An Evaluation Of Total Productive Manufacturing In Kenya: A Case Study Of Unilever Kenya

by

Felix Maingi

A thesis submitted to the School of Business and Economics of Daystar University Nairobi-Kenya

in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION in Strategic Management

May 2011
AN EVALUATION OF TOTAL PRODUCTIVE MANUFACTURING IN KENYA:
A CASE STUDY OF UNILEVER KENYA

In accordance with Daystar University policies, this thesis is submitted in partial
fulfillment of the requirements for the Master of Business Administration

Stephen Manya, PhD
Supervisor

Michael Bowen, PhD
Reader

Thomas Koyier, MSc
HOD, Commerce Department

Muturi Wachira, DBA, CPA(K) CPS(K)
Dean, School of Business and Economics
DECLARATION

AN EVALUATION OF TOTAL PRODUCTIVE MANUFACTURING IN KENYA:
A CASE STUDY OF UNILEVER KENYA

I declare that this thesis is my original work and it has not been submitted to any other college or University for academic credit

Signed ______________________  Date ______________________
Felix Maingi
ACKNOWLEDGEMENTS

I wish to extend my sincere gratitude to the following, first to God the almighty, for giving me the opportunity to study at Daystar University without which this research would not have been possible. I wish to express sincere appreciation to my Supervisor Dr. Reverend Stephen Manya and Reader Dr. Michael Bowen for their selfless work, assistance and encouragement during the study. I learnt so much during the interaction I had with them.

I am greatly indebted to my employer Unilever Kenya Limited for allowing me to carry out the research and take unscheduled leave days to carry out data collection, Ednah and Ann for going through the document picking out any grammatical inconsistencies, and my fellow students for their valuable suggestions. This extends to all others who contributed in one way or the other in making the study a success.

Lastly but not least, I am thankful to my family, my wife Flocy, my sons Mambo and Kwame, for their understanding and support during my studies at Daystar. I denied them companion over the weekends and evening as I attended classes.
DEDICATION

To my wife Flocy, sons Mambo and Kwame, and my late mother Serah who passed on during my second year of study, for the continuous encouragement throughout my studies at Daystar.
# TABLE OF CONTENTS

APPROVAL PAGE ............................................................................................................ ii  
DECLARATION ............................................................................................................... iii  
ACKNOWLEDGEMENTS ............................................................................................... iv  
DEDICATION .................................................................................................................... v  
LIST OF TABLES ........................................................................................................... viii  
LIST OF FIGURES ........................................................................................................... ix  
ABBREVIATIONS AND ACRONYMS ........................................................................... x  
ABSTRACT ....................................................................................................................... xi  

## CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY ........ 1

Introduction ......................................................................................................................... 1  
Background of Total Productive Manufacturing .............................................................. 1  
Total Productive Manufacturing Concept ......................................................................... 2  
History of Unilever .............................................................................................................. 3  
Statement of the Problem .................................................................................................... 4  
Purpose of the Study ........................................................................................................... 5  
Objectives of the Study ........................................................................................................ 5  
Research Questions ........................................................................................................... 5  
Significance of Study ........................................................................................................... 6  
Rationale of the Study ........................................................................................................ 6  
Limitations and Delimitations ............................................................................................ 6  
Assumptions of the Study ................................................................................................. 7  
Scope of the Study ............................................................................................................ 7  
Definition of Terms .......................................................................................................... 7  
Summary ............................................................................................................................. 8  

## CHAPTER TWO: LITERATURE REVIEW ................................................................ 9

Introduction ......................................................................................................................... 9  
Manufacturing Industry ...................................................................................................... 9  
Pillars of Total Productive Manufacturing .......................................................................... 11  
The Total Productive manufacturing Culture Change ...................................................... 14  
Measures of Total Productive Manufacturing .................................................................... 16  
Strategy and Competitive Advantage .............................................................................. 16  
Sources of Competitive Advantage .................................................................................. 19  
Competitive Strategy ......................................................................................................... 20  
Generic Competitive Strategies ....................................................................................... 21  
TPM as a source of Manufacturing-led competitive advantage ....................................... 22  
Theoretical Orientation; Goldratt’s Theory of Constraint .............................................. 23  
Conceptual Framework ..................................................................................................... 25  
Summary ........................................................................................................................... 25  

## CHAPTER THREE: RESEARCH METHODOLOGY ................................................ 26

Introduction ......................................................................................................................... 26  
Research Design .............................................................................................................. 26  
Population .......................................................................................................................... 28
LIST OF TABLES

Table 2.1: TPM Culture Change ................................................................. 14
Table 2.2: Maintenance Technicians activities ...................................... 15
Table 3.1: Sample Selection Units .......................................................... 30
Table 4.1: Departmental Distribution of Respondents ............................. 38
Table 4.2: Age distribution .................................................................... 39
Table 4.3: Respondents’ Level of Education ............................................ 40
Table 4.4: Duration Worked in Unilever Kenya Limited ......................... 41
Table 4.5: Level of Agreement with statements on TPM ....................... 43
Table 4.6: TPM’s Objectives ................................................................. 45
Table 4.7: Rating of Statements on the Effects of TPM ......................... 46
Table 4.8: Effects of on OEE ................................................................. 48
Table 4.9: Areas of Cost Reduction using TPM ....................................... 49
Table 4.10: Ways TPM has Resulted in Competitive Advantage ............. 51
Table 4.11: Factors for Success in TPM Implementation in UKL ............ 55
Table 4.12: Factors Limiting Attainment of TPM’s Goals in UKL ........... 57
Table 4.13: Remedial Actions Recommended to overcome the Challenges 58
LIST OF FIGURES

Figure 2.1 TPM House ...................................................................................................... 11
Figure 2.2: Conceptual Framework .................................................................................. 25
Figure 4.1 :Gender of Respondents .............................................................................. 39
Figure 4.2: Duration Worked in Manufacturing Industry ................................................. 42
Figure 4.3: Assessment whether TPM Enabled UKL Gain Advantage....................... 50
Figure 4.4: Rating of Employees’ Adjustment TPM Implementation ........................... 53
Figure 4.5 :Extent of TPM Implementation Success ...................................................... 54
Figure 4.6: Limitations in the Attainment of TPM Goals.............................................. 56
ABBREVIATIONS AND ACRONYMS

TPM  Total Productive Manufacturing
UKL  Unilever Kenya Limited.
OEE  Overall Equipment Efficiency
KIMBO Kenya Industrial Management Board Organization
CM   Competitive Manufacturing
JIT   Just in Time
Muda Process Waste
UNTAD United Nations Conference on Trade and Development
5s    Work Place Organization, Cleanliness and Discipline
EM   Early Management
PM   Preventive Maintenance
FI   Focused Improvement
QDI  Quality Demerit Index
ABSTRACT

The ultimate goal of Total Productive Manufacturing (TPM) is to implement perfect manufacturing. Originally introduced as a set of practices and methodologies focused on manufacturing equipment performance improvement, TPM has developed into a comprehensive equipment-centric effort to optimize manufacturing productivity. TPM is based on team work and provides a method for the achievement of world class levels of overall equipment effectiveness through people and not through technology or systems alone. This study was intended to evaluate TPM in Kenya, its effect on productivity and production cost of firms in the manufacturing sector and to come up with recommendations that would help firms to implement TPM successfully. The study focused on Unilever Kenya limited and found that TPM had improved Unilever’s performance by increasing efficiency and reliability of production equipments, reduced cost of production, increased employee involvement and morale. In the manufacturing industry, the strategy formulation considers the forces of competition in the industry segment. Due to the increased awareness of the competition efforts must surpass the mass production witnessed in the 1920’s, by adoption of practices using technology and innovativeness to ensure survival. TPM is hence used as a source of manufacturing-led competitive advantage through improved quality, speed, delivery, flexibility and cost. The role of business operations in tapping into the different sources of manufacturing-led competitive advantage is based on the production needs of the organization and availability of the technological advances. The study used a descriptive survey method in which Goldratt’s theory combined with the collection of qualitative data. Data collected was coded to allow the researcher to use descriptive statistics. The research findings
showed that implementation of TPM has improved UKL’s performance by improving OEE through cost reduction, increasing employee knowledge, improving employee involvement, morale and product quality, ensuring continuous machinery maintenance, reduced wastage of materials and employee training.
CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY

Introduction

This chapter will give the background of Total Productive Manufacturing (TPM) based on the historical development of the TPM concept and the history of Unilever Kenya limited. It will also present the statement of the problem statement, purpose, objective, research questions, rationale, significance, scope and limitation of the study. This chapter also gives the definition of terms and a chapter summary.

Manufacturing Improvement Systems (MIS) are intended to streamline the production capacity of a company in order to place the organization ahead of its competitors. This has seen the introduction of competitive manufacturing strategies employed by various manufacturing companies. Supply chain defines competitive manufacturing in terms of, reduced product cycles, efficient work flows and participatory approach by all the employees in the product improvements processes (Bird, 2002).

According to Ben-Daya, Dafuua, and Raouf (2000), the competitive manufacturing system adopted by manufacturing companies express the level of use of systematic approach to produce high quality goods, for the least cost and with the least waste. Total Productive Manufacturing (TPM) is one of the competitive manufacturing systems adopted to ensure not only the physical product is of quality but also that the value created in these products imparts a value chain relationship that is critical for the success of any organization.

Background of Total Productive Manufacturing

TPM is a proactive approach that essentially aims to identify issues as soon as possible and plan to prevent any issues before occurrence. It is a methodology and
philosophy of strategic equipment management focused on the goal of building product quality by maximizing equipment effectiveness. It embraces the concept of continuous improvement and total participation by all employees and departments (Society of Manufacturing Engineers). TPM aims at achieving zero error in quality, zero work-related accident, and zero loss/process waste. TPM is a Japanese idea that can be traced back to 1951, when preventive maintenance was introduced into Japan from the United States of America (USA). Nippondenso, an arm of Toyota car making company, was the first in Japan to introduce plant wide preventive maintenance in 1960 (Leflar, 2001).

Bird (2002) records that in the 1980s, TPM spread out from the automobile industries and auto parts and machinery into process industries such as food, and chemicals; adoption of TPM has since gained interest. Bird (2002) explains that today’s manufacturing industries have adopted TPM globally. He further explains that TPM’s purpose and scope has changed over time to reflect its application in overall efficiency of supply chain in different contexts. In Kenya there are three companies that have adopted TPM; these include British American Tobacco (BAT), BIDCO oil refineries and Unilever Kenya Limited (UKL).

**Total Productive Manufacturing Concept**

The concept behind TPM is maintenance and production personnel cooperate to define, standardize, allocate and perform the tasks needed to maximize Overall Equipment Efficiency (OEE). This keeps equipment producing quality product at maximum efficiency and minimum lifecycle cost (Bird, 2002). Maximizing OEE means balancing productivity and reliability, getting the most from the machine with the least time lost for maintenance and breakdowns. Production operators and maintenance
technicians must work in concert, not conflict. Bird (2002) gives five objectives of TPM, these include the development of corporate institutions in order to maximize overall process efficiency, the reduction of overall process waste through cycle management, the integration of TPM in all departments, overall employee participation in loss reduction and/or elimination and merging small groups or processes to ensure zero loss.

The achievement of the above objectives is based on five pillars. They are individual equipment improvements to eliminate losses, autonomous maintenance, planned preventive maintenance, maintenance and operations skills training, and maintenance plan design and early equipment management (Ben-Daya et al., 2000). According to Basu and Wright (2005), TPM is the highest level of maintenance and is a major contributor to a company’s competitive advantage. Baier (2008) explains that competitive advantage is defined with respect to actions of current or prospective competitors. Misra (2008) further explains that for TPM to be achieved the machines must be available at the time they are needed. They must also be shut down in a way that they are ready the next time they are needed for use.

History of Unilever

Unilever Kenya was registered in 1949 as East Africa Industries Limited (EAI); it later changed its name to Unilever Kenya Limited in 2000, and developed to be one of the leading manufacturers of food, home and personal care products with a strong market leadership. EAI limited evolved during the Second World War when essential household items and other vital products became increasingly scarce. The colonial Government set up a body to co-ordinate the supply of essential items. This body was called Kenya Industrial Management Board Organization (KIMBO).
EAI limited was registered and incorporated in Kenya on 13 April 1949 following an agreement signed by the Kenya Government and the Colonial Development Corporation (now the Commonwealth Development Corporation: CDC). In 1953 Unilever was invited as a strategic partner to bring in its soap, margarine and fat technology; it acquired 50% shareholding in EAI Limited. Its brand portfolio continued to grow to include such well-known brands as Blue Band, Royco, Home cup Tea, Omo, Geisha, Close-up, Lady gay, Fair & Lovely and Sunlight. In 1999 Unilever purchased the remaining shares in EAI from ICDC. 25 October 2000 marked the name change from EAI to Unilever Kenya Limited. Shortly after this purchase, Unilever announced the international acquisition of Bestfoods Inc.

In Kenya, this meant that Bestfoods Kenya Limited joined the Unilever family, bringing with it household brands such as Haria Curry powder, Knorr soups and bouillons, Mazola Oil and Skippy Peanut Butter. UKL now employs 1400 employees. The company’s leading brands reach consumers through a network of over 50,000 retail outlets providing employment to over 120,000 Kenyans. Considering that UKL is recognized as a major player in the economic development of the country, its contribution to the Kenya government revenue is huge; its products are household names throughout the region (Wilson, 2003).

Statement of the Problem

The implementation of TPM requires that the whole supply chain be involved, as it calls for alignment of all actions and objectives. Major manufacturing companies in the world have embraced TPM as a vehicle to take them to world class level and gain a
competitive edge (Bird, 2002). The competitiveness of multinationals is largely determined in how well MIS concepts are deployed in the operating units.

TPM being a concept developed in an oriental culture faces challenges of implementation within other cultures (Basu & Wright, 2005). This explains why it has been difficult to adopt TPM in Kenya. UKL was the first company in Sub-Sahara Africa to receive a TPM award in 2005 for level one implementation. However there has not been much progress in the implementation of this concept as it is multi-staged. The newness of the concept in the country presents challenges since it requires a culture change which must be maintained consistently. Although TPM is meant to enhance productivity through its objectives (lean manufacturing and cost effectiveness) not much has been achieved (Wilson, 2003).

Purpose of the Study

The purpose of this study was to evaluate the impact of TPM on productivity in manufacturing firms in Kenya, with a focus on UKL.

Objectives of the Study

1. To assess the contribution of TPM on production efficiency and production cost in UKL.
2. To find out the challenges in the implementation of TPM in UKL.
3. To find out UKL employee’s opinions on how TPM affected their attitude towards work.

Research Questions

1. How did the implementation of TPM in UKL contribute to production efficiency?
2. What difficulties were there in the process of implementing TPM in UKL?

3. How did TPM affect employees’ attitude towards work in UKL?

**Significance of Study**

This study would be significant to UKL for the assessment of progress on this competitive manufacturing system. The findings of this study would be used to make the needed changes in the implementation of TPM in UKL and other manufacturing firms in Kenya in order to realize full benefits of the system. The study could help develop a TPM implementation manual for companies in Kenya.

**Rationale of the Study**

The reason for choosing the study was that TPM is a competitive manufacturing system that encompasses most other systems such as ISO and Total Quality Management (TQM). It aims at producing high quality goods for the least cost and with the least waste. The rationale for choosing the study was the researcher works with UKL and the study would help him develop a viable career in supply chain management.

**Limitations and Delimitations**

The researcher’s effort to carry out the study may have been limited by the managers of UKL failing to give the required information about TPM because it would expose the company to its competitors. The researcher overcame this by assuring the management of UKL that the research was solely for academic purpose and that any privileged information that the researcher obtained would not be divulged.

The employees of UKL may have failed to give required information because of the fear that the findings would expose them to the management who could use it against them. The researcher assured them of confidentiality and encouraged them not to write
their names on the questionnaires. Even with the assurance of confidentiality, a number of respondents declined to give information.

Assumptions of the Study

The researcher assumed that all the UKL employees were aware of the implementation and the progress of TPM in UKL and they gave honest responses and opinions to the questions asked by the researcher, to generate appropriate data for the study. The researcher also assumed that the recommendations of the study would be of interest to UKL.

Scope of the Study

In order to establish the impact of TPM in the manufacturing industry in Kenya and meet the objectives, the study was limited to UKL. The research also limited itself to the area of manufacturing industry.

Definition of Terms

Manufacturing Improvement Systems

Manufacturing Improvement Systems (MIS) are systems intended to streamline the production capacity of a company in order to place the organization ahead of its competitors (Frontini & Kennedy, 2003).

Overall Equipment Efficiency

OEE means balancing productivity and reliability, getting the most from the machine with the least time lost for maintenance and breakdowns (Bird, 2002).
**Total Productive Manufacturing**

It is a methodology and philosophy of strategic equipment management focused on the goal of building product quality by maximizing equipment effectiveness (Leflar, 2001).

**Summary**

This chapter has discussed the historical development of the Background of total productive manufacturing and the concept of TPM, and its role in the economy. It has also given the problem statement, purpose, objectives, research questions, rationale, significance, scope and limitation of the study, and the definition of terms.
CHAPTER TWO: LITERATURE REVIEW

Introduction

This chapter will focus on providing relevant literature on the area of study. It will give a description of the manufacturing industry and its trends, competitive advantage detailing the different competitive strategies describing how a company can achieve or defend a competitive advantage by implementing TPM.

Manufacturing Industry

According to Lin, Justin, and Pleskovic (2009), the basic unit of technological activity is the industrial firm. Lin et al. explain that industrial firms stimulate innovation through their acquisition, development, adaptation, and use of technology. They say that technological development is influenced by competition and trade policies, governing rules and regulations, physical infrastructure, skills and financing. It is further noted by Lin et al. that skills acquired through high level specialized training and research generated knowledge are key determinants in industrial development.

Lin et al. (2009) explain that the manufacturing industries in Africa are dominated by low level processing of natural resources and the production of simple consumer goods. United Nations Conference on Trade and Development (UNCTAD, 2003) cited in Lin et al. also adds that industry structure consist mainly of large refining industry, aluminum smelting facility with limited capacity. UNCTAD (2003) further explains that, the modern sector which is largely food processing and industrial intermediaries manufactures are mostly owned by foreign companies. UNCTAD also notes that most of the semi enterprises are relatively small scale African-owned operations. They use simple machinery and are managed with low level technical and managerial skills.
According to UNCTAD (2003) cited in Lin et al. (2009), the industrial sector in Africa produces lower quality products which are sold mainly in the local market. African industrial sector has remained significantly unchanged since its colonial raw material production and export origin. This is because most of the African industries are resource based as opposed to technology-based industries which are more prevalent in the west (Lin et al., 2009).

According to Price Waterhouse Coopers (PWC) (2010), Kenya has a large manufacturing industry which serves both the local market and the East African region. UKL is the sourcing unit for East and Southern Africa; and supplies Uganda, Tanzania, Rwanda, Malawi, Mozambique, Zambia and Zimbabwe. PWC (2010) and Graham (2003) explain that manufacturing industry in Kenya is dominated by subsidiaries of the multinational-national corporations (MNC’s) and contributes a Gross Domestic Product of approximately 13%. Graham (2003) explains that the manufacturing industry in Kenya is mainly involved in the manufacturing of agricultural produce, some household goods, vehicle parts and farm tools.

Bas, Franco, and Gasquet (2010) note that, new millennium has seen a rapid change in many aspects and segments of manufacturing industries. Bas et al. (2010) add that global competition, mass market fragmenting into niche markets, customer expectation of low price, high quality and custom products are the factors that have led to these rapid changes. Other factors that have led to the dynamics in the manufacturing industry include change in product life cycle which seem to be increasingly shortened and the customers, need to be treated in a special way as individuals according to the manufacturing Society of Engineers (1995).
According to Misra (2008), TPM identifies sixteen types of wastes known as *muda*. TPM therefore works towards eliminating them by systematically making improvements (Kaizen). Through TPM and training UKL aims to have equipment operators who can be autonomous in maintenance; carry out improvement projects aimed at making equipment better in reliability and product quality. By doing this the maintenance personnel are released to carry out planned maintenance which should result to zero equipment failure (breakdown). Borris (2006), Khörrow-Pour (2006) and Misra (2008) give eight pillars of TPM (figure 2.1), which are intended to cover every department and function in the company. In UKL, TPM remains largely a supply chain management tool.
activity, other functions such as marketing, sales and customer development are yet to establish TPM. Misra (2008) explains that each of the eight pillars is set to achieve zero targets. These are; focused improvement, autonomous maintenance, planned maintenance, early management, training, quality maintenance, administrative/office TPM, safety, health and environmental (Borris, 2006; Khorrow-Pour, 2006).

According to Borris (2006) and Khorrow-Pour (2006), autonomous maintenance is aimed at developing equipment competent operators. It also empowers operators to look after their own equipment. Focused improvement on the other hand, aims at eliminating breakdowns, quality defects and any other type of loss (Borris, 2006; Khorrow-Pour, 2006). It also targets to achieve the ultimate in production efficiency.

Willmontt (1994) further explains that effective management improves the effectiveness of the maintenance department to the point where the eight major equipment losses are no longer generated. Related to this is early management which helps by reducing equipment and product development and prototyping lead times. It also works towards achieving stable commissioning of equipment and products (Borris, 2006; Khorrow-Pour, 2006). Quality maintenance as a pillar helps achieve zero quality defects by sustaining correct equipment conditions.

Borris (2006) and Khorrow-Pour (2006) explain that TPM administration plays a very important role in achieving zero functional losses, creating highly efficient offices and providing effective service and support to the production department. This coupled with staff training which boosts the expertise of the operators and maintenance personnel and safety, health and development enables the achievement and sustainability of zero accidents, creates a healthy, rewarding and pleasant work environments.
On the contrary Ben-Daya et al. (2000) regard six pillars of TPM as individual equipment improvement to eliminate the six big losses, autonomous maintenance, planned preventive maintenance, maintenance and operations skills, maintenance plan design and early equipment management. They further explain that, to achieve TPM overall objective, TPM model can be built on five pillars. It is aimed at eliminating manufacturing losses. Ben-Daya et al. (2000) give the six big losses in manufacturing to include: equipment failure, setup and adjustment, idling and minor stoppages, reduced speed, defects in process, and reduced yield. They explain that equipment failure and setup, reduces the time equipment is available for use, while idling and minor stoppages and reduced speed affects its performance by reducing the net operating time. In addition, defects in process and reduced yield affect the rate of quality.

Regarding individual equipment improvement, Ben-Daya et al. (2000) explain that the management team should be ready to continuously improve their machines and themselves in order to achieve zero failures and zero defects. Autonomous maintenance according to Ben-Daya et al. calls for the involvement of the operators in the maintenance of their own machines. This will build on the operators understanding of their machines thereby working more effectively and taking care of their own equipment. In addition Ben–Daya et al. explain that the maintenance teams should perform periodic inspections and preventive maintenance so as to improve the life span of the equipment. Ben-Daya et al. suggest that equipment maintenance should be done when the equipment is idle such as during the night or weekends. Misra (2008) adds that if spare parts control and breakdown analysis is well done this can help in the achievement of greater efficiency and reduction in the maintenance cost.
The Total Productive manufacturing Culture Change

TPM implementation changes the maintenance culture of an organization in many ways (Leflar, 2001). However, this need for a change in people’s thinking makes successful TPM implementation difficult. According to Leflar (2001) people naturally resist change, they want to think of TPM only as a project tool, instead of as an ongoing process that becomes a part of their normal work routine. Table 2.1 indicates some of the culture changes that TPM implementation brings about.

Table 2.1: *TPM Culture Change (Leflar, 2001)*

<table>
<thead>
<tr>
<th>Old culture</th>
<th>New Culture created with TPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only top pareto problems are resolved using any means possible to make improvements.</td>
<td>All minor defects in a machine are eliminated; machine performance is continually improved with the methodical and repeated application of TPM steps.</td>
</tr>
<tr>
<td>Improvement methods are implemented by individuals or teams in any way they see fit.</td>
<td>Improvement methods are vigorously defined and are expected to be implemented precisely.</td>
</tr>
<tr>
<td>Improvements in the organization’s work methods and processes are localized by each team as they desire.</td>
<td>Improvements in the organization’s work methods and processes are coordinated by managers so the entire organization is learning and benefitting from improved techniques. Even improvement methods themselves are continually improved.</td>
</tr>
<tr>
<td>Machine problems are resolved one at a time reactively. Ultimately, improvements only occur in systems that have failed.</td>
<td>A reliable and systematic improvement process is applied to a machine to address all productivity losses proactively. Failures are prevented before they occur.</td>
</tr>
<tr>
<td>Improvement steps are taken as absolute once completed they are not revised.</td>
<td>Improvement steps are revised as people’s skills improve and expectations for their performance are raised.</td>
</tr>
<tr>
<td>Only results are measured by managers</td>
<td>Both results and the process used to obtain the results are measured by managers.</td>
</tr>
</tbody>
</table>
Leflar (2001) explains that any human skill can always be improved to a higher standard; however they are developed in elevating stages. It is not feasible to expect people to achieve a high level of performance when first undertaking a new activity. For instance when a karate student first learns to perform a front kick, the kick has many flaws but once the student achieves a certain level of performance; he can advance from white belt to a yellow belt. More practice will be needed for an even higher level belt. TPM activities are improved in a similar way, a team first learning what it means to create a clean and defect free machine will do so at a lower level than a team that has more experience working with TPM activities. As teams advance their skills they can be held to a higher standard of clean and defect free machine. This first TPM step can be continually revisited and improved even as teams have moved beyond this step (Leflar, 2001).

Eventually, as the way people work on the factory floor changes the culture change becomes observable. For example the following changes in the way maintenance technicians spend their time might be observed after TPM activities have progressed (Robinson & Ginder, 1995) as shown in table 2.2.

Table 2.2: Maintenance Technicians activities (Robinson & Ginder, 1995)

<table>
<thead>
<tr>
<th>Maintenance technician activity</th>
<th>Before TPM</th>
<th>After TPM progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine Repairs</td>
<td>70%</td>
<td>10%</td>
</tr>
<tr>
<td>Machine PM’s</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>Improvement Activities</td>
<td>10%</td>
<td>50%</td>
</tr>
</tbody>
</table>
Measures of Total Productive Manufacturing

Misra (2008) affirms that the key measures of TPM include overall efficiency and quality. According to Misra overall equipment effectiveness (OEE), tells of how TPM works while discrediting OEE as just an indicator of the uptimes and downtimes. Misra further describes OEE as a product of availability, performance efficiency, and quality rate. Since the operators of the manufacturing equipment are expert, they know the expectations of the efficient systems; TPM thus, creates ownership of the manufacturing process among all employees.

Misra (2008) further notes that from the viewpoint of a house whose foundation is discipline, involvement, communication, responsibility, and ownership. For the long-term success of TPM, teamwork and ownership are essential components. For teams to function well, Misra suggests that a code of conduct, rules and regulations to be observed should be laid down. This is because TPM achieves its objectives through activities of overlapping small group in a hierarchical way. To measure the impact of TPM in the organization, Ben-Daya et al. (2006) argue that actual performance should be measured against the target.

Strategy and Competitive Advantage

According to Montgomery and Porter (1991), strategy is a deliberate plan of action that will develop a business, competitive advantage and compound it. They explain that competition existed long before strategy. Kollowski (2007) explains that strategy plays an important role in the organization. The essence of strategy formulation in an organization is coping with competitive forces. This is not limited to competition alone which is the greatest fear of any businessman, but in all aspects of business as pointed out
by Kollowski. According to Pearce and Robinson (2009), companies have to fight for
market share and the strength of the competitive force determines the profitability making
them important to strategy formulation.

In the early years of existence UKL was a monopoly until the liberalization of the
economy in the 80’s. With liberalization Unilever faced competition in all its major
categories; detergent and fats. Omo which is one of the core brands of UKL has over the
years faced stiff competition from brands such as Toss, Gentle and Power Boy all from
local companies; KAPA and BIDCO oil refineries. Omo is a brand that is positioned as
being tough on dirt and stains, competing brands exploited on this aspect positioning
themselves as being kind to hands and preserving colours. This resulted in major loss in
market share, 10 percentile points. To protect its market share UKL came up with a
Sunlight washing powder that is marketed on the platform of being soft on hands and
making colours brighter. This innovation has seen UKL maintain dominance in
detergents and has even resulted in market share of OMO because of being marketed as
the best detergent for the very dirty cloths such as for children and working gear.
Competition in an industry depends on five basic forces (Pearce & Robinson, 2009).
These are: new entrants, industry competitors or rivals, suppliers, substitutes, and buyer’s
power.

Competition is a common feature in various industries. Porter (2008) points out
that in past few years competition has intensified in the various domains. Porter further
explains that competition is the most powerful force in making things better in many
fields of human endeavor. Porter explains that competition is pervasive whether it
involves companies contesting markets, coping with globalization, or social organizations
responding to the needs of the society. It has spread across all sectors and geographical locations. Porter explains that the competition witnessed in all fields is all centered on delivery of value to the companies. Companies compete to deliver value to its clientele. According to Porter the scope of competition goes beyond established industry rivals to the customers, suppliers, potential entrants, and substitute products. Competition from the five sources defines an industry structure and shapes the nature of competitive interaction within the industry.

In the manufacturing industry the strategy formulation takes into consideration the forces of competition in the industry segment. Frontini and Kennedy (2003) have stated that manufacturing industry is the industry that makes products from raw materials by use of manual labour or use of machinery and that is carried out systematically by division of labour. In addition, manufacturing has gone beyond the mass production age that was witnessed in the 1920’s, as industries are aware of the competition thus have to improve their practices using technology and innovativeness to ensure survival (Frontini & Kennedy, 2003).

Porter (2008) argues that the work of strategies is to understand and cope with competition. Winning business strategies are grounded in sustainable competitive advantage. A company has competitive advantage wherever it has an edge over rivals in securing customers and defending against competitive forces. Porter further argues that while there are many varied factors that affect industry profitability in the short-run, industry structure manifested in the competitive forces determines industry profitability in the medium and the long-run. One of the key advantages that UKL has over its competitors is in building of brands. UKL invests heavily in building brands such that the
brand names become synonymous with the kind of product hence becoming the functional name for the product. For example Blue Band which is UKL’s brand for margarine has become the functional name for margarine with most consumers. One of the key UKL’s strategies is winning with brands and innovation by delivering superior products, design, branding and marketing. Unilever has done this by establishing research centers around the world for different categories for example research center for margarine is in Netherlands and Savoury research center is in Germany. So for Unilever, research in all categories is a continuous process aimed at delivering better value to consumers.

Sources of Competitive Advantage

Montgomery and Porter (1991) point out that a business should have a unique advantage from its competitor’s failure to which it has no reason to exist. Porter (2008) explains that there are different sources of competitive advantage. These are making quality product, provision of superior customer service, achieving lower costs than rivals, having a more convenient geographic location, designing a product that performs better than competing brands, making a more reliable and a longer lasting product, and providing buyers more value for their money. Porter describes value delivery as a combination of good quality, good service and acceptable price. To succeed in building a competitive advantage, a firm must seek to provide what buyers will perceive as “superior value”; either a good product at a low price or a “better” product that is worthy paying more for (Porter, 2008).

Montgomery and Porter (1991) explain that undertaking strategic competition gives a company advantage over its rivals. They give the elements of strategic
competition to include the understanding of competition as a system in which competitors, customers, money, systems and resources continually interact. Second, is the ability to use the understanding to predict how a particular move will balance the competitive equilibrium, committing resources permanently although the benefits may not be realized in the short-run, ability to accurately predict risk and return and the confidence to justify the return and taking corrective action.

**Competitive Strategy**

According to Porter (2008), competitive strategy consists of all the moves and approaches a firm has taken and is taking to attract buyers, withstand competitive pressures, and improve its market position. Porter explains that competitive strategy concerns what a firm is doing to try to knock the socks off rival companies and gain competitive advantage. Porter points out that a firm’s strategy can be mostly offensive or mostly defensive, shifting from one to another as market conditions warrant.

Takata and Umeda (2007) describe defensive as a strategy whereby a company takes a reactive approach to the environment. They add that the defensive strategy is employed where a company perceives the surrounding environment as a threat to the business and can bring alterations in the company products and processes. An example of this is the lowering of calling charges by Safaricom to protect its market share with the entry of other companies such as Airtel and Yu offering cheaper calling rates. On the contrary offensive strategy, Takata and Umeda explain that, they are a strategy whereby a company regards the environment as the opportunity. Companies that use this strategy makes use the research and development to come up with new products (Takata & Umeda, 2007). An example of this strategy is Unilever’s research is oils and fats
discovering that the orientation of carbon molecules either “trans” or “cis” saturated or unsaturated is critical to the health of consumers hence processing products that are safe to the consumers.

Generic Competitive Strategies

Kollowski (2007) maintains that the generic competitive strategies called strategies generic were developed in 1980 by Michael Porter. Hunger and Wheelen (2001) cited in Kollowski adds that that these strategies can be undertaken by any business of any size both profit and nonprofit making organizations. Lynch (2001) cited in Kollowski holds that there are only three generic competitive strategies that a company can pursue. These are: Cost leadership, differentiation and focus. Kollowski adds that a company decides which strategy to follow based on its competitive scope. Hunger and Wheelen (2001) cited in Kollowski explain that the decision on which strategy to adopt is based on a company’s competitive scope. The competitive scope is determined by the size of the target market, the range of products a company wishes to offer, the types of buyers and their geographical location the firm is willing to serve and the related industries which the company is competing with.

A strategy whereby a company strives to be the overall low-cost producer in the industry is aimed at the broad mass market and requires cost minimization (Kollowski, 2007). This can be done through the minimization of costs related to the production and provision of products and services to customers which include research and development, service and sales force costs, among others. Cost leadership according to Kollowski (2007) also involves the creation of entry barriers for new entrants. This makes it difficult for them to match the low cost of the existing producer. Hunger and Wheelen (2001;
cited in Kollowski, 2007) point out that low cost strategy serves to increase the market share of a firm.

On the contrary, differentiation strategy refers to a situation whereby a firm seeks to differentiate its product offering from rival’s products (Porter, 2008). The aim of differentiation according to Kollowski (2007) is production of a product that is perceived as unique by the customers through design, image, customer service and dealer networks among others. Hunger and Wheeler (2001; cited in Kollowski, 2007) hold that differentiation generates more profits as it creates a better entry barrier.

Focus strategy according to Porter (2008), involves focusing on a narrow portion of the market rather than the whole market. Porter points out that striving to be the low-cost producer is a powerful competitive approach in markets where many buyers are price sensitive. Kollowski (2007) notes that the aim of this strategy is to open up a sustainable cost advantage over competitors and then use lower cost as a basis for either under pricing competitors and gaining market share at their expense or earning a higher profit selling at the going price. Kollowski adds that cost advantage will not generate superior profitability unless it is used up in aggressive price cutting efforts to win sales from rivals. Firms that achieve low-cost leadership typically emphasize low cost relative to competitors as the theme of their entire business. The organization must be careful not to pursue low cost so zealously that their products end up being too stripped down and cheaply made to generate buyer appeal.

TPM as a source of Manufacturing-led competitive advantage

Slack (1991; cited in McCarthy & Rich, 2004) who gives five sources of competitive advantage attained through manufacturing. These are: quality, speed,
delivery, flexibility and cost. The role of business operations in tapping into the different sources of manufacturing-led competitive advantage is dependent on the production needs of the customers, provision of products and services in the shortest time possible dependable to deliveries.

McCarthy and Rich (2004) concur that competitive advantage can also be gained through the provision of variety products with the manufacturers having the flexibility to change and update the product catalogue. McCarthy and Rich further demonstrate that low cost production is another way which ensures the manufacturing-led competitive advantage. A producer should enhance the margins in which the product is fit for purpose and meets the customer needs through low cost production (Slack, 1991; cited in McCarthy & Rich, 1991).

Theoretical Orientation; Goldratt’s Theory of Constraint

According to Robinson and Ginder (1995), TPM enables continuous and rapid improvement to gain or maintain competitive advantage in manufacturing. They explain that the goal of the theory of constraint/continuous flow manufacturing; introduced by Goldratt in 1984 is to make profit. A competitive advantage in manufacturing will allow an organization to make money now and in the future. This is guaranteed by competitive advantage which ensures current and future company profitability. The theory of constraints according to Sayer and Williams (2007, p. 24) is based on the premise that “the level of productivity is always limited at the point of constraining process; these are the bottlenecks.” By increasing the throughput at the bottleneck process, the overall productivity is increased (Sayer & Williams, 2007).
According to Sayer and Williams (2007), TPM’s focus is on removing the constraints that hinder the full realization of organizational goals. Its emphasis is on process flow and waste reduction. It guarantees overall efficiency in production and lean systems. TPM has maintenance as an integral part of business. It uses planned maintenance activities in the prevention of unscheduled and emergency maintenance which in the theory of constraints are referred to as bottlenecks. This makes this theory applicable to this study. The goal of TPM which is continuous and sustainable improvement in production makes the five Competitive strategies by Michael Porter part of the theoretical framework. They are the ultimate goal of TPM.
Successful implementation of TPM is expected to result in high productivity, low cost of operation, better equipment reliability, better product quality and better working environment with highly motivated work force. The effectiveness of TPM will therefore be depicted by increase in all the dependent variables.

**Summary**

This chapter has given an elaborate discussion on manufacturing industry in Kenya, pillars of TPM, the measures of TPM, strategy and competitive advantage. TPM, as a source of competitive advantage and the theoretical orientation based on the Goldratt’s theory.
CHAPTER THREE: RESEARCH METHODOLOGY

Introduction

Research methodology refers to a systematic way of solving a research problem. It includes what the study is about, why and where the study is being done, the type of data required, sources of required data, sampling method, data collection and analysis technique (Kothari, 2004). Further, Mugenda and Mugenda (2003) agree that research methodology is that process of arriving at an effective conclusion to a problem through systematic collection, analysis and interpretation of data. They further show that the purpose of research is to discover new facts, whose correct interpretation can have practical application.

In consideration of the above, this section presents description of the methods and procedures which the researcher used to conduct the study. The chapter therefore focuses on the research designs, the population studied, the sample and sampling methods, how the data was collected and ethical considerations of the research. The researcher collected data at UKL and analyzed it, in order to evaluate the implications TPM on the company’s competitive advantage.

Research Design

A research design expresses both the structure of the research problem and the plan of investigation used to obtain empirical evidence in relation to the problem. According to Kiplinger (1986), research design is a plan, structure and a strategy of investigation so conceived as to obtain answers to research questions or problems. Chandran (2004) adds that the arrangement of these conditions must combine their relationship with the purpose of the research to the economy of time, effort and money. A
research methodology needs to be grounded on a frame work that encourages good research (Soosay, 2003). Thus the plan is the complete program of the research which includes an outline of what the researcher did, from writing the initial and hypothesis of the research to their operational implications and how the data collected from the field was analyzed.

Keppel and Zedeck (1989) address the areas for which the design must answer such as: What techniques should be used to gather data? What kind of sampling should be used? How should time cost constraint be dealt with? Further, Cooper and Schindler, (2003) discuss different types of classifications of research design based on the purpose of the research, on the method of data analysis or by the type of the research being done.

The classification of research design based on the type of research is cited by Chandran (2004) to include survey research, historical research, observational research and experimental research. The research design that was employed in this study is survey design. Survey is a method of collecting information about a phenomenon. In a survey, direct (or indirect) contact is made with the subject of the study by use of specially designed tools such as questionnaires, structured interviews and focused group discussions (Cooper & Schindler, 2003). Surveys are useful in establishing certain characteristics associated with the subject of study and uses a small part of the subject where a representative sample is drawn. The survey design is a cost effective way of studying a sample population and draw accurate conclusion regarding the larger population. The survey design also has advantages over the other research designs in that while in the other methods, elements are subjected to control, in survey design, subjects are studied in their natural environment. The study was guided by three independent
variables, which included; the impact of TPM on the production cost, OEE, and employee morale.

This study was carried out in March 2011 on employees of UKL based in Nairobi with the help of a questionnaire and brief open discussion to examine the impact of TPM on cost of production, OEE, and employee morale. A number of employees (management and shop floor) were systematically selected for the survey, and asked to fill in a questionnaire to provide information regarding the research questions.

The study takes the form of descriptive case study as the researcher selected one manufacturing company. At this company, the researcher sought to understand whether TPM as a manufacturing improvement system had given UKL competitive advantage over its competition and how this system has affected the employees’ morale. Silverman (2005) explains the essence of a case study as the attention to details for the researcher in order to develop full understanding of the case. Generalizations from case study can be drawn provided statistical sampling methods are used and the sample is representative of the population’s characteristics. This study covered one case in the manufacturing industry to focus on impact of TPM on OEE, production cost and employee morale at UKL.

Population

Population is the whole set of measurements or counts about which a researcher wants to draw a conclusion while a sample is a subset of a population, a set of some of the measurements or counts which comprise the population (Rees, 1995). The study population was all the Employees of UKL in Nairobi from which information on impact of TPM was sort. The total population of UKL in Nairobi comprises of 1400 employees.
Sampling and Sampling Techniques

Sampling entails selecting a few individuals from the population to become the basis of estimating the TPM impact on the competitive advantage according to Kumar (2005). Further, the author notes that a researcher must explore diversity and also ensure the sample size is sufficient to reduce sampling error. Cooper and Schindler (2003) have defined sample as a selected portion of the population for conducting study in order to represent the population adequately since it is impossible to take the entire population.

Methods used to select the sample for a research can either be probability or non-probability (Kothari, 2004). Probability sampling methods in which every unit of a given study population has a known non-zero chance to be part of the study sample (Mugenda & Mugenda, 2003). This removes any biases the researcher may have, granting an equal chance to all the elements, and then the sample is reliable and objective. Simple random sampling method is an example of the probability sampling methods.

The second sampling method is non-probability, in which the elements of the population have an unknown chance of being selected according Kothari (2004). This method does not give every element within the population an equal chance of being selected. This method is mainly used when the researcher is interested in selecting a sample that will give specific information that is relevant to the area of study. Purposive sampling is an example of non-probability sampling method. In such a case the researcher uses knowledge of the population in terms of the research goals.

This study used stratified simple random sampling. This is a method of sampling that involves the division of a population into smaller groups known as strata (Mugenda & Mugenda, 2003). The strata are formed based on members' shared attributes or
characteristics. A random sample from each stratum is taken in a number proportional to the stratum's size when compared to the population. These subsets of the strata are then pooled to form a random sample. This was used in the study because employees are categorized into management, union staff and fixed contracts employees. From each group of employees 10% as recommended by Mugenda and Mugenda (2003) was selected to make the representation across the organization reliable as TPM requires to be implemented by all employees in the organization.

Sample Size

It has been recommended by Mugenda and Mugenda (2003) that when carrying out a descriptive study, a sample of 10 % would be sufficient. For grounded theory research, sample size guidelines have ranged from 15-20 participants (Creswell, 2002) to 20-30 participants (Creswell, 1998). Thus 10% sample was drawn from the population with the aim of estimating characteristics of the entire population (Cramer & Howitt, 2004).

Table 3.1: Sample Selection Units

<table>
<thead>
<tr>
<th>Population</th>
<th>Sample size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>Unionisable staff</td>
<td>580</td>
<td>58</td>
</tr>
<tr>
<td>Fixed contract staff</td>
<td>720</td>
<td>72</td>
</tr>
<tr>
<td>Total</td>
<td>1400</td>
<td>140</td>
</tr>
</tbody>
</table>
Data Collection

Data collection involves gathering empirical evidence in order to develop new knowledge about the subject of inquiry. This can be in the form of a description of the situation as it is or can be in form of answers to particular interest of the researcher. Flick, 1998 shows that a researcher can get primary or secondary data to use in a research. Primary data is defined as first hand information received from a respondent and collected for the sole purpose of a study. Chandran (2004) indicates that secondary data would already have been collected and passed through the statistical process for other purposes other than the current research. Text books, national census economic surveys fit into this group of data.

There are various data collection methods which include interviews, questionnaires, focus groups and observations (Chandran, 2004). Interviews are used in social research. The different types of interviews according to Robson (2002) are fully structured, semi-structured and unstructured interviews. Fully structured interview requires that the researcher predetermines the questions with fixed wording and order of the questions. Semi-structured interview still requires predetermined questions; however the order of questions is not pre-set. Lastly, unstructured interviews, questions are asked by the interviewer in the general area of interest and the conversation that develops within this area can be completely informal (Robson, 2002).

There are various reasons as to why a researcher may use interviews. Interviews allow the researcher to follow up on interesting responses giving opportunity for further probing (Jackson, 1990). Fully structured interview require homogeneity in the sample as only one set of questions are asked to selected respondents. This is appropriate where the
views sought are specific thus sought from the different respondents. The suitability of semi-structured and unstructured interviews according Silverman (2005) is determined by the interviewers; as the flow of the interview is guided by the appropriateness of the responses. These types of interviews are time consuming if not well controlled. However they are suitable for measuring attitudes and probing on sensitive issues that respondents may otherwise find intrusive.

Chandran (2004) holds that questionnaire is a series of written questions on a topic about which the respondents’ opinions are sought. The major advantage of questionnaires is in the provision of highly standardized data and adoption of generalized information amongst any population. In research they are useful where one need to collect data quickly and easily in a friendly way (Kumar, 2005). Chandran (2004) further adds that questionnaires are useful in establishing the popular views on an issue through the responses generated. The standardization of the research tool introduces the concept of objectivity as compared to semi structured and unstructured interviews. Where the respondents are cooperative, the questionnaire is relatively faster to collect information. Potentially, information can be collected from a large portion of a group, however in some cases only few questionnaires are returned. Thus potential is not often realized, as returns from questionnaires are usually low (Mugenda & Mugenda, 2003). Questionnaires are a written document and can be useful in future referencing should the need arise unlike interviews which rely on note taken by the interviewer.

There are some disadvantages of using questionnaires; According to Chandran (2004), respondents do not recall all details if the context is historical. In other cases respondents may decline to answer the questions that seem personal if the structure is not
appealing to them. Further the author shows that probing is lost as compared to interview as questionnaires are standardized so it is not possible to explain any points in the questions that participants might misinterpret.

A focus group is defined as a group of interacting individuals having some common interest or characteristics, brought together by a moderator, who uses the group and its interaction as a way to gain information about a specific or focused issue (Robson, 2002). According to Stewart and Shamdasani (1990), focus groups are small group in-depth interviews. In research, focus groups are mostly used for socio-political issues and are useful in understanding how or why people hold certain beliefs about a topic or program of interest (Chandran, 2004). They encourage group to open up on issues and share but they are also subject to cohesion in the group dynamics.

Observation is a method where elements are observed in their natural environment or in lab setting, and their activities and behaviors or other items of interest noted and recorded (Kumar, 2005). Although a seemingly straightforward technique, the observation must be pursued in a systematic way, following scientific rules, to ensure relevance and quantifiable data is obtained.

In this study data was collected using both structured and unstructured questionnaire forms which contained few concise and relevant questions necessary to carry out the research. The questionnaire had both open-ended and close-ended questions. The open-ended questions allowed respondents to express their opinions while close ended required employees to give very specific answers by selecting or ticking appropriately. Open-ended questions were designed to facilitate individual opinion while the close-ended questions were for specific information (Mugenda & Mugenda, 2003).
The choice of a questionnaire over other methods was due to the effectiveness in generating the data needed for this research, the respondents were reached in a cost effective manner. Also the provision for anonymity allowed respondent to freely express their views on the research subject. The questionnaires were hand delivered to the respondents in the organization by a well trained research assistant. The researcher trained the research assistant before commencement of the research. A cover letter was provided by the research assistant for every questionnaire forwarded explaining to the respondent purpose of the study, their role or expectations of the researcher, significance of providing honest information and an assurance of confidentiality and anonymity. The use of research assistants reduced the researcher bias or any form of undue influence since the researcher works in the same organizations and the respondents are colleagues.

Data Analysis

Processing the raw data aimed to ensure that it was free from inconsistencies and incompleteness also known as editing (Kumar, 2005). For the structured data obtained from the questionnaires, the researcher checked for internal consistency and also trained the assistant to check on the completeness of the questionnaire upon collection.

The data obtained was qualitative in nature and was coded to allow the researcher to use descriptive statistics. This then enabled comparisons to be made as to whether the responses converged or diverged in particular areas (Chandran, 2004). Responses were coded to facilitate basic statistical analysis using the Predictive Analytical Software (PASW). The output from the package has been presented in frequency distribution tables, graphs, percentages and cross tabulations.
Questionnaires Pre-test

To ensure validity and reliability of the data collection instruments, the questionnaires were pre-tested. Pre-testing is the administration of the data collection instrument with a small set of respondents from the population for the full scale survey (Mugenda & Mugenda, 2003). If problems occur in the pre-test, it is likely that similar problems will arise in full-scale administration. The purpose of pre-testing is to identify problems with the data collection instrument and find possible solutions (Krueger, 1988). A pre-test of 5 questionnaires in BIDCO was carried out to allow for time to correct inconsistencies and clarity of questions.

Ethical Issues

Ethical issues considered under this research were confidentiality and anonymity of the respondents as careers could be jeopardized. Social research involves people and they must be protected from any harm, physical or psychological that may arise from embarrassing questions, threats or irrelevant questions (Mugenda & Mugenda, 2003).

These issues may arise in the research and the researcher will seek to address them by observing strict ethical conduct at all times, maintaining the information in great confidence. A cover letter was given with every questionnaire to inform the respondents that the information shared were treated with confidentiality and names of employees were not be used. The responses generated were also used for the purpose of the study which was purely academic. A research permit was obtained from the Ministry of Education and permission to carry out the study also obtained from the management of UKL.
Summary

The chapter has discussed the methodology that researcher used to carry out the research in order to establish the impact of TPM in production efficiency at UKL. In the discussion are: research design, target population, sample size, the sampling method, data collection method, pre-test of data collection instruments, data collection, data analysis and presentation techniques. It has also given the ethical considerations in this research. Primary data was collected using the questionnaire. The next chapter discusses the data analysis, data presentation and interpretation of the findings.
CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND INTERPRETATION

Introduction

In this chapter data collected to evaluate TPM was analyzed, presented and interpreted. Demographic data was presented first, followed by data on the effect of TPM on the competitive advantage of manufacturing companies.

Response Rate

Questionnaire was used as the primary data collection method. Out of the 140 questionnaires administered 86 questionnaires were received back. This translates to a response rate of 61.4%. This was considered sufficient for analysis based on Babbie (2008) recommendation of a response rate of minimum 50%. Babbie (2008) explains that a response rate of 50% is adequate for analysis, 60% is good while a response rate of 70% and above is very good. Therefore, the response rate in this study was considered good hence could be used for data analysis in order to evaluate TPM.

Departmental Distribution of Workers at UKL

The researcher sought to understand the departmental distribution of workers at UKL. Table 4.1 shows how UKL has distributed workers in various departments.
When asked to respond to the question of what department they worked in at Unilever Kenya, 47.7% indicated that they worked for Savoury department, 18.6% in Spreads and Cooking Category (SCC), 11.6% in Non Soapery Detergent (NSD), 11.6% Soapery, 3.5% in Engineering, 3.5% TPM, and 1.2% in Logistics. The results show that majority of employees at UKL worked in the Savoury department while minority worked in the Engineering, TPM and logistic departments respectively. This means that all the supply chain departments in UKL were represented in this study.

Gender Ratio of workers

The researcher sought to find out the distribution of workers based on gender. Figure 4.1 shows the ratio of male to female workers at UKL.
Figure 4.1: Gender of Respondents

The findings on gender of the respondents presented in Figure 4.1 shows that 76.7% were men and only a partly 23.3% were females. The data therefore shows that majority of employees at Unilever Kenya Ltd were males.

Age of Workers at UKL

The researcher sought to find out the age distribution of workers at UKL. Table 4.2 shows the age distribution of workers at UKL.

Table 4.2: Age distribution

<table>
<thead>
<tr>
<th>Age Bracket</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 20 years</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>21-30</td>
<td>39</td>
<td>45.3</td>
</tr>
<tr>
<td>301-40</td>
<td>32</td>
<td>37.2</td>
</tr>
<tr>
<td>41-50</td>
<td>9</td>
<td>10.5</td>
</tr>
<tr>
<td>Over 50</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>No Response</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Total</td>
<td>86</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From table 4.2, it is seen that majority of the respondents (45.3%) were between the age brackets of 21-30 years followed by 37.2% at 31-40 years, 10.5% at 41-50 years, 3.5% over 50 years and 1.2% were up to 20 years of age. From the findings therefore, majority of employees at Unilever Kenya Ltd were youths with a minority aged over 40
years and teenagers below 20 years. This implies that employee retention in UKL was low and hence training in TPM for new young employees is necessary.

Education Level of Workers at UKL

The level of education of the respondents plays a significant role in job performance, depending on the knowledge and skill required. The findings in Table 4.3 present the education level of the respondents.

Table 4.3: Respondents’ Level of Education

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary school</td>
<td>39</td>
<td>45.3</td>
</tr>
<tr>
<td>Diploma</td>
<td>41</td>
<td>47.7</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>4</td>
<td>4.7</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>No Response</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Total</td>
<td>86</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From table 4.3, it can be seen that close to fifty percent of the respondents (47.7%) reported to have attained diploma level of education, 45.3% secondary education, 4.7% undergraduate, and a mere 1.2% postgraduate level. The findings show that majority of the respondents were individuals with very relatively low of education level. 5.9% have either undergraduate degree or postgraduate degree. This means that most employees at UKL had diploma education and below with the majority having specialized training. This further implies that most of the jobs in UKL required specialized training. The level of education for workers at UKL implies that it was important for employees to have college education in order to be further trained in TPM methodologies.

Duration of Employment at UKL

The researcher wanted to find out what number of years individual employees had worked at UKL. Table 4.4 shows the number of years workers have been with UKL.
Majority of the respondents (31.4%) indicated that they had worked in UKL for a period of 1-5 years, 24.4% had been in UKL for a duration of up to 1 year, 24.4% for over 10 years and 19.8% between 6-10 years. From the data, 31.4% had worked between 1-5 years with minority 19.8% having worked over 6-10 years. This means that the majority of the employees had knowledge on the area of study since all the respondents had been in the company for at least 1 year. Also, the finding implies that there was a moderate turnover in UKL given that over forty percent (45.2%) of the respondent had been in the company for at least 6 years.

Experience in Manufacturing Industry

Experience in manufacturing industry is important for workers to gain knowledge in Good Manufacturing Practices (GMP) and factory Key Performance Indicators (KPI’s). The researcher therefore sought to know how long workers at UKL had been working in the manufacturing industry; figure 4.2 shows the results.
The findings presented in Figure 4.2 shows that 33.7% had worked between 1-5 years, 27.9% over ten years, 19.8% up to one year, and 17.4% between 6-10 years. From these findings, it can be concluded that over forty percent of the respondents (45.3%) had worked in the industry for at least 6 years. Since these findings coincided with the findings on the duration in the company, it can be concluded that UKL served as an entry point to the manufacturing industry for most of the respondents.

Total Productive Manufacturing

In order to find out the effect of TPM on competitive advantage of manufacturing companies the respondents were asked to rate the statements whose findings are presented in table 4.5.
Table 4.5: Level of Agreement with statements on TPM

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Missing response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPM has helped increase my productivity</td>
<td>-</td>
<td>-</td>
<td>1.2</td>
<td>40.7</td>
<td>58.1</td>
<td>-</td>
<td>100.0</td>
</tr>
<tr>
<td>TPM has enhanced team work and employee involvement</td>
<td>-</td>
<td>1.2</td>
<td>10.5</td>
<td>46.5</td>
<td>40.7</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>TPM has increased my workload</td>
<td>14.0</td>
<td>11.6</td>
<td>12.8</td>
<td>34.9</td>
<td>19.8</td>
<td>7.0</td>
<td>100.0</td>
</tr>
<tr>
<td>TPM has improved the quality of my work</td>
<td>3.5</td>
<td>1.2</td>
<td>2.3</td>
<td>34.9</td>
<td>58.1</td>
<td>-</td>
<td>100.0</td>
</tr>
<tr>
<td>TPM activities are different from my normal work duties</td>
<td>23.3</td>
<td>23.3</td>
<td>10.5</td>
<td>25.6</td>
<td>11.6</td>
<td>5.8</td>
<td>100.0</td>
</tr>
<tr>
<td>TPM has improved my job security</td>
<td>9.3</td>
<td>8.1</td>
<td>17.4</td>
<td>34.9</td>
<td>25.6</td>
<td>4.7</td>
<td>100.0</td>
</tr>
<tr>
<td>TPM has increased my knowledge about what I do</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>44.2</td>
<td>54.7</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>TPM has made the company or management care for my well being</td>
<td>4.7</td>
<td>9.3</td>
<td>15.1</td>
<td>36.0</td>
<td>31.4</td>
<td>3.5</td>
<td>100.0</td>
</tr>
<tr>
<td>I would recommend other organizations to adopt TPM</td>
<td>1</td>
<td>1</td>
<td>7.0</td>
<td>27.9</td>
<td>64.0</td>
<td>1.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.5 shows that majority (98.1%) of respondents agreed that TPM had helped them increase productivity, while 97.2% of the respondents reported that TPM had enhanced teamwork and employee involvement. Respondents who agreed that they would recommend implementation of TPM by other organizations and that TPM had improved their knowledge in what they did were 91.9% and 98.9% respectively. This means that TPM helped in improving productivity, enhancing teamwork and employee
involvement, increasing employee knowledge and thus the implementation of TPM is recommended. The above findings are in line with the eight pillars of TPM given by Misra (2008), Khorrow-Pour (2006) and Borris (2006). They are intended to cover every department and function of the company with an aim of achieving zero targets. The zero targets include focused improvement, autonomous maintenance, early management, training, quality maintenance, planned maintenance, office/administrative TPM, safety health and environment.

The agreement level on the statement on TPM’s improvement of managements’ concern for employees was varied with 67.4% of the respondents agreeing with the statement while 12.0% of the respondents disagreed with the statement. Increased workload was reported by 25.6% of the respondents while 54.5% agreed that TPM had increased their workload. These findings further imply that TPM results in increased management concern for the employees. This finding agrees with the aim of TPM in administration according to Leflar (2001).

According to Borris (2006) and Khorrow-Pour (2006), TPM plays an important role in achieving zero functional losses, creating efficient offices and providing effective and efficient support to the production department. Therefore, increased workload is a perception contrary to the resulting effects of TPM while increased concern for employees fall under employees’ support. These findings agree with Misra (2008) who explains that the long-term success of TPM depends on teamwork and ownership, which are both essential components. Teams according to Misra should be governed by a code of conduct, rules and regulations which should be laid down. This in turn implies that
management would be concerned about the employees; hence the assurance of job security.

Further, as regards the statement seeking to compare the activities carried out under TPM and those carried out before the implementation of TPM, 37.2% of the respondents agreed that activities carried out in TPM were different from normal duties whereas 46.6% disagreed to the statement. This means that there was a divided perception on the nature of activities of TPM with the majority of the respondents being of the opinion that TPM activities are different from the normal activities. When asked whether they would recommend the adoption of TPM by other companies, the findings show that majority of the respondents (64.0%) strongly agreed and 27.9% agreed to the statement. This means that to the respondents TPM was beneficial. This is supported by Bird (2001) who explains that TPM is centered on continuous improvement.

Total Productive Manufacturing Objectives

For the implementation of TPM to be successful; it is important for every employee to know the objectives and goals of TPM. The researcher therefore sought to understand whether workers at UKL knew the objectives of TPM. Table 4.6 shows the results.

<table>
<thead>
<tr>
<th>TPM’s Objectives</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximize production</td>
<td>62</td>
<td>72.1</td>
</tr>
<tr>
<td>Reduce equipment downtime</td>
<td>53</td>
<td>61.6</td>
</tr>
<tr>
<td>Reduce inventory</td>
<td>27</td>
<td>31.4</td>
</tr>
<tr>
<td>Reduce accidents</td>
<td>57</td>
<td>66.3</td>
</tr>
<tr>
<td>Promote employee involvement and morale</td>
<td>49</td>
<td>57.0</td>
</tr>
<tr>
<td>Improve quality</td>
<td>65</td>
<td>75.6</td>
</tr>
<tr>
<td>Reduce operating cost</td>
<td>59</td>
<td>68.6</td>
</tr>
</tbody>
</table>
The findings on the objectives of TPM presented in table 4.6 shows that the respondents were aware of the objectives of TPM. It is clear that majority of the respondents (72.1%) reported that the objective of TPM was to maximize production. This was followed by reduced operation cost, quality improvement, reduction of equipment down-time and accidents’ reduction reported by 75.6%, 68.6%, 66.3% and 61.6% of the respondents respectively. Reduced inventory, promotion of employee involvement and morale were reported by 31.4% and 57.0% of the respondents respectively. This means that the majority of the respondents were aware of the objectives of TPM. This is in line with the pillars of TPM given by Misra (2008) and Bird (2006) that TPM seeks to embrace continuous improvement concept and total participation by employees from all departments.

Impact of TPM in UKL

The researcher sought to understand how TPM had affected and influenced operations at UKL. Table 4.7 shows how TPM has affected operations at UKL.

Table 4.7: Rating of Statements on the Effects of TPM

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Missing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPM has helped increase OEE</td>
<td>1.2</td>
<td>9.3</td>
<td>37.2</td>
<td>50.0</td>
<td>2.3</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>TPM has helped reduce cost of production</td>
<td>-</td>
<td>4.7</td>
<td>41.9</td>
<td>50.0</td>
<td>3.5</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>TPM has improved customer service</td>
<td>1.2</td>
<td>2.3</td>
<td>4.7</td>
<td>41.9</td>
<td>2.3</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Due to TPM quality of products is better</td>
<td>2.3</td>
<td>2.3</td>
<td>3.5</td>
<td>41.9</td>
<td>47.7</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>TPM has improved employee involvement</td>
<td>3.5</td>
<td>3.5</td>
<td>5.8</td>
<td>48.8</td>
<td>34.9</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The findings presented in table 4.7 show that majority of respondents strongly agreed that TPM has helped increase OEE while 37.2% of respondents agreed with the
statement. A small percent (1.2%) disagreed with the statement while 9.3% were neutral about it. This means that to UKL, the implementation of TPM has helped increased OEE. This is in line with Bird (2002) definition of TPM which is a concept behind maintenance and production personnel cooperation to standardize, allocate and perform all tasks needed to maximize overall efficiency. This argument further supports employee involvement and morale findings which were reported to have resulted from TPM. This is based on the finding that 48.8% and 34.9% of the respondents agreeing and strongly agreeing with the statement respectively.

On the statement on the effect of TPM on cost reduction, majority of the respondents (91.9%) agreed with the statement while 4.7% of disagreed. This means that UKL has indeed decreased the cost of production. TPM was also found to have improved the quality of products as shown by the 47.7% and 41.9% of the respondents who agreed and strongly agreed to the statement respectively; while 4.7% of the respondents were neutral on the statement. This finding is in line with Bird’s (2002) argument that reduction of overall process waste through production cycle management and development of overall corporate institutions in order to maximize overall process efficiency which in turn results in cost reduction.

Effects of Total Productive Manufacturing on OEE

Respondents were asked to give the effects of TPM on OEE. Table 4.7 shows the results.
The findings presented in table 4.7 show that there are many ways in which TPM affects OEE. Efficient production was reported by 11.6% of the respondents while reduced costs and continuous machinery maintenance were each reported by 5.8% and 7.0% of the respondents respectively. Increased OEE, reduced wastage of materials, improved quality and employee training were other factors reported by 8.1%, 4.7%, 7.0% and 2.3% of the respondents respectively. Other factors reported by 1.2% of the respondents are reduced machine breakdowns, employee’s focus on improvement, improved adherence to quality standards, employee’s involvement and reduced accidents.

The above findings are in agreement with TPM concept which is centered on development of institutions to improve overall process efficiency, reduction of overall waste, integration of TPM in all departments, employee participation and merging small groups to ensure zero loss (Bird, 2002). From the listed effects of TPM, it is clear that they are generated from the five TPM concepts.
Ways of Cost Reduction

One of the objectives of TPM is cost reduction. The researcher sought to understand how TPM results in cost reduction. Table 4.8 shows the results.

Table 4.9: Areas of Cost Reduction using TPM

<table>
<thead>
<tr>
<th>Area</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Response</td>
<td>7</td>
<td>8.1</td>
</tr>
<tr>
<td>Reduced time to repair</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Running machines at optimum speeds</td>
<td>8</td>
<td>9.3</td>
</tr>
<tr>
<td>Reduced wastage</td>
<td>28</td>
<td>32.6</td>
</tr>
<tr>
<td>Reduced downtimes</td>
<td>7</td>
<td>8.1</td>
</tr>
<tr>
<td>Reduced cost of production</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Reduced production time</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Energy saving</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Reduced manpower costs</td>
<td>5</td>
<td>5.8</td>
</tr>
<tr>
<td>Efficient equipment operation</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Optimal machine operations</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>No rework</td>
<td>7</td>
<td>8.1</td>
</tr>
<tr>
<td>Reduced cost of spare parts and repairs</td>
<td>10</td>
<td>11.6</td>
</tr>
<tr>
<td>Encourages teamwork</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Proper employee training</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Autonomous machine maintenance</td>
<td>3</td>
<td>3.5</td>
</tr>
</tbody>
</table>

The findings in Table 4.8 shows that one of the main ways in which TPM reduces cost is through reduced wastage reported by 32.6% of the respondents followed by reduced cost of spare parts and repairs reported by 11.6% of the respondents. Other factors include machine operation at efficient speed reported by 9.3% of the respondents, reduced machine downtimes, quality production resulting on no products rework and reduced cost of production were each reported by 8.1% of the respondents. Other ways reported by the respondents include enabling timely repairs, reduced overall cost of production, and efficient equipment operation each reported by 3.5% of the respondents. Reduced production time, optimal machine operations, encouraging teamwork and employee’s training reported by 1.2% of the respondents. This is in line with the eight
pillars of TPM given by Borris (2006), Khosrow-Pour (2006) and Misra (2008) who argue that focused improvement, autonomous maintenance, planned maintenance, early management, training, quality maintenance, administrative TPM, safety, health and environment are the pillars in which TPM is grounded. This implies that timely repairs, machine maintenance, reduced down times and overall focus on efficiency are pillars of TPM at UKL.

UKL and Competitive Advantage

The researcher sought to understand whether TPM had given UKL an advantage over its competitors. Respondents were therefore asked whether the implementation of TPM had enabled UKL gain competitive advantage. Figure 4.3 shows the results.

![Figure 4.3: Assessment whether TPM Enabled UKL Gain Advantage](image)

The findings presented in Figure 4.3 show that majority of respondents (95.4%) reported that TPM had enabled UKL to gain competitive advantage while a meager 2.3% of the respondents disagreed that the implementation of TPM has resulted in UKL
gaining competitive advantage. This means that TPM enables manufacturing companies to gain competitive advantage. Porter (2008) argues that competitive strategies consist of all moves and approaches a firm has taken or is taking to attract buyers, withstand competitive pressures and improve market position. This implies that the benefits realized by the adoption of TPM results in a company gaining an edge over competition.

Having found out whether TPM results in UKL gaining competitive advantage, the respondents were asked on how TPM resulted in competitive advantage. The table below shows the results.

Table 4.10: Ways TPM has Resulted in Competitive Advantage

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Response</td>
<td>5</td>
</tr>
<tr>
<td>Reduced cost of production</td>
<td>3</td>
</tr>
<tr>
<td>Reduced wastage</td>
<td>1</td>
</tr>
<tr>
<td>Advantage in UKL over competitors</td>
<td>5</td>
</tr>
<tr>
<td>Reduced machine stoppages</td>
<td>1</td>
</tr>
<tr>
<td>Increase employee knowledge and skills</td>
<td>5</td>
</tr>
<tr>
<td>Improve productivity</td>
<td>17</td>
</tr>
<tr>
<td>Improved product quality</td>
<td>23</td>
</tr>
<tr>
<td>Increased employee involvement and accountability</td>
<td>2</td>
</tr>
<tr>
<td>Increased customer loyalty</td>
<td>8</td>
</tr>
<tr>
<td>Timeliness in production and product delivery to customers</td>
<td>7</td>
</tr>
<tr>
<td>Benchmarking of competitors enables resulting in better quality than competitors</td>
<td>6</td>
</tr>
<tr>
<td>Led to employee motivation</td>
<td>3</td>
</tr>
<tr>
<td>Increased market share, sales and profitability</td>
<td>5</td>
</tr>
<tr>
<td>Reduced accidents</td>
<td>2</td>
</tr>
<tr>
<td>Reduced customer complaints</td>
<td>1</td>
</tr>
<tr>
<td>Reduced plant maintenance cost</td>
<td>1</td>
</tr>
<tr>
<td>Enhanced teamwork</td>
<td>1</td>
</tr>
<tr>
<td>Quality awareness among employees</td>
<td>1</td>
</tr>
</tbody>
</table>

The findings show that improving Productivity and product quality reported by 19.8% and 26.7% of the respondents were the main ways in which TPM enabled UKL to gain
competitive advantage. Beating competition, increasing employee knowledge and skills, and increased market share, sales and consequently profitability were each reported by 5.8% of the respondents. Reduced cost of production is another way of competitive advantage reported by 3.5% of the respondents, increased customer loyalty, timely production and product delivery to customer and ability to benchmark competitor’s reported by 9.3%, 8.1% and 7.0% of the respondents respectively. Other factors include waste reduction, and reduced machine stoppages, reduced customer complaints, enhanced teamwork, quality awareness among employees and down times each reported by 1.2% of the respondents while employee involvement and accountability and reduced accidents reported by 2.3% of the respondents.

The above findings show that competitive advantage results to a company gaining an edge over rivals. This is gained by understanding competitors, customers, systems and resources and using the understanding to predict how a particular move will balance the competitive equilibrium, committing resources, and being able to accurately predict the risk, return and confidence to justify the investment (Montgomery & Porter, 1991).

Rating of Employee Adjustment

The respondents were asked on whether TPM Implementation required culture change in the way things have always been done in the company and how they would rate the employees’ adjustment to the new way of doing things. The findings are presented in Figure 4.4.
The findings in figure 4.4 shows that the respondents who rated employees adjustment to the new ways of doing things as average and very good were 22.1% while those who rated the employee’s adjustment as good were the majority with a response of 52.3%. This means that in terms of culture change TPM has been successful in UKL. This finding is an implication of the TPM as a source of competitive advantage in manufacturing. McCarthy and Rich (2004; cited in Slack, 1991) list quality, flexibility, speed, delivery and cost as being sources of competitive advantage in manufacturing, employees’ adjustment to TPM ensures sustainability of these benefits.

Level of Success in the Implementation of TPM

The researcher sought to understand how successful the implementation of TPM had been at UKL. Figure 4.5 shows the results.
When asked on the extent to which implementation of TPM in UKL had been successful, majority of the respondents (54.7%) reported that it had been successful to a great extent followed by 23.3% of the respondents who rated the success of TPM implementation as average, while those who gave very great extent were 19.8%. This means that the implementation of TPM in UKL had been generally successful.

The respondents were further asked to give the factors that had made the implementation of TPM in UKL successful. Table 4.10 shows the results.
Table 4.11: *Factors for Success in TPM Implementation in UKL*

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Response</td>
<td>10</td>
<td>11.6</td>
</tr>
<tr>
<td>Cost saving</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Autonomous maintenance</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Improved quality</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Management commitment</td>
<td>14</td>
<td>16.3</td>
</tr>
<tr>
<td>Team work</td>
<td>13</td>
<td>15.1</td>
</tr>
<tr>
<td>Training</td>
<td>21</td>
<td>24.4</td>
</tr>
<tr>
<td>Employee awareness of TPM</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Competition from other companies</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Employee involvement</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Employee motivation</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Culture change</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Availability of resources</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Change acceptance</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Reduced wastage</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Improved machine efficiency</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Communication</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Reduced machine downtimes</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Employees’ understanding of own duties and downtimes</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Talent recognition</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

The findings presented in table 4.10 show that management commitment, training and teamwork as reported by 16.3%, 5.1% and 24.4% of the respondents respectively were reported to be the main factors that have contributed to the success in implementation of TPM. Cost saving, and improved quality were factors reported by 3.5% of the respondents while awareness of TPM by employees, employee involvement, and motivation, change acceptance, reduced wastage, good communication, and employee understanding of own duties and responsibilities were each reported by 2.3% of the respondents. Other factors reported by 1.2% of the respondents were autonomous maintenance, competition from other companies, resource availability, culture change, reduced machine downtimes and talent recognition.
The above findings are supported by Misra’s (2008) argument that the success of TPM implementation is centered on discipline, involvement, communication, responsibility and ownership. Further in support of the above findings Ben Deya et al. (2006) argue that teamwork and ownership of TPM play a major role in the successful implementation of TPM.

Limitation in TPM Implementation

This study sought to find out from the respondents whether they had any limitation in the implementation of TPM. Figure 4.6 shows the results.

![Pie chart showing limitations in TPM implementation](image)

Figure 4.6: *Limitations in the Attainment of TPM Goals*

The findings presented in figure 4.6 shows that the majority of the respondents (70.9%) had faced challenges in the implementation of TPM while 19.8% had not faced any challenges. This means that most employees in UKL had encountered challenges in the implementation of TPM.
Limiting Factors in the TPM Implementation

The researcher sought to understand factors that have limited the attainment of TPM goals in UKL. Table 4.11 shows the results.

Table 4.12: Factors Limiting Attainment of TPM’s Goals in UKL

<table>
<thead>
<tr>
<th>Factor</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Response</td>
<td>30</td>
<td>34.9</td>
</tr>
<tr>
<td>Lack of Training</td>
<td>9</td>
<td>10.5</td>
</tr>
<tr>
<td>Employee resistance</td>
<td>15</td>
<td>17.4</td>
</tr>
<tr>
<td>Equipment efficiency</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Cost reduction</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Competition</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Lack of spare parts</td>
<td>8</td>
<td>9.3</td>
</tr>
<tr>
<td>Infrastructural challenges</td>
<td>4</td>
<td>4.7</td>
</tr>
<tr>
<td>Poor communication</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Procurement process</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Evaluation of the overall implementation of TPM</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Ignorance</td>
<td>6</td>
<td>7.0</td>
</tr>
<tr>
<td>Poor Coordination of activities</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Lack of motivation</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Poor quality materials</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Lack of management support</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Delayed response</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Too many responsibilities per employee</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Lack of TPM implementation at all level</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Unqualified employees</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Lack of equal treatment of all employees</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Variation in employee capabilities</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Respondents were asked to give the factors that have limited the attainment of TPM’s goals in UKL. Employee resistance was reported by 17.45% of the respondents, training reported by 10.5%, lack of spare parts reported by 9.3% and ignorance among the employees reported by 7.0% of the respondents. These were the main factors reported by the respondents. Other factors reported by the respondents include cost reduction, competition, infrastructural challenges and poor communication as being among the limiting factors reported. Other factors were inefficient procurement process, poor
coordination of TPM activities, incomplete implementation of TPM process, lack of motivation, poor quality inputs, delayed response to raised tags, lack of management commitment and support, unqualified staff and variation of employee capabilities. The above findings imply that there are many factors that companies have to work on in order to ensure successful implementation of TPM.

Remedial Actions

Having found out the limitations in the implementation of TPM, this study sought to find out from the respondents the remedial actions to the challenges faced. Table 4.12 shows the findings on the remedial actions.

Table 4.13: Remedial Actions Recommended to overcome the Challenges

<table>
<thead>
<tr>
<th>Remedial Actions</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Response</td>
<td>27</td>
<td>31.4</td>
</tr>
<tr>
<td>Timely response</td>
<td>6</td>
<td>7.0</td>
</tr>
<tr>
<td>Certification upon training</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Training</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Job security</td>
<td>36</td>
<td>41.9</td>
</tr>
<tr>
<td>Communication to all stakeholders</td>
<td>5</td>
<td>5.8</td>
</tr>
<tr>
<td>Enhanced teamwork</td>
<td>6</td>
<td>7.0</td>
</tr>
<tr>
<td>Employ qualified personnel</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Reduced wastage</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Reduced machine stoppages</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Employee involvement</td>
<td>8</td>
<td>9.3</td>
</tr>
<tr>
<td>Daily AM</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Source quality products</td>
<td>5</td>
<td>5.8</td>
</tr>
<tr>
<td>Follow up process to ensure implementation</td>
<td>5</td>
<td>5.8</td>
</tr>
<tr>
<td>Put in place clear guiding procedures</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Improve infrastructure</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Reduce number of machine per operator</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Frequent machine servicing</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Decentralize TPM office</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Recruit qualified personnel</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>
Among the solutions to the challenges faced in the implementation of TPM, job security had the highest response with 41.9% of the respondents advocating for the assurance of job security among employees in organizations where TPM is being implemented, followed by employee involvement reported by 9.3% of the respondents. Enhancing teamwork programs and activities and timely response to raised tags were each reported by 7.0% of the respondents, while follow up of the implementation process, developing clear guidelines and procedures, and communication to all stakeholders were each reported by 5.8% of the respondents.

Training employees and giving certification upon training were reported by 3.5% of the respondents, while daily AM was reported by 2.3% of the respondents. Other remedial actions that could be taken to ensure successful implementation of TPM reported by 1.2% of the respondents were improving production efficiency by waste reduction and reduced machine stoppages, employing qualified personnel, developing clear TPM guideline and procedures, frequent machine servicing, reduction of the number of machines operated per person, and decentralization of TPM office. The above factors serve as remedial actions to the implementation of TPM.

Summary

This chapter presented findings on the evaluation of TPM in Kenya focusing on UKL. It has also presented the analysis and interpretation of findings. The next chapter gives the summary of findings, conclusions and recommendations.
CHAPTER FIVE: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose of this study was to evaluate TPM in Kenya with a focus on UKL. The objectives were to assess impact of TPM on production efficiency and cost at UKL, to find out the challenges in the implementation of TPM at UKL and to find out how TPM affected employees’ attitude. This chapter provides a summary of key findings, conclusions, and recommendations.

Summary of Key Findings

Background Information

This study’s respondents were 76.7% male and 23.3% female; with the majority (45.3%) being aged between 21-30 years followed by 37.2% at 31-40 years. This study also found out that 47.7% of the respondents had basic education, 45.3% had secondary education, 4.7% had undergraduate, and a mere 1.2% had postgraduate level. Also, the majority of the respondents (31.4%) had worked in UKL for a period of 1-5 years, 24.4% had been in UKL for a duration of up to 1 year, 24.4% for over 10 years and 19.8% for between 6-10 years. Further, 33.7% had worked between 1-5 years, 27.9% for over ten years, 19.8% for up to one year, and 17.4% for between 6-10 years.

Employees’ perception of Total Productive Manufacturing

TPM had increased employees’ productivity as shown by 98.1% responses which agreed that that TPM had helped them increase productivity. TPM was also reported to have improved teamwork and employee involvement shown by 97.2% in favor of the statement. Further, recommendation of the implementation of TPM by other
organizations and its effect on improving the employee knowledge in what they did were each reported by 91.9% and 98.9% of the respondents respectively. TPM’s was also reported to have contributed in the improvement of managements’ concern for employees by 67.4% of the respondents.

Further, the activities carried out under TPM and those carried out before the implementation of TPM was varied as reported by 37.2% of the respondents who at least agreed that the activities carried out in TPM were different from normal duties whereas 46.6% disagreed to the statement.

**TPM Objectives**

The majority of the respondents (72.1%) reported that the objective of TPM is to maximize production. This was followed by reduced operation cost, quality improvement, reduction of equipment downtime and accidents’ reduction reported by at least 61.6% of the respondents. Reduced inventory and promotion of employee involvement and morale were reported by 31.4% and 57.0% of the respondents respectively.

**Effects of TPM on Performance**

TPM had helped increase OEE as reported by 87.2%. TPM was further reported by 87.3% of the respondents to improve employee involvement and morale. To 91.9% had led to cost reduction while to 89.6% of the respondents, TPM had improved the quality of products. TPM was reported to have influenced OEE by increasing production efficiency, cost reduction, continuous machinery maintenance, and reduced wastage of materials, improved quality and employee training of TPM. Other factors were, reduced
machine breakdowns and downtimes, employee’s focus on improvement, improved adherence to quality standards, employee involvement and reduced accidents.

One of the objectives of TPM is cost reduction through reduced wastage as reported by 32.6% of the respondents followed by reduced cost of spare parts and repairs reported by 11.6% of the respondents. Other factors include machine operation at optimum speed, reduced machine downtimes, quality production and reduced cost of production each reported by 8.1% of the respondents. Other measures of reducing cost reported by the respondents include enabling timely repairs, reduced overall cost of production, and efficient equipment operation. This was reported to have an overall effect of reduced production time, optimal machine operations, encouraging teamwork and employee’s training.

*UKL and Competitive Advantage*

The implementation of TPM had enabled UKL gained competitive advantage according to majority of the respondents (95.4%); while a meager 2.3% of the respondents disagreed that the implementation of TPM had resulted in the UKL gaining competitive advantage. This means that UKL enables manufacturing companies to gain competitive advantage. Porter (2008) argues that competitive strategies consist of all moves and approaches a firm has taken or is taking to attract buyers, withstand competitive pressures and improve market position. This implies that the benefits realized by the adoption of TPM.
**TPM and Competitive Advantage**

TPM was reported to contribute to the attainment of competitive advantage reported by 46.5%. TPM also help in gaining competitive advantage by; increasing employee knowledge and skills, and increasing market share, cost reduction, increasing sales and consequently profitability, increasing customer loyalty, timely production and product delivery to customer and ability to benchmark against competitors. Other ways include waste reduction, and reduced machine stoppages, reduced customer complaints, enhanced teamwork and quality awareness among employees.

**Employee Adjustment**

Employee adjustment to new ways resulting from the implementation of TPM was reported to be good shown by 74.4% rating while the success level on the implementation was reported to be successful by 54.7%. The success was realized mainly due to management commitment, training and teamwork. Cost saving, and improve quality awareness of TPM by employees, employee involvement an motivation, change acceptance, reduced wastage, good communication, and employee understanding of own duties and responsibilities, autonomous maintenance, competition from other companies, resource availability, culture change, reduced machine down times and talent recognition were factors that have led to the success of the implementation of TPM.

On the contrary, it was reported that the implementation of TPM had been limited as reported by 70.9% of the respondents. The limiting factors reported were employee resistance, employee training, lack of spare parts, and ignorance among the employees. Other limiting factors reported by the respondents include equipment efficiency, cost
reduction, competition an infrastructural challenges and poor communication inefficient procurement process, poor coordination of TPM activities, incomplete implementation of TPM process, lack of motivation, poor quality inputs, delayed response to raised tags, lack of management commitment and support, unqualified staff and variation of employee capabilities.

The proposed ways of dealing with the limitations of TPM include assurance of job security, employee involvement, enhancing teamwork programs and activities and timely response to raised tags, follow up of the implementation process, developing clear guidelines and procedures, and communication to all stakeholders. Training employees and giving certification upon training, daily maintenance activities, improving production efficiency by waste reduction and reduced machine stoppages, employing qualified personnel, developing clear TPM guideline and procedures, frequent machine servicing, reduction of the number of machines operated per person, and decentralization of TPM office. The above factors serve as remedial actions to the implementation of TPM.

Conclusions

The study’s intention was to evaluate TPM in manufacturing sector, a case of UKL. The study fulfilled its objective and found that implementation of TPM is due to benefits derived from the TPM pillars which include individual equipment improvement to eliminate losses, autonomous maintenance, planned preventive maintenance and operating skills training, maintenance plan design and early equipment management. With escalating world prices of commodities such as mineral oil and palm oil TPM can be employed to reduce cost of operations by reducing waste and increasing productivity.
Implementation of TPM has improved UKL’s performance by improving OEE through cost reduction, increasing employee knowledge, improving employee involvement, morale and product quality, ensuring continuous machinery maintenance, reduced wastage of materials and employee training.

The implementation of TPM has enabled UKL gain competitive advantage by increasing employee knowledge and skills, reducing cost leading to growth in market share and consequently profitability. TPM has also resulted in timely production and product delivery to customer and ability to benchmark against competitors. Employees adjusted well to the new culture resulting from TPM hence contributing to its success.

TPM implementation in UKL was successful. Its success is mainly attributed management commitment, training and teamwork. However, there were limitation in TPM implementation caused by employee resistance, lack of sufficient training for lower cadre employee training, lack of spare parts, and ignorance among the employees.

Recommendations

These recommendations address issues that would lead to successful implementation of TPM. They are issues that have arisen from this study as well as from available literature. The recommendations are as follows.

It is important to get the support of all employees at the inception of TPM; this can only happen if they are guaranteed job security. Management needs to present TPM as a system that will not increase the amount of work for employees but one that will ensure the existence of the organization. In order to show commitment to this end, management needs to ensure that there are no job losses as a result of improvements delivered through TPM.
Most employees are educated to secondary and diploma level. It is recommended that firms initiate special training in TPM methodologies for their employees. Specific training curriculums need to be developed for specific sections of the organization and areas of work. It is important for all employees regardless of job level to be taken through suitable training program as this will not only improve on their skill but also commitment to the company. It is recommended that a certification process be put in place for internal training programs. In order to reduce the need for training, employee retention is important. For organizations that use casual employees, it would be important to establish a rotational process which would ensure there is a pool of trained personnel.

For TPM implementation to be successful the support of senior management is important. Therefore TPM should be launched by the leadership team and its benefits to the organization clearly and passionately articulated by the team. TPM should be the only system that the organization should use hence all other systems such as ISO and TQM if in operation should be encompassed under the TPM pillars. The integration of TPM in all operations and processes is important such that it becomes a way of life. This will ensure that employees do not perceive TPM activities as being separate or different from their normal duties.

Recognition is an important incentive that can enhance employees’ morale and motivation. This can result in improved performance of employees. As a company does this it is important to ensure that it does not introduce unhealthy competition among employees as this can kill team work. Therefore it would be important to recognize team performance which should be at the fore front as well as individual performance.
Companywide celebrations for achievement of TPM milestones is recommended as this keeps the TPM fire burning.

It is recommended that companies like UKL partner with local colleges to incorporate TPM methodologies in their curriculums. This will ensure that workers have TPM knowledge at entry point. This would also enhance the quality of graduates especially in engineering disciplines.

Recommended Areas for Further Studies

1. This study was evaluating TPM in manufacturing industry focusing on UKL. However, further studies require to be done on TPM in other sectors such as the hospitality industry like hotels and Service industry such as banks and insurance firms.

2. The impact of incentives on the attainment of TPM goals is another area that should be explored. It would be important to establish the forms of incentives that hasten the attainment of TPM goals and the ones that are retrogressive.
REFERENCES


APPENDICES

APPENDIX A: QUESTIONNAIRE

PART 1: BACKGROUND INFORMATION

1. Gender
   Male [ ] Female [ ]

2. Age
   Below 20 years [ ] 31-40 years [ ] Above 50 years [ ]
   21-30 years [ ] 41-50 years [ ]

3. Highest Level of Education
   Secondary school [ ]
   Tertiary college [ ]
   University graduate [ ]
   Post graduate degree [ ]
   Other (please specify) __________________________________________________

4. Department __________________________________________________________

5. For how long have you worked in Unilever Kenya Limited?
   Up to 1 year [ ] 6-10 years [ ]
   1-5 years [ ] More than 15 years [ ]

6. For how long have you worked in the manufacturing industry?
   Up to 1 year [ ] 6-10 years [ ]
   1-5 years [ ] More than 15 years [ ]
PART 2: CONTRIBUTION AND EFFECTS OF TPM

7. Please tick the extent to which you agree or disagree with the following statements on TPM.
   1= strongly agree 2 = Agree 3 = Neutral 4 = Disagree 5 = strongly disagree

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPM has helped increase my productivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM has enhanced team work and employee involvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM has increased my workload</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM has improved the quality of my work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM activities are different from my normal work duties</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM has improved my job security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM has increased my knowledge about what I do</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM has made the company or management care for my well being</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would recommend other organizations to adopt TPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. Which of the following would you consider as objectives of TPM

(i) Maximize production [  ]
(ii) Reduce equipment downtime [  ]
(iii) Reduce inventory [  ]
(iv) Reduce accidents [  ]
(v) Promote employee involvement and morale [  ]
(vi) Improve quality [  ]
(vii) Reduce operating cost [  ]

9. Please tick the extent to which you agree or disagree with the following statements on TPM.

1 = strongly agree 2 = Agree 3 = Neutral 4 = Disagree 5 = strongly disagree

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPM has helped increase OEE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM has helped reduce cost of production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM has improved customer service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Due to TPM quality of products is better</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPM has improved employee involvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. From question 9 above, if TPM helps increase OEE explain how this happens.

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
11. From question 9 above, if TPM helps reduce production costs; explain how this happens.
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

12. Given the effects or results of TPM has it enabled UKL gain advantage over its competitors?
   Yes [ ]
   No [ ]

13. Please explain your answer in question 12 above.
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

CHALLENGES OF IMPLEMENTATION OF TPM

14. Implementation of TPM requires culture change in the way things have always been done in the company, how would you rate the employees’ adjustment to the new way of doing things, TPM way?
   Very good [ ]
   Good [ ]
   Average [ ]
   Poor [ ]
   Very poor [ ]

15. In your opinion, to what extent has the implementation of total product manufacturing in Unilever Kenya been successful?
   Very great extent [ ]
   Great extent [ ]
   Average [ ]
   Some extent [ ]
   No extent [ ]
16. From question 15 above if implementation of TPM has been successful what are some of the factors that have made it succeed?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

17. Have there been any limitations in the attainment of TPM goals?
   Yes [   ]
   NO  [   ]

18. If your answer is yes from question 17 above what are some of the factors that have limited the attainment of TPM’s goals in UKL?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

19. In your opinion, what remedial actions can be taken to overcome the challenges listed in question 18 above?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Thank You.
## APPENDIX B: TIME FRAME

<table>
<thead>
<tr>
<th>Activity</th>
<th>Dates</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 15, 2010 Approval of Thesis topic</td>
<td></td>
<td>Supervisor</td>
</tr>
<tr>
<td>Proposal Writing and Corrections</td>
<td>July 24, 2010- January 15, 2011</td>
<td>Researcher, Supervisor and reader</td>
</tr>
<tr>
<td>Submission of research proposal</td>
<td>January 21, 2011</td>
<td>Researcher</td>
</tr>
<tr>
<td>Proposal Defense</td>
<td>February, 2011</td>
<td>Researchers, supervisor, Reader, defense panel</td>
</tr>
<tr>
<td>Corrections from defense panel</td>
<td>February, 2011</td>
<td>Researcher</td>
</tr>
<tr>
<td>Data collection</td>
<td>Mid February 2011 to March 15, 2011</td>
<td>Researcher</td>
</tr>
<tr>
<td>Data analysis and report writing</td>
<td>March 17- 30, 2011</td>
<td>Researcher</td>
</tr>
<tr>
<td>Presentation to supervisor and readers and corrections</td>
<td>April 2011</td>
<td>Researcher, supervisor, reader</td>
</tr>
<tr>
<td>Submission of thesis copies</td>
<td>April 2011</td>
<td>Researcher</td>
</tr>
<tr>
<td>Thesis defense</td>
<td>May, 2011</td>
<td>Researchers, supervisor, Reader, defense panel</td>
</tr>
<tr>
<td>Corrections</td>
<td>May, 2011</td>
<td>Researcher</td>
</tr>
<tr>
<td>Submission of error free bound copies</td>
<td>October, 2012</td>
<td>Researcher</td>
</tr>
</tbody>
</table>
## APPENDIX C: ESTIMATED BUDGET

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Cost in Kshs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationery- printing papers and photocopy</td>
<td>15,000.00</td>
</tr>
<tr>
<td>Binding</td>
<td>5,000.00</td>
</tr>
<tr>
<td>Legal requirements- Research Permit</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Data collection</td>
<td>9,000.00</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>15,000.00</td>
</tr>
<tr>
<td>Total</td>
<td>45,000.00</td>
</tr>
</tbody>
</table>