standardized work which were used by 80% of the total tea factories, total productive maintenance was used by 70% of the total respondents or tea factories, kaizen which was implemented by 60% of the tea factories who respondents, and bottleneck analysis which least implemented by the factories in the region that only 50% of the factories implemented the practice. It was also noted that although the practices were implanted most of them were partially implanted and that was the reason as to why their impact on firm performance was not fully felt or seen.

On the issue of the factors or challenges affecting the implementation of LM practices it the analysis depicted that almost all the factors listed had an influence on the implementation and the order under which the factors were ranked was as below; high electricity bills as it was attested by with a mean of 4.4 with a standard deviation of 0.561640 from the maximum value, followed by poor information/data accuracy with a mean of 3.8 and standard deviation of 1.31656, lack of vendor support and poor infrastructure came third challenge with a mean of 3.6 and standard deviation of 1.07497 and 3.6 with a standard deviation of 1.17379 respectively, the fourth

challenge was, the fourth ranked challenge was lack of top management support with a mean of 3.5 with a standard deviation of 1.71951, government policy emerged the fifth challenge with a mean of 3.4 and a standard deviation of 1.42400, the sixth ranked challenge was power outage/blackouts which had a mean of 3.2 and standard deviation of 1.31656 and lastly lack of appreciation of resulting benefits, lack of internal expertise and lack of interface with existing systems were ranked last with a mean of 2.5 and standard deviations of 1.64992,1.77951 and 1.43372 respectively. On further probing it was established power was a common challenge to all factories and this was justified by high electricity bills.

To a great improvement (mean≥2.5) there was a strong relationship between lean manufacturing practices and firm performance, the respondents agreed that kaizen had a greater impact on the performance of the tea processing firms this was clearly depicted by the overall mean of all key firm performance indicators of 2.75 which was almost approaching the maximum value of 3 which was indicating that there was improvement on firm performance after implementation of lean manufacturing practices. This then was followed by JIT (Just in Time) with an overall mean of 2.69, automation followed then with a mean of 2.62; the fourth practice which had an impact on firm performance was continuous flow which had an overall mean of 2.61, total productive maintenance (TPM) was ranked the fifth position with an overall mean 2.60, the sixth practice was bottleneck analysis (BNA) which had an aggregated mean of 2.54 and lastly standardized work (SW) was ranked last with an overall mean of 2.44. on the other hand when the overall mean for all the practices was calculated against the maximum of 3 which indicated that there was improvement on firm

performance, it was found that the mean was 2.607143 which was nearing the maximum value hence it was a clear indication that there was a strong relationship between lean manufacturing practices and performance of tea processing firms in Kisii region. This means that lean manufacturing practices have a strong relationship with performance of tea processing firms to a great extent with an overall mean (2.607143).

5.2 Conclusions

The objectives of the study were to establish the relationship between lean manufacturing practices and performance of tea processing firms in Kisii Kenya and to establish the extent of the relationship between lean manufacturing practices and performance of tea processing firms in Kisii. The findings of the study indicated that there was a very strong relationship between lean manufacturing practices and performance of tea processing firms in Kisii County; the six Lean Manufacturing Practices (standardized work, continuous flow, just in time, bottleneck analysis, kaizen, total productive maintenance) explain 75.4% of the changes in the performance of tea processing firms in kisii region. On the study which was conducted by Ondiek and Kisombe (2012), on lean operation tools and techniques used in the sugar industry they found that standardization of work (mean 3.22) and total productive maintenance (mean 2.91) was a clear indication that sugar companies implemented the techniques in isolation which was similar to this study. According to Herron and Braident (2007) lean manufacturing techniques are not supposed to be executed in isolation but instead they should be executed as an overall strategy. The study also had almost similar results as the study conducted by Malonza (2014) on

lean manufacturing and operational performance of Mumias sugar company limited, Kenya where it was found that most lean manufacturing practices had a positive effect on operational performance where the level of implementation was average.

5.3 Recommendations

The following are the recommendation as pertains to the study; the tea processing firms in Kisii region should over trainings both the on job trainings and off job trainings in relation lean manufacturing in order to ensure efficiency and effectiveness in tea processing hence improving on firm performance, the firms should ensure full implementation of lean manufacturing practices in order to enjoy the full benefits of the lean manufacturing practices in the firm, the firms should look for alternative sources of power in order to reduce the high costs of electricity and to take care of blackouts which usually leads to increased wastes within the system or process, the firms should create the post of operations manager at the factory level instead of the post at the regional level only who understands more about the issues related to lean manufacturing instead delegating the duty to production managers, the firms should improve on infrastructure in both communication and transportation in order to ensure there is continuous flow of raw materials, information and also distribution of the finished production and lastly firms should embrace technology by coming up with more than one line which will ensure that there will be there product variety instead of dealing with only one product that is broken black tea.

5.4 Limitation of the Study

During the research the researcher experienced several challenges which were not limited to the following; lean manufacturing concept was not well understood and

this posed challenges in getting feedback and gathering information on its implementation, dynamic nature of manufacturing may change as time goes by and the given views are limited to a given period, there was also a challenge of acquiring the NACOSTI certificate and also getting authority to start collecting data from the respective the processing factories.

5.5 Suggestions for Further Study.

Assessment factors affecting the implementation of LM practices in tea manufacturing firms in Kisii region and also based on the study there is a great need to conduct a study on the relationship kaizen and firm performance

REFERENCES

Abdulmalek, Jayant, 2013, analyzing the benefits of lean manufacturing and value stream mapping via simulation

Ahmad, S. & Schroeder, R.G. 2003, "The impact of human resource management

Anand, G., Ward, P.T., Tatikonda, M.V. & Schilling, D.A. 2009, "Dynamic capabilities

Atkinson, A.A., Kaplan, R.S., Matsumura, E.M, Young, M.S. (2007) Management Accounting. (5th edition) Pearson Prentice Hall.

Brian D. Krichbaum, 2008; standardized work: The power of consistency. differences", *Journal of Operations Management,* vol. 21, no. 1, pp.19 43.Engineering, vol. 135, no. 5, pp. 7-12.

Brunet, A.P., and New, S. (2003) Kaizen in Japan: An Empirical Study. International Journal of Operations and Production Management, Vol. 23(12),

Eric Oscar Olsen, 2014, lean manufacturing management the relationship between practice and firm level financial performance.

Imai, M. (1986) Kaizen: The Key to Japan's Competitive Success. Random House, New York.

Imai, Masaaki (1986). Kaizen: The Key to Japan's Competitive Success. New York: Random House.

Jordy Byrd, 2015, what is total productive maintenance

Kaneko J, Nojiri W (2008). The logistics of Just-in-Time between parts suppliers and car assemblers in Japan. J. Transp. George, 1: 155-173.

Kevin Gingerich, Bosch Rexroth (2015); Lean production and automation; Select the be**st** production platform for Lean operations.

Koenigsaecker, G. 2005, "Leadership and the Lean Transformation", Manufacturing

M. M. Feldman (1992). "Audit in psychotherapy: the concept of Kaizen" Psychiatric Bulletin. Royal College of Psychiatrists. pp. 334–336

M. Shabeena Begam et al (2013); International Journal of Lean Thinking / Volume 4 pg 7 Management, vol. 27, no. 6, pp. 444-461.

Maria Mičietová, 2011; Lean production, Lean vs. Mass Production, TPM as a tool of Lean Production volume VI December, 2011

Michael E. Porter (1990), Competitive Advantage; creating superior performance, 33- 36

Michal Marton et al, 2010; Applying the theory of constraints in the course of process improvement.

Mike Rother and Rick Harris, 2001; creating continuous flow: USA press: The lean enterprise institute, inc. ISBN 9781498737548

Misiurek, Bartosz, 2016; Standardized Work with TWI: Eliminating Human Errors in Production and Service Processes. New York: Productivity Press. ISBN 9781498737548.

Musara Manazai 2012; impact of just in time (JIT) inventory system on efficiency, quality, and flexibility among manufacturing sectors, small and medium enterprise in South Africa.

Ondiek, Kisombe, 2013, a survey on adoption of lean manufacturing tools and techniques in sugar processing industries in Kenya

P. Okinda Owour, 2011, Tea in Kenya; production and country profile

Parmenter, David, 2007, key performance indicators: developing, implementing and using winning KPIs. Practices on operational performance: recognizing country and industry

Rachna shah, peter T. Ward, 2002; lean manufacturing: context, practice bundles and performance.

Richard et al. (2009): Measuring Organizational Performance: Towards Methodological Best Practice. Journal of Management

Talha M (2002). Implication of Just-in-Time (JIT) on accounting Delhi. Bus. Rev, 3(2) through continuous improvement infrastructure", Journal of Operations

Weed, Julie (July 10, 2010). "Factory Efficiency Comes to the Hospital". The New York Times.

Winroth, M.; Safsten, K. & Stahre, J.2006, Automation Strategies Requirements on the Strategy Process, the 39th CIRP International Seminar on Manufacturing Systems, June 7 –9, Ljubljana, Slovenia.

APPENDICES

APPENDIX I: RESEARCH QUESTIONNAIRE

This research targeted to get an insight of the LM practices adopted in tea processing farms in Kisii County, challenges facing the implementing Lean Manufacturing practices in tea processing firms in tea processing firms in Kisii County and the relationship between lean manufacturing practices and performance of tea processing firms. The information obtained will be only used for academic purposes and will be treated with great secrecy.

SECTION ONE: GENERAL INFORMATION OF THE RESPONDENT

1. Respondent's position in the organization

( ) Production Manager ( ) Factory Unit Manager ( ) Field Coordinator ( ) Supervisor ( ) Accountant

( ) Production Coordinator ( ) Quality Controllers ( ) Board of Directors

Other (specify)……

2. Respondent's level of education

( ) Under graduate ( ) Graduate ( ) Doctorate

Other (specify)…….....

3. Gender

( ) Male ( ) Female

4. For how long have you served in the position?

( ) Less than 1-4years ( ) 5 -10 years ( ) 10 -15 years ( ) above 15 years

SECTION TWO: LEAN MANUFACTURING PRACTICES COMMONLY USED BY TEA PROCESSING FACTORIES IN KISII COUNTY

Listed below are some of the commonly used lean manufacturing practices in most processing firms. Please tick the most common practice(s) which is implemented in your factory (firm). (Multiple answers are accepted).

Lean manufacturing practices	
Kaizen	
Just in time	
Continuous flow	
Automation	
Total productive maintenance	
Standardized work	
Bottleneck analysis	

SECTION THREE: CHALLENGES TO LEAN MANUFACTURING IMPLEMENTATION

The factors listed below affect the implementation of lean manufacturing practices in tea processing factors within Kisii County. Tick the appropriate option using the likert scale given below;

5 = strongly agree, 4 = Agree, 3 = Undecided 2 = Disagree, 1 = Strongly Disagree.

Contest to LM implementation	5	4	3	2	1
Lack of interface with existing systems					
Lack of internal expertise					
Government policies					
Lack of political goodwill					

Poor infrastructure					
Poor information/data accuracy					
Employees resistance to change					
Lack of vendor support					
Lack of appreciation of resulting benefits					
Power outages/blackouts					
High cost of electricity					
Lack of continuing education/training					
Lack of top management commitment					
Any other (please indicate)					

SECTION FOUR: IMPACT OF LEAN MANUFACTURING IMPLEMENTATION

Based on the above lean manufacturing practices how do you compare the performance of your firm before and after implementing the practices. Rate it using the following three Likert scale; 1- No improvement 2-I don't know 3-There is improvement

Kaizen	3	2	1
Quality products			
Cost reduction			
Product variety			
Satisfied customers			
Final product distribution reliability			
Increased profits			
Maximization of stakeholders interest			
Innovation			
Waste elimination			
Bottleneck analysis			
Quality products			
Cost reduction			
Product variety			

Satisfied customers			
Final product distribution reliability			
Increased profits			
Maximization of stakeholders interest			
Innovation			
Waste elimination			
Continuous flow			
Quality products			
Cost reduction			
Product variety			
Satisfied customers			
Final product distribution reliability			
Increased profits			
Maximization of stakeholders interest			
Innovation			
Waste elimination			
Total productive maintenance			
Quality products			
Cost reduction			
Product variety			
Satisfied customers			
Final product distribution reliability			
Increased profits			
Maximization of stakeholders interest			
Innovation			
Waste elimination			
Automation			
Quality products			
Cost reduction			
Product variety			
Satisfied customers			
Final product distribution reliability			
Increased profits			
Maximization of stakeholders interest			
Innovation			
Waste elimination			
Standardize work			
Quality products			

Cost reduction			
Product variety			
Satisfied customers			
Final product distribution reliability			
Increased profits			
Maximization of stakeholders interest			
Innovation			
Waste elimination			
JIT			
Quality products			
Cost reduction			
Product variety			
Satisfied customers			
Final product distribution reliability			
Increased profits			
Maximization of stakeholders interest			
Innovation			
Waste elimination			

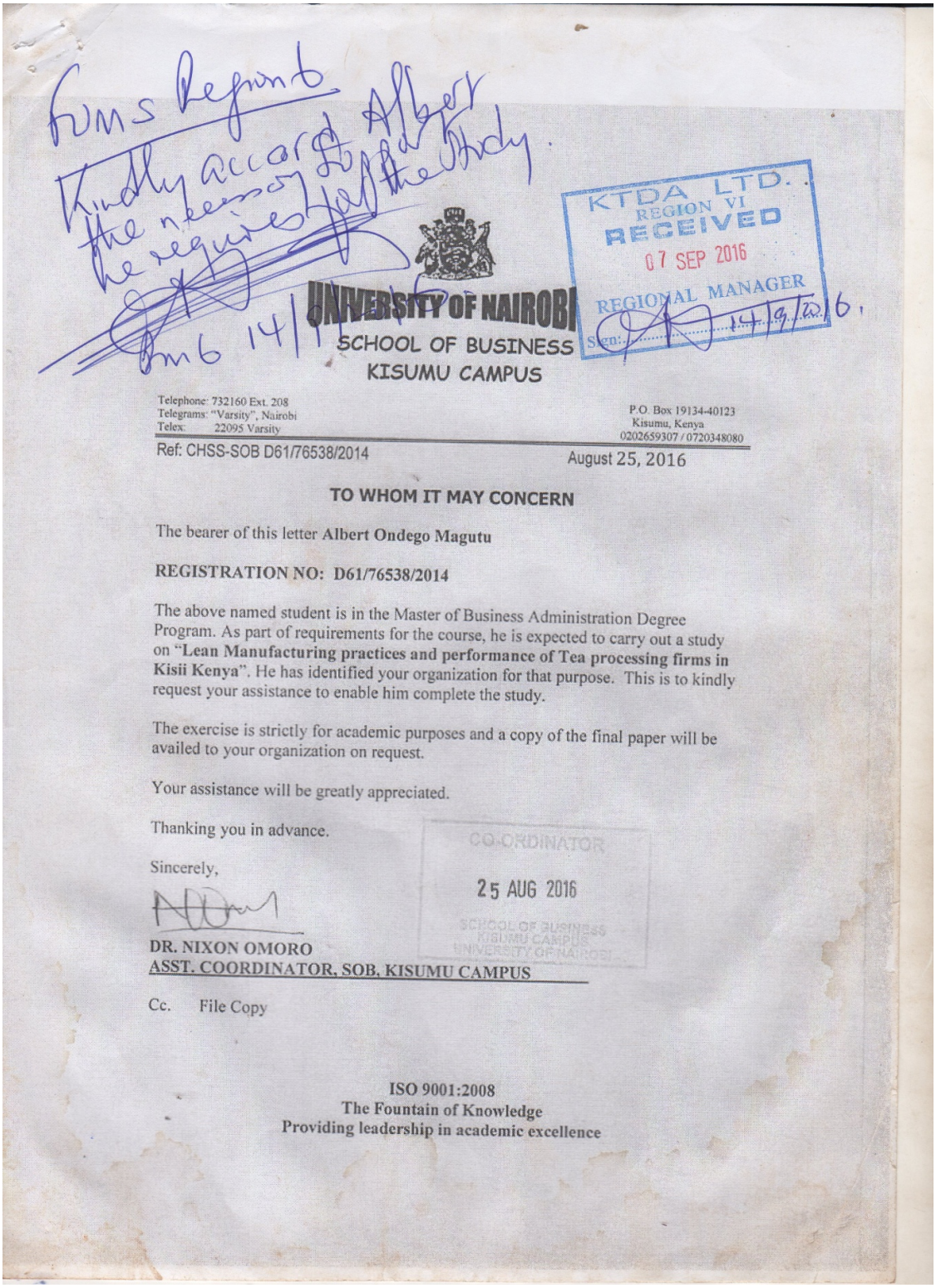
Thanks for your response

APPENDIX II; LIST OF FACTORIES IN KISII COUNTY

Factory	County
Nyamache tea factory	Kisii
Itumbe tea factory	Kisii
Kiamokama tea factory	Kisii
Ogembo tea factory	Kisii
Rianyamwamu tea factory	Kisii
Eberege tea factory	Kisii
Sang'anyi tea factory	Nyamira
Tombe tea factory	Nyamira
Gianchore tea factory	Nyamira
Nyansiongo tea factory	Nyamira
Nyankoba tea factory	Nyamira
Kebirigo tea factory	Nyamira

Source; KTDA website; factories-region/region 6-kisii highlands

APPENDIX III : UNIVERSITY INTRODUCTORY LETTER



Runs Regards
Kindly accord Albert the necessary support he requires for the study.

KTDA LTD.
REGION VI
RECEIVED
07 SEP 2016
REGIONAL MANAGER
Sign: 14/9/2016.

UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS
KISUMU CAMPUS

Telephone: 732160 Ext. 208
Telegrams: "Varsity", Nairobi
Telex: 22095 Varsity

P.O. Box 19134-40123
Kisumu, Kenya
0202659307 / 0720348080

Ref: CHSS-SOB D61/76538/2014

August 25, 2016

TO WHOM IT MAY CONCERN

The bearer of this letter **Albert Ondego Magutu**

REGISTRATION NO: D61/76538/2014

The above named student is in the Master of Business Administration Degree Program. As part of requirements for the course, he is expected to carry out a study on "**Lean Manufacturing practices and performance of Tea processing firms in Kisii Kenya**". He has identified your organization for that purpose. This is to kindly request your assistance to enable him complete the study.

The exercise is strictly for academic purposes and a copy of the final paper will be availed to your organization on request.

Your assistance will be greatly appreciated.

Thanking you in advance.

CO-ORDINATOR
25 AUG 2016
SCHOOL OF BUSINESS
KISUMU CAMPUS
UNIVERSITY OF NAIROBI

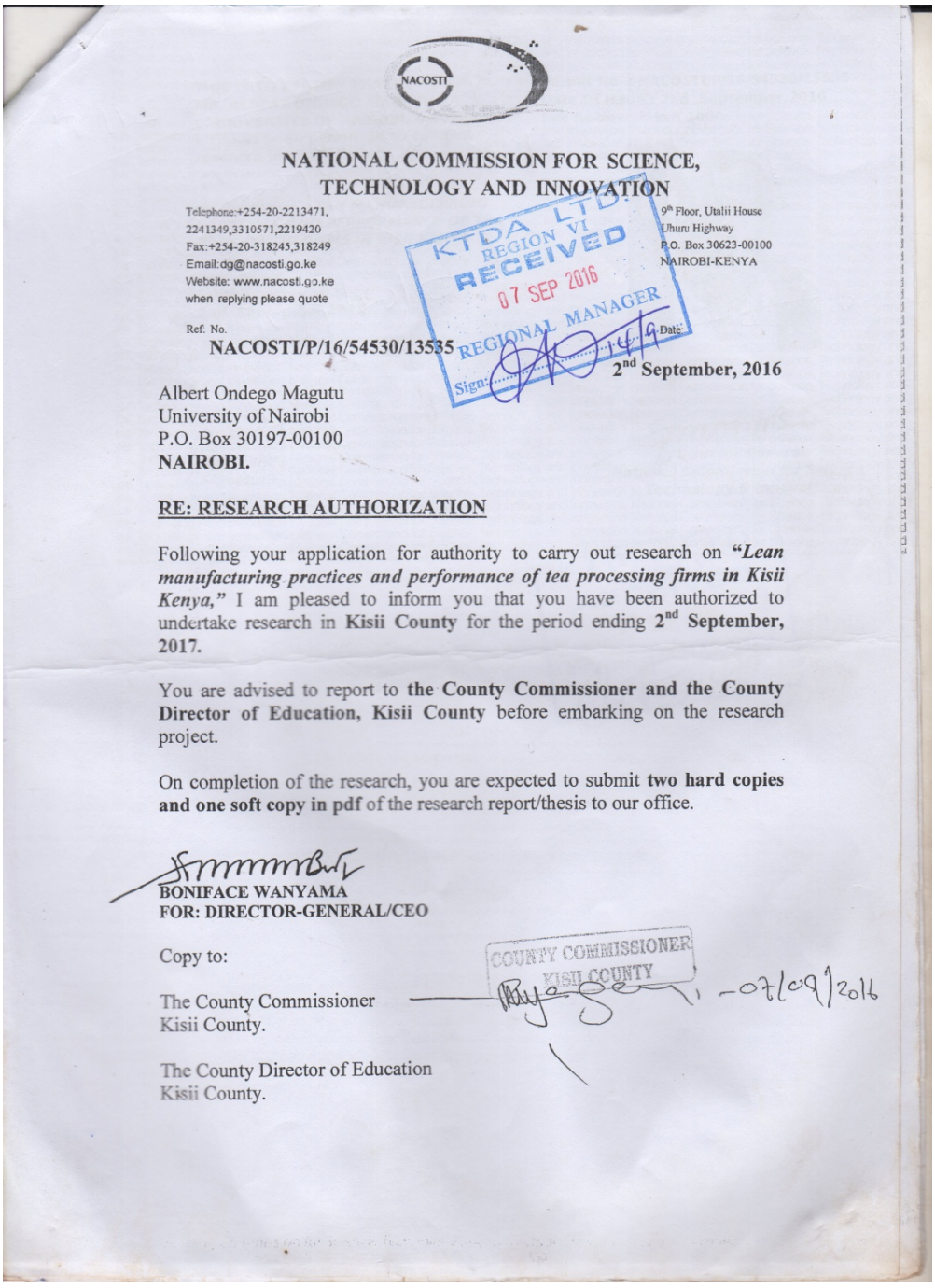
Sincerely,

DR. NIXON OMORO
ASST. COORDINATOR, SOB, KISUMU CAMPUS

Cc. File Copy

ISO 9001:2008
The Fountain of Knowledge
Providing leadership in academic excellence

APPENDIX IV: NACOST AUTHORIZATION LETTER



NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email:dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

KTDA LTD
REGION VI
RECEIVED
07 SEP 2016
REGIONAL MANAGER

Ref. No. NACOSTI/P/16/54530/13535

Date: 2nd September, 2016

Albert Ondego Magutu
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Lean manufacturing practices and performance of tea processing firms in Kisii Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Kisii County** for the period ending **2nd September, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Kisii County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

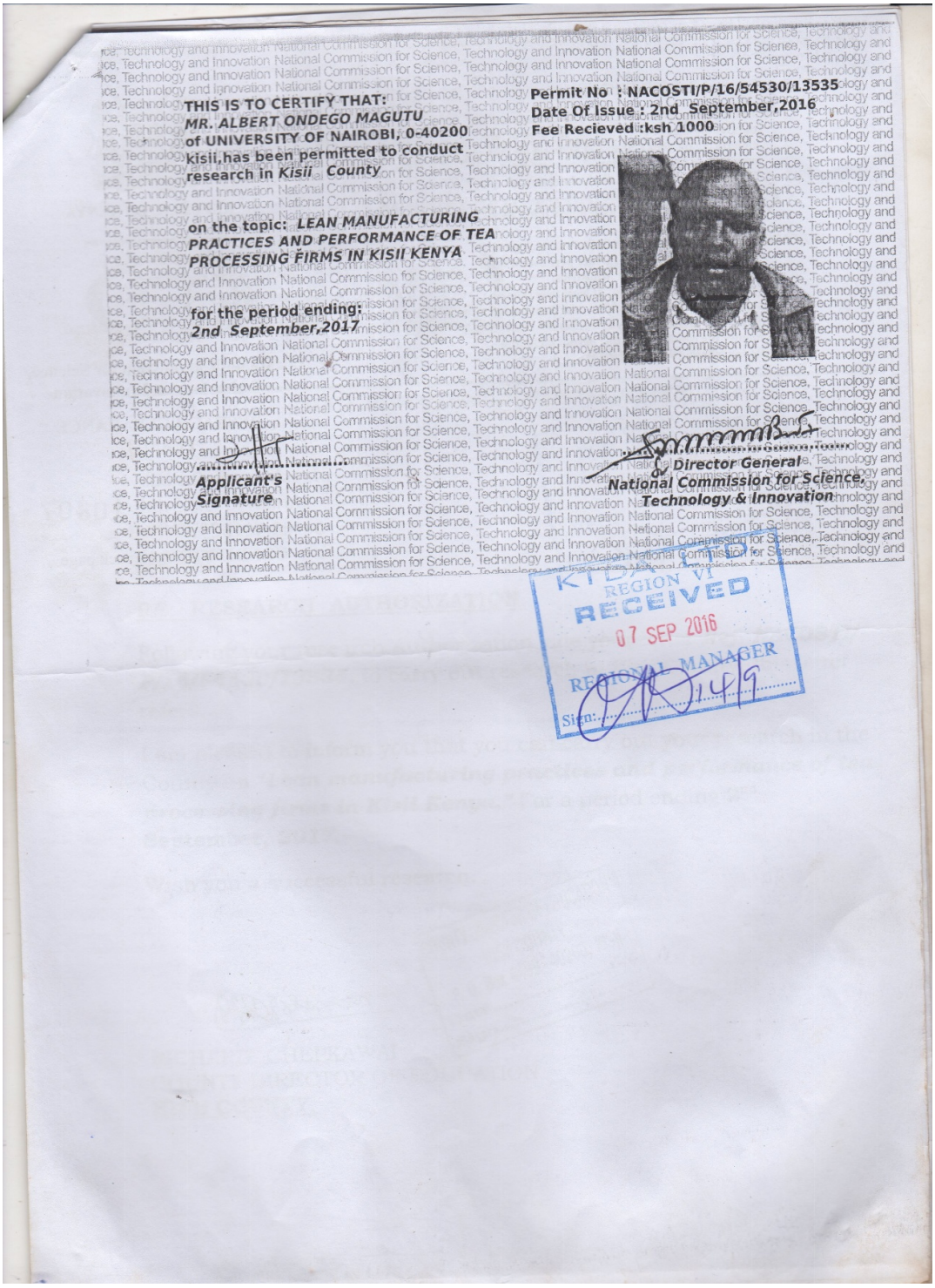
Copy to:

The County Commissioner
Kisii County.

COUNTY COMMISSIONER
KISII COUNTY
07/09/2016

The County Director of Education
Kisii County.

APPENDIX V: NACOST AUTHORIZATION CERTIFICATE



Permit No : NACOSTI/P/16/54530/13535
Date Of Issue : 2nd September,2016
Fee Recieved :ksh 1000

THIS IS TO CERTIFY THAT:
MR. ALBERT ONDEGO MAGUTU
of UNIVERSITY OF NAIROBI, 0-40200
kisii,has been permitted to conduct
research in Kisii County

on the topic: LEAN MANUFACTURING PRACTICES AND PERFORMANCE OF TEA PROCESSING FIRMS IN KISII KENYA

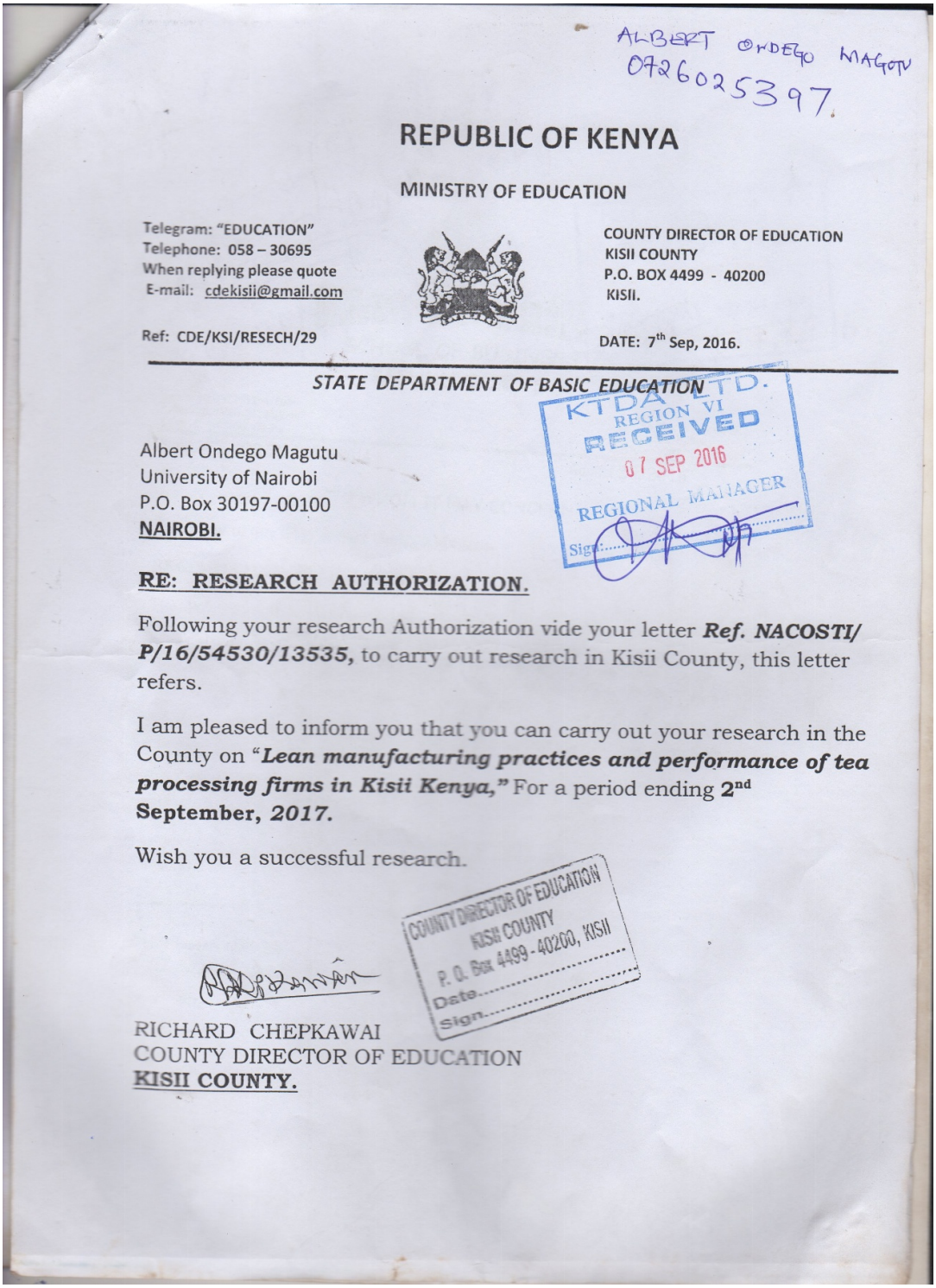
for the period ending:
2nd September,2017

Applicant's Signature

Director General
National Commission for Science, Technology & Innovation

REGION VI
RECEIVED
07 SEP 2016
REGIONAL MANAGER

APPENDIX VI: COUNTY DIRECTOR OF EDUCATION AUTHORIZATION LETTER



ALBERT ONDEGO MAGOTU
0726025397

REPUBLIC OF KENYA

MINISTRY OF EDUCATION

Telegram: "EDUCATION"
Telephone: 058 – 30695
When replying please quote
E-mail: cdekisii@gmail.com

COUNTY DIRECTOR OF EDUCATION
KISII COUNTY
P.O. BOX 4499 - 40200
KISII.

Ref: CDE/KSI/RESECH/29

DATE: 7th Sep, 2016.

STATE DEPARTMENT OF BASIC EDUCATION

KTDA LTD.
REGION VI
RECEIVED
07 SEP 2016
REGIONAL MANAGER
Sign:

Albert Ondego Magutu
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION.

Following your research Authorization vide your letter ***Ref. NACOSTI/ P/16/54530/13535,*** to carry out research in Kisii County, this letter refers.

I am pleased to inform you that you can carry out your research in the County on "***Lean manufacturing practices and performance of tea processing firms in Kisii Kenya,"*** For a period ending **2nd September, *2017.***

Wish you a successful research.

COUNTY DIRECTOR OF EDUCATION
KISII COUNTY
P. O. Box 4499 - 40200, KISII
Date.....
Sign.....

RICHARD CHEPKAWAI
COUNTY DIRECTOR OF EDUCATION
KISII COUNTY.