# OPERATIONS MANAGEMENT AND PERFORMANCE OF KENYA TEA DEVELOPMENT AGENCY MANAGED TEA FACTORIES IN KENYA

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**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION, SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI**

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# DECLARATION

I declare that this research project is my original work and has never been submitted for award of a degree in any other University.

Signed……..…….…….. Date ……..……

**LILIAN OGAGE KEMUNTO**

**D61/67515/2013**

This project has been submitted for examination with my authority as the university supervisor**.**

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# DEDICATION

I dedicate this research project to my parents, Mr. and Mrs. Ogage for their immense sacrifice in making this research possible. Also, this is dedicated to all those who have supported me in the preparation of this research project.

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# ABBREVIATIONS AND ACRONYMS

**CPM:** Continuous Performance Measurement

**KTDA:** Kenya Tea Development Agency

**OMP:** Operations Management Practices

**VSM:** Value Stream Mapping

# ABSTRACT

Operations play a major role in the tea industry where the business involves suppliers, some of who are the business owners and customers. Organizations in the tea industry are faced with challenges in their quest to deliver their products to consumers while concurrently ensuring profitability. Thus, they have to tailor their business operations practices to fit the market. This research aims to see to what extent operations management practices are being undertaken in the Kenyan tea industry by looking at the Kenya Tea Development Agency managed factories, studying their supply chain and their process to determine how they impact on the operational performance of the factories.

The target population in this study was the 65 Kenya Tea Development Agency managed factories. Primary data on the project implementation was collected using a questionnaire. Secondary data was obtained from relevant publications and literature review from the different organizations. Data was tabulated and analyzed for purpose of clarity, using SPSS version 20 software. Data was presented using tables, and pie charts to make them reader friendly and his study conducted a multiple regression analysis. Multiple regression analysis was used to establish the relationship between the independent and dependent variables.

The study found that there is a positive significant relationship between supply chain, lean management, value stream mapping, machine maintenance and operational performance. However, the study found a negative relationship between constraints and operational performance of an organization.

The study recommends that factories should be urged to adopt all the practices under supply chain management, adoption of communication channels enhancement among all the staff working in various organizations to improve value stream mapping. The study further, recommends that all factories under KTDA should have a skilled team to handle issues on machine maintenance and replacement as this will lead to continued production. In addition, the study recommends that similar studies be done on change management in other organizations for deeper understanding of the phenomenon under research.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the Study

In modern times, businesses have to come up with sustainable business policies and frameworks in their operations to attain attractive results, moving away from mass production (Liyanage, 2007). The changing business environment has necessitated companies to change their operations strategies. The Japanese came up with lean management that incorporates continuous improvement in the operations production processes and supply chains (Peng *et al*., 2011). They have been able to produce their products with an aim of zero defects, efficiency in production processes, minimal stock and automation (Pham and Thomas, 2008). Studies have shown that operations management and operational performance are linked. Chaves *et al*. (2013) studied the operations management aspect of lean internal practices in manufacturing firms located in Ireland where they established that this has an effect on the operational performance elements of quality, delivery, flexibility, and cost. Feng *et al.* (2013) in his study of Chinese manufacturing companies found that internal business activities like the operations management aspect of supply chain affect business operational performance.

### 1.1.1 Operations Management Practices

Operations are a combination of tasks performed to create value for a product. Operations Management is a company role enabling the achievement of company goals through efficient acquisition and use of resources (Bayraktar *et al*., 2007). Operations Management has a direct impact on both costs and revenues. It is an area that should be given due attention in any company as it potentially has an effect on profit (Slack *et al*., 2004). The Operations Management in any industry is affected by aspects of uncertainty and competition (Boyle, 2006). Operations management is composed of three levels: the strategic, systems and processes levels. The strategic level incorporates the operations strategies. A company has to come up with an operations strategy that will determine how they run their manufacturing processes. The importance of operations strategy is that it specifies how the organization will allocate the available resources to support production and infrastructure. According to Martín-Peña and Díaz-Garrido (2008) the

operations strategy should contain operations policies and competitive priorities. Operations policies provide the set of actions to achieve the operations and business goals while competitive priorities provide the areas of focus to gain competitive advantage.

The systems-level comprises a company's quality and supply chain. Management generates this and has to be in line with the operations strategy as this is a major point in achieving company objectives. Many businesses are undertaking various sustainability initiatives like the supply chain sustainability to mitigate the adverse environmental and social impacts of their firm operations (Varsei *et al*., 2014). Both buyer and supplier actions can impact on the company's operations. This has led to businesses forming buyer-supplier collaborations to ensure they get the right specification of materials to better their product offering and streamline operations. Buying from green suppliers and the use of green energy is one of the upcoming supply chain trends in an attempt to have minimal negative impact on the environment (Orji and Wei, 2015). Quality can be seen in the perspective of the customer or from the company's perspective (Pham and Thomas, 2008). Quality can be essential, performance or exciter quality. Quality management can lead to the introduction of new high-value products that can competitively compete in the market (Kafetzopoulos *et al*., 2015). Firms have to define what their quality approach is since it can affect how the customers think of the organization and how the staff carries out their duties (Kashou and Omran, 2014).

The processes level involves the process design, planning and control and project management. Process design implies a plan of how the work will flow, the equipment to use and how the work will flow in the production process to be a finished product (Nembhard, 2014). The process design in a factory will depend on the type of product being produced and what the management prioritizes. This helps an organization to be organized in their processes for smooth movement of materials and staff. Planning and control involve decisions around capacity, resource planning and production planning (Sokol, 1994). This is important to an organization as it can know the limits under which they operate to find out when and how to produce their products. Project management involves interrelated activities with defined starting and ending times. This is useful when

the organization has short-term events that need planning and monitoring, throughout the project duration (Sokol, 1994).

According to Hicks (2009) tea is highly consumed in many world societies with three billion cups being drunk daily. The production of tea is increasing thus increasing the competition for markets. The tea production is increasing, with China being the biggest world producer. Their tea production rose by 9.5% in 2005 as a result of their government's aim to improving the rural living standards (Hicks, 2009). This increased competition for other producers. The producers of tea have to come up with sustainable operations so as not to lose their market in the tea industry.

### 1.1.2 Operational Performance

According to Peng *et al*. (2008) Operational performance is the actual achievement level of a company's costs, flexibility, quality, and speed. Staughton & Johnston (2005) identify the operational performance objectives as to include: cost, flexibility, quality, speed and dependability. These objectives are influenced by the companies' operations, therefore, companies are always working their strategies around these factors to fulfill their needs and the customers' needs. Cost involves all monies put into the operations process. This requires constant monitoring and strategies to keep them in check. It includes the price of raw materials, rent, insurance, labour and energy costs. Oke (2005) argues that flexibility can help a manufacturing plant rapidly change production level; rapidly develop new products, therefore, having an appropriate response to threats by the competition. This is identified by the adaptability of machine set-up, multi-tasking, enterprise resource planning systems, process technology and staff adaptability to change. In a market with a demand that is not constant, flexibility will help a company avoid the unnecessary stock, labour and production time (Nembhard, 2014). Also, the company can be able to produce goods to the specifications by the customers.

Quality can be viewed both from the customer and organizational perspective. The customer has the expected functionality of the product. They can be satisfied if it meets expectations, dissatisfied if expectations are not met or excited when a product exceeds their expectations. The company views quality as being the product conforming to

expectations (Vecchi and Brennan, 2011). The speed of delivery involves the firm having enough capacity to produce the products as soon as the customer needs them. This can be affected by a companies' production policies, labour, type of technology and machine reliability. Dependability involves the company being able to satisfy its customers by having the product ready whenever the customer needs them, and it is indicated by the difference in demand from production (Hallgren *et al*., 2011).

Hicks (2009) found that the range of tea products is increasing with there being a lot of process and product development. With there being an increase in the industry, the manufacturers who do not conform to the market demands cannot survive. They can borrow best manufacturing practices from other industries to succeed in their operational performance depending on the market requirements.

### 1.1.3 Operations Management and Operational Performance

The research looks into the operations management areas of supply chain and processes. In the processes, Parris (2014) argue that companies must apply lean tools and apply lean thinking and principles. Companies are trying to stay afloat and competitive thus, need to design and offer better products and services. They have resorted to making improvements to their manufacturing operations (Taj and Morosan, 2011). In the supply chain, companies are forming buyer-supplier relationships and environmental considerations in their dealings to achieve trust and cooperation (Zhang *et al*., 2006). In the processes, lean management is the bar to look up to. Companies are tailor making lean practices to fit their company operations (Ward *et al*., 2007).

### 1.1.4 Tea Factories under the Kenya Tea Development Agency

According to Szenthe (2015) Kenya is the third largest world producer of tea after China and India. In Africa, Kenya is the largest African producer of tea, with most of its product being exported to other countries. The majority of tea leaf suppliers are small-scale farmers, under the umbrella of the Kenya Tea Development Agency (KTDA), a private incorporation dealing majorly in the tea industry. It handles the collection of leaf from the suppliers, processing the leaf and selling the final product. The tea suppliers are also the

shareholders of the company. Large populations of tea farmers depend on this produce for their livelihoods. They take their leaf to designated collection points where the factory collects it for processing at the plant. There are 65 factories spread around East (Meru, Embu, Nyeri, Kiambu and Kirinyaga) and West (Kisii, Nandi, Bomet, Kericho and Kakamega) regions. Their factory operations involve activities from attaining raw materials from the supplier who doubles up as the shareholder, processing and packaging of the leaf to selling the final product to the customer. The tea farmers are then given monthly income on their delivered produce and a yearly bonus.

## 1.2 Statement of the Problem

A world market is a competitive place full of turbulence where both quality and innovation are playing crucial roles in companies surviving (Kafetzopoulos *et al*., 2015). Companies have to continuously improve their processes and produce products that appeal to the buyers. The global tea industry has many players with limited markets around the world. The customer trends are changing necessitating the producers to be wary of what and when to produce. Taj (2008) found that Chinese firms emphasize on scheduling and control and machine maintenance. Chavez *et al.* (2013) studied an Australian business and suggested that lean internal practices have an impact on the operational performance elements of cost, speed, flexibility, and quality.

The production of tea in Africa is on a minimal scale and with small-scale farmers. The region has the task of competing with large producers who have been able to provide their product at lower prices with their ability to produce at lower costs with advancements in operations.

Campbell *et al.* (2011) on their study of manufacturing in South Africa concluded that the cost of product offering is still high despite the technology being more affordable due to material costs being high. This portrays that the production environment costs have been on the rise for a lot of organizations in the present times.

Kenya is the number one African tea producer. The tea manufacturing industry is faced with a lot of challenges. Cost of electricity and wood fuel, that are a necessity in

production have increased highly due to environmental uncertainty and government legislation, consequently impacting on the cost of the final products. Labour cost also increases the cost of production (Gesimba *et al.*, 2005). Parris (2013) identified the East African challenges to processes excellence to be the little economic development level, people not being time conscious, failure to follow written instructions, no problem foreseeing, low levels of innovation, unpredictability of life and poor quality acceptance.

Not many researches relating operations management and operational performance have been carried out on the tea manufacturing area. This industry is an important agricultural area that is depended upon by a lot of households. This research aims to identify what are the operations management practices in the KTDA managed factories, what are the operational performances of the companies and what is the relationship between operational performance and operations management practices in these factories.

## 1.3 Objectives of the Study

i) To establish the operations management practices of the KTDA managed factories

ii) To establish the operational performance of the KTDA managed factories

iii) To determine the relationship between operations management practices and operational performance of the KTDA managed factories

## 1.4 Importance of the Study

The study will be of value to the KTDA factories management team as they will be able to identify the effect of the operations management on their operational performance. They will be able to reassess their operations from the recommendations of the study and identify the areas that need improvement. They will also be able to identify the practices in other industries and be able to tailor them to fit their business.

The shareholders and potential investors in the industry will be able to understand what goes on in their business, how they can improve their production, and whether there is a hope of their business flourishing for them to get their investment returns. They will

benefit from the findings of the study and know whether their trade practices are the best practices.

Academicians will be able to identify the relationship of operations management and operational performance. They will be able to make reference to the research findings in their future studies. They can be able to do further research from the gaps identified in the recommendations. They can apply the same concept to other industries to see whether the findings hold in these industries.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

This chapter aims at looking into the theory and practice of operations management. This is through theoretical writings on operations practices. It also looks into empirical studies that have been done in the subject areas. From the identified gap, it comes up with a conceptual framework.

## 2.2 Operations Management Practices

This section focuses on the operations management practices including: lean manufacturing, value stream mapping, theory of constraints, machine maintenance and supply chain.

### 2.2.1 Lean Manufacturing

Many organizations have adopted lean manufacturing with the hope of optimizing their resources (Karim and Arif-Uz-Zaman, 2014). A lot of studies have been done on lean manufacturing and advocate for its use. Lean manufacturing aims at the elimination of waste in every area of production, including customer relations, product design, supplier networks and factory management. Chauhan and Singh (2012) identify the benefits of lean manufacturing as bringing in automation, less inventory, less time wastage, and less space to produce quality products efficiently and economically. The benefits are seen in the long run thus identifying that Lean management is not a quick fix solution. According to Pham and Thomas (2008) lean manufacturing eliminates waste, and agile manufacturing helps deal with uncertainty through flexibility and responsiveness.

### 2.2.2 Value Stream Mapping

Mobley (2013) identifies Value Stream Mapping (VSM) as a visual way of depicting and improving the flow of manufacturing and production process, also the information that controls the flow of materials through the process. According to Librelato *et al.* (2014) using VSM, a company can map out its value chain's productive processes and

information flow. VSM main contributions are in the identification of process wastages and simplification of data along operations. Value Stream Mapping advocates for continuous improvement in the production system.

### 2.2.3 Theory of Constraints

The Theory of constraints (TOC) is pioneered by Eli Goldratt. It identifies that organizations' resources are limited. It can be used to find the root of variables limiting the organization's performance. The theory states that every system, no matter how well it performs, has at least one constraint that limits its performance- this is the system's weakest link (Manktelow, 2015). Companies must identify these limitations and eliminate them to attain smooth operations. It is based on limitations of organizational and market variables (Librelato *et al.,* 2014). Companies can use this theory to apply into their operations. They can identify the aspects that need change, what to change into and how the changes can be implemented. According to Librelato *et al.* (2014) TOC is proved to be useful for management in their production processes.

### 2.2.4 Machine Maintenance

According to Narayan (2012) Asset reliability is affected by people, production processes, and equipment. People’s productivity can be measured in terms of the actual against estimated resources. Asset reliability determines downtime duration and resources. An asset should be able to return the investment used to acquire and maintain them. Repairs are a reactive measure when machines break down. There could be parts that are routinely needed and some identified during an inspection. Thus, management has a responsibility to plan for these by practices like having the spares in stock. According to Liyanage (2011) maintenance is a preventive measure that can be set up in the plant or outsourced and machine downtime can impact negatively on the performance of a plant; thus machines should be taken care of to maintain operational performance. Foon and Terziovski (2014) identified that maintenance management needs to be integrated into a company's management functions.

### 2.2.5 Supply Chain

Modern supply chain management is about companies realizing that they are interdependent on the companies providing their products. Each player's actions affect the whole chain, with problems in one affecting the strength of the supply chain (Paik & Bagchi, 2007). There is a long chain tying these companies and the players are left double-guessing what is required of them (Towill, 2005) which could induce inefficiencies. The rough set theory is a data-mining approach that can determine the factor relationships (Bai and Sarkis, 2014). It can be applied to supply chain in creating the key performance indicators.

According to the stakeholder theory, stakeholders can influence organizations to adopt specific actions. This includes sustainability initiatives and integration of sustainability into business operations (Varsei *et al.,* 2014). Therefore, they should be involved and trained on the importance. When stakeholders put in commitment, this can impact positively on the performance of a supply chain. The creation of a sustainable supply chain is necessary for the business to prosper. They must be continually improved to sustain the company's operations and profitability.

## 2.3 Operational Performance

(Prajogo, 2006) found that firms lay more emphasis on external aspects than the internal elements affecting performance. Operational performance is the actual achievement level of costs, flexibility, quality, and speed. (Peng *et al*., 2008). Radnor and Barnes (2006) suggested that improving operational performance starts at measurement. Cost can be reviewed by looking at the monetary spending within a given period. Flexibility helps a firm to be able to manipulate its production to align with the customers' needs. Quality is important since customers have many options and would go for products meeting their quality specifications. The speed of product delivery is affected by the firm's activities.

Plants need to have their machinery, labour and frameworks in check to be able to keep par with demand. According to Taj and Morason (2011) the supply chain has a positive effect on flexibility. To improve quality, they should adopt lean manufacturing to meet

the global market challenges. According to Peng *et al.* (2008) cost is measured as a percentage of sales, quality by the defect rates, speed by orders delivered on time. Flexibility is essential to achieve organizational competitive advantage similar to capability in the areas of cost, quality, and delivery (Larso *et al.,* 2009). According to Peng *et al*. (2008) improvement capability has an impact on the operational performance. Kannan and Tan (2007) found that the quality of suppliers has an effect on the operational cost. Taj and Morason (2011) see the reduction of operational costs as one of the top ten manufacturing competencies.

## 2.4 Operations Management and Operational Performance

The operations practices have been seen to have an impact on the operational performance metrics. Anh and Matsui (2011) suggest that manufacturing plants need to shop-floor processes have an impact on the performance of the plant. Operations management involves the activities of acquiring raw materials and transforming them to finished products. The practices like Japanese lean management have enabled many companies to improve their production (Pham and Thomas, 2008). Process excellence is critical since it can allow the plant to be effective, continually improve, be efficient and empower individuals (Parris, 2013).

The tea industry involves the manufacture of raw tea leaves into a finished product ready for the market. A lot of individuals are dependent on this industry for their livelihood. The processing is carried out in a factory environment. The raw material is a perishable commodity, so the factories are located near the plantations. The large manufacturing factories mostly have their own tea plantations. They offer a variety of tea products and have established their local markets and compete for external markets. The operations play a significant role in this industry. If left unchecked, the cost of production can be exuberant leading to losses. The operations include main processes and the supply chain. The processes include the transformation of the raw leaf to a finished product. Here, the factories use people and machines for processing. The supply chain can determine the quality of tea that reaches the final consumer. The factories get their raw materials from various sources. This can be tea plantations or individual farmers.

Ward *et al*. (2007) studied the business strategies and manufacturing decisions: An empirical examination of linkages. They sampled 101 US manufacturing firms and classified them according to their business strategies of broad-based competitors, product differentiators, and price leaders. Data was collected from some public and private US manufacturing firms in plants with more than 150 employees from the fabricated metal, electrical devices, and electronic controls sectors. This focused on the product line where the respondents worked: plant, marketing, and engineering managers.

Their data was analyzed by the use of analysis of variance (ANOVA), to assess the differences in the external environments of these groups of firms. The most diverse industries were the broad-based and the price strategies in most of the content areas. There was no significant difference in investment capacity in the three study areas. They had almost equal investment capacity. On workforce empowerment, just-in-time (JIT) and development programs, broad-based competitor displayed a higher emphasis than the two other groups. In the quality aspect, price groups had the lowest score. Cross-functional activity was highest at the broad-based product firms though the degree of work delegation was found to be almost similar in the three groups. In conclusion, he found that companies competing on price were not better off than broad based manufacturers. They encounter many structural and manufacturing capability problems. They also discovered that manufacturing strategy and business strategies are linked.

Taj (2008) undertook to study 65 Chinese manufacturing plants in various industrial sectors to find out if they have adopted lean manufacturing and know the impact it had on performance. The scope of his study involved production processes of set-ups, quality, maintenance, processes, inventory, layout and handling, suppliers, teamwork, and scheduling. The data was collected through a questionnaire, posing 40 questions to participants with the questions having scores from zero to four. This enabled them find the gaps between the prevailing situation and the lean targets. All the industries got a low score in inventory management. In teamwork, the industries were seen to be exploratory and bureaucratic. In processes, close to half the firms were found to be flexible to product mix. These firms scored highest in scheduling and control alongside machine maintenance. The suppliers ranked lowest with management alluding supplier

incompetence. Set-up and quality were seen to be an important factor for these industries. His findings were that the Chinese are becoming market-driven enterprises and flexible manufacturing is gaining popularity. He found that lean manufacturing improves the level of operations and customer satisfaction. He concluded that there still was a gap from lean targets but saw potential for improvements.

Christopher and Howleg (2011) sought out to do research on "Supply Chain 2.0": managing supply chains in the era of turbulence. They found that to convince management to invest in a flexible supply chain, they reviewed the real options theory and the Monte Carlo simulation. They found that the real options theory is impractical in the day to day business and proposed the Monte Carlo simulation. This approach enables a firm deal with volatility by looking at multiple factors rather than a single one. In measuring structural supply chain flexibility, they considered dual sourcing, asset sharing, outsourcing, flexible labour arrangements, rapid manufacture, postponement of finishing the product and separating the base from surge demand.

They observed that HP - the electronic products manufacturer - is in an industry that is rapidly changing, has embraced late product configuration, introducing vendor-managed inventory, centralizing their inventory and logistics management, near sourcing strategy and alternative distribution channels. And contract manufacturers at about 92% of its manufacturing. Their findings were that key business parameters need a change in the supply chain design to be able to adapt to supply and demand since the business environment are unstable. Optimal supply chains are no longer functional with any competitive advantage being short-lived. Firms should see the changing times as an opportunity and not base it on a single parameter.

Chaves *et al*. (2013) carried out a study on lean internal practices and operational performance, the contingency perspective of industry clock speed. The research was an empirical study carried out in 228 manufacturing companies based in Ireland. They tested the impact of internal lean practices and industry clockwise on the operational measures of cost, speed, flexibility and quality. From their study, they found that lean internal practices are associated with quality, delivery, flexibility, and cost. Also, process set-up

and JIT can improve the level of quality. Delivery is improved with strategies focused on set-up time. Flexibility is achieved through lean practices like adjustment of capacity and new product introduction. Cost reduction is achieved through lean practices. They found that lean practices of process set-up time and JIT were likely to improve flexibility, delivery and quality in industries characterized by low industry clock speed. Cost improvement is not affected by industry clock speed. Therefore, all lean practices can be aimed at this.

Feng *et al*. (2013) carried out a study on external involvement and operational performance. This focused on the external elements of customers and suppliers. Their construct involves the relationships of clients and vendors on internal integration and operational performance. Also, it looks into the relationship between internal integration on operational performance. They did a survey on 176 Chinese manufacturing companies. They found that supplier and customer involvement affected internal integration, with customer involvement having a greater effect. They also found that internal integration affects operational performance significantly. The study further finds that both suppliers and customers affect operational performance significantly. They emphasize the importance of internal integration in building supplier and customer relationships for better operational performance. They recommend future studies on the dimensions of operational performance and customer service.

Karim and Arif-Uz-Zaman (2013) did a study on a methodology for effective implementation of lean strategies and its performance evaluation in manufacturing organizations. The research was applied to an Australian company manufacturing medium voltage switchgear products. The types of waste were identified through process mapping and time studies. They then developed an improved process map. They evaluated process efficiency and effectiveness by using an established continuous performance measurement (CPM) metric. From their findings, moving, holding and handling distance and time had drastically improved. The distance moved by the operators as well as holding and handling times had been reduced significantly by the proposed method and layout, efficiency and effectiveness of the new process had improved and waste cut from the process. They noted that their study had limitations in

the industry scope and proposed further studies in diverse manufacturing processes and the integration of supply chain in manufacturing.

Librelato *et al.* (2014) did a study on Value Stream Mapping and the Theory of Constraints Thinking Process as a process improvement approach. Their study was carried out on a Brazilian company in the automotive industry producing automotive loudspeaker kits for the leading automotive industries among others. They sought to analyze their production process to suggest an improvement plan. They collected their data using direct observation, interviewing process actors and data presented in the company's managerial information system. They noted that their suggested improvements would not resolve all issues in production but is an improvement towards lean production. VSM contributes in being able to present the information flow of the production process thus the ability to identify the productive processes and determine losses incurred in implementation. They noted that using VSM in isolation would not have led to the identification of the root causes that sustained wastages. They suggested the application of VSM and TOC to other processes and industries to validate their study.

## 2.5 Summary and Conceptual Framework

This section looks into the summary of the literature review, identified research gaps, and the conceptual framework.

### 2.5.1 Summary

Manufacturing companies are continuously trying to improve their production. This can be through the adoption of new and emerging strategies that fit their type of business. The processes can contribute to a lot to the performance of the operations department of a company. Chaves *et al*. (2013) study on lean practices is consistent with the theory that lean practices improve operational performance. Value stream mapping and the theory of constraints are two theories that aim at improving manufacturing processes. With value stream mapping being able to find the wastage areas and theory of constraints identifying the weak link, Librelato *et al.* (2014) found that there is a need for companies to

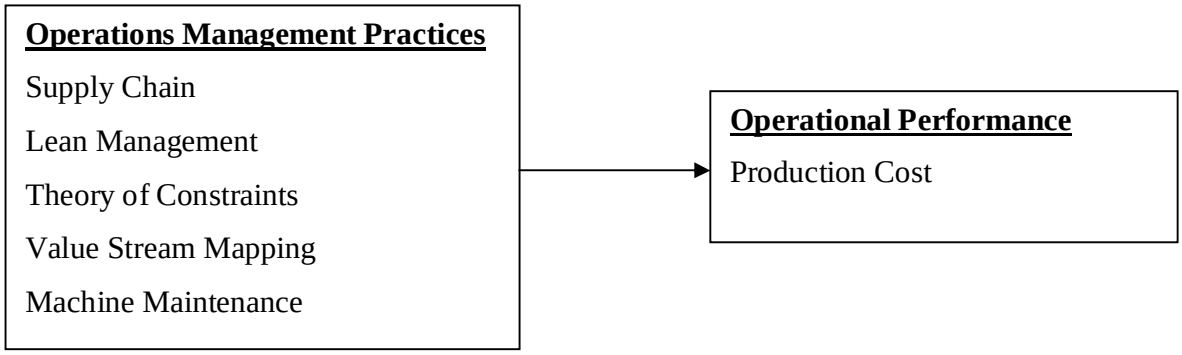
customize their strategies. Machine maintenance and inspection are important to ensure processes are running without wastage of labour and machine time with reworks being a cost.

The supply chain can be a deterrent or advantage to production operations. When the suppliers are incorporated by alliances, they can know the company needs and cooperate to the company achieving their objectives. Feng *et al.* (2013) study on the external involvement on operational performance found that creating a relationship with suppliers is important. Christopher and Howleg (2011) advocated for a flexible supply chain. This would help a company avoid obsolete stock and overproduction. The global tea industry is experiencing a lot of competition, and, therefore, the players have to resort to improving their operations for their business to be sustainable. A lot of manufacturing companies have been able to improve their operations with the use of strategies like Lean Management. The players in the industry have to come up with better strategies to be sustainable. All these studies have been carried out in different countries and industries other than the tea industry. The practices adopted are seen to work well for a lot of them to improve their operational performance. All these have led this research to look into the practices of a local company in the tea industry to find out the kind of operations practices they have adopted for their processes and their relationship to operational performance.

### 2.5.2 Conceptual Framework

A conceptual framework is a visual representation of ideas showing a presumed relationship among the factors as presented in Figure 2.1. The ideas are organized in an easy and understandable way. This research aims to find the relationship between operations management and operational performance. The areas of operations management the research looks into are the supply chain, lean management, theory of constraints, value stream mapping and machine maintenance. The operational performance metric is cost.

**Figure 2.1: Conceptual Framework**




**Independent variables** **Dependent variables**

Source: Author

# CHAPTER THREE: RESEARCH METHODOLOGY

## 3.1 Introduction

The study was about the operations management practices and operational performance in the tea industry with a view of KTDA. This section describes the procedures followed in carrying out the study. It looks into the research design, target population, sampling, data collection and data analysis.

## 3.2 Research Design

The study used a descriptive design. The operations management variables included supply chain, lean management, theory of constraints, value stream mapping and machine maintenance. The operational performance measure used was production cost. The descriptive study was chosen since it enabled the investigation and description of the cause-effect relationship existing between the operations management and operational performance variables.

## 3.3 Target Population

The target population for this research was the 65 Kenya Tea Development Agency managed factories distributed in the East and West regions. The company's managed factories are the largest tea producers in Kenya. The research chose the company because it has operations in all the tea growing areas in the country, The East (Meru, Embu, Nyeri, Kiambu and Kirinyaga) and the West (Kisii, Nandi, Bomet, Kericho and Kakamega).

## 3.4 Sampling

The sampling frame for this research included 65 KTDA managed factories. The population was clustered into two, according to the location of the factories: the East and the West regions as in Appendix 2; 28 factories in the West and 37 factories in the East. Clustering was appropriate because the factories in these regions do not differ much in terms of their characteristics. The sampling within the two clusters at 50% of the

population. These factories were chosen using simple random sampling of factories within the clusters, with each factory in the cluster having an equal chance of selection for this study.

**Table 3.1: Sampling**

| REGION | POPULATION | SAMPLE PERCENTAGE | SAMPLE SIZE |
|---|---|---|---|
| West | 28 | 50 | 14 |
| East | 37 | 50 | 19 |

The total number of factories assessed was 33 factories.

### 3.5 Data Collection

The data on operations management was primary data. This was because the people directly involved in the operations management could be able to provide the useful information that would not have been captured by figures. This was be attained through issuing of a structured questionnaire with specific alternative choices. The questionnaire was issued to the production managers and their deputies the production assistants because it was deemed able to obtain information in a short period and the results could scientifically be analyzed. The data on operational performances was secondary data. This was attained from the factories' records. This method was appropriate since the figures could be obtained from the factory records for analysis.

### 3.6 Data Analysis

The operations management areas of data collection include the supply chain, lean management, theory of constraints, value stream mapping and machine maintenance. These operations management practices, collected on a 5 point Likert scale, will be analyzed using means and standard deviation. The data will be presented in charts and tables, giving a visual summary of the findings in an understandable manner.

The operational performance variable for the study was production cost. This was attained by getting the production cost measure of production cost per kilogram. The relationship between operational performance and operations management was measured using regression analysis to characterize and identify the relationships among the multiple factors.

The regression equation is of the form:

$Y= B_0+B_1X_{1+}B_2X_{2+}B_3X_{3+} B_4X_{4+} B_5X_{5+}e$

where:

Y = Produced kilograms/Total production cost; $X_1$ = Supply chain; $X_2$ = Value Stream; $X_3$ = Constraints; $X_4$ = Machine Maintenance; $X_5$ = Lean Manufacturing; $B_0$ = Constant; $B_1$, $B_2$, $B_3$, $B_4$, $B_5$ = Regression Coefficients; e = error term

# CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSION

## 4.1 Introduction

This chapter analyses, interprets and presents the study findings as per the aim of this study, which was to establish the operations management practices of the KTDA managed factories. The study also sought to establish the operational performance of the KTDA managed factories and determine the relationship between operations management practices and operational performance of the KTDA managed factories. The chapter begins with demographic information, followed by findings on the objectives of the study.

## 4.2 Response Rate

The study had a sample size of 33 respondents who included production managers and production assistants. Out of 33 respondents, 31 responses were obtained giving a response rate of 93.94%. A 100% response rate was not achieved as some of the questionnaires were half way filled by the respondents and hence could not be used in the study. However, according to Kothari (2004) any response of 50% and above is adequate for analysis thus 93.54% formed an acceptable basis for drawing conclusions.

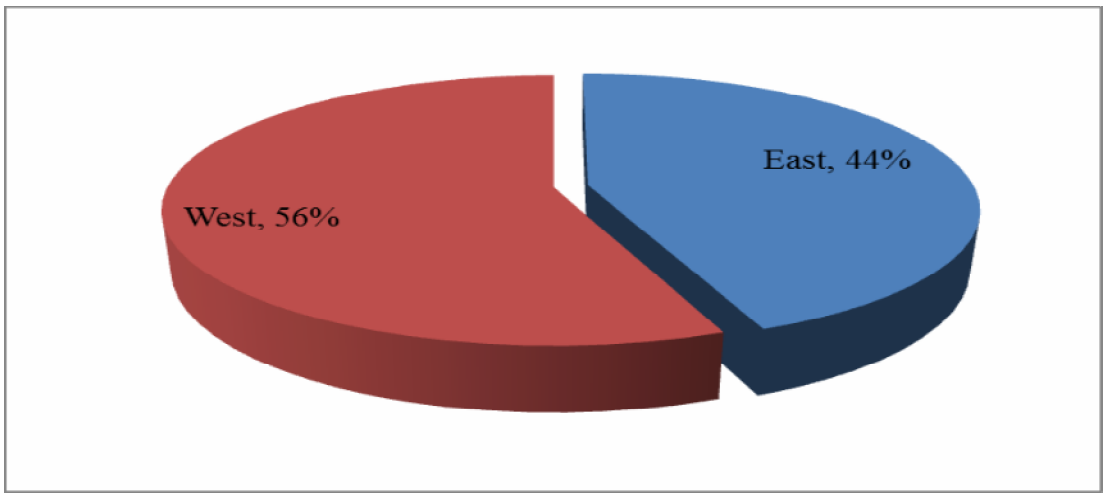
## 4.3 General Information

The general information of this study comprised of the region, factory, year established and title of the respondents.

### 4.3.1 Region and factory of the Respondents

The respondents were asked to indicate the region they work from. The results were as shown in Figure 4.1.

**Figure 4.1: Region of the Respondents**

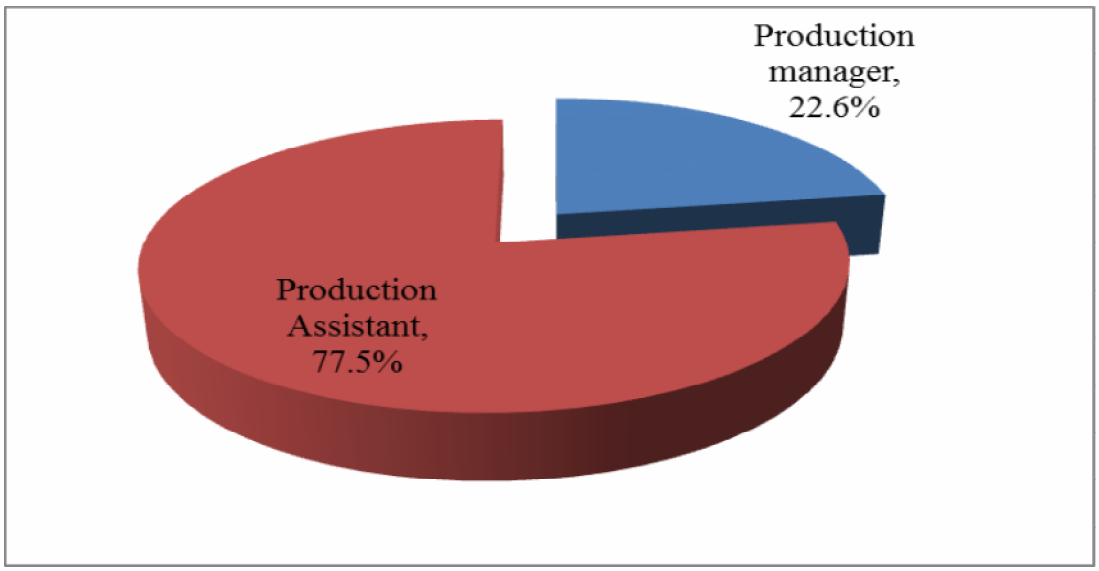



From the findings, 56% of the respondents indicated that they were from the western region while 44% of the respondents indicated that they were from eastern region. This clearly shows that the carried out fairly from both regions as the difference was not that large.

### 4.3.2 Title of the Respondents

The respondents were requested to indicate their title. The results were as shown in Figure 4.2

**Figure 4.2: Title of the Respondents**




According to the findings, 77.5% of the respondents indicated that they were production assistance while 22.6% of the respondents indicated that they were production managers. This clearly depicts that most of the respondents who participated in the study were production assistants.

## 4.4 Operations Management Practices in KTDA Managed Tea Factories in Kenya

The first objective of the study sought to determine the operations management practices in KTDA Managed Tea Factories in Kenya.

### 4.4.1 Supply Chain Practices at KTDA

The study sought to determine supply chain practices adopted by the KTDA managed factories. The results were as shown in Table 4.1.

**Table 4.1: Supply Chain Practices at KTDA**

| | Mean | Std. Deviation |
|---|---|---|
| The supply chain programs are regularly reviewed | 2.936 | 0.574 |
| Inventory level over the passage of time shows declining trend | 3.032 | 0.948 |
| Production is sensitive to demand changes | 3.484 | 0.962 |
| The production materials arrive promptly on need | 3.258 | 0.682 |
| **Supply chain** | **3.178** | **0.792** |

From the findings, the respondents indicated with a mean of 3.484 that production is sensitive to demand changes 3.484 to a great extent. They also indicated with a mean of 3.258 that the production materials arrive promptly on need to a moderate extent. In addition, the respondents indicated with a mean of 3.032 that inventory level over the passage of time shows declining trend to a moderate extent. Finally, the respondents indicated with a mean of 2.936 that the supply chain programs are regularly reviewed to a little extent. The general supply chain mean was 3.178, showing that supply chain is moderately practiced in the factories.

### 4.4.2 Lean Management practices at KTDA

The study sought to determine the lean management practices adopted in KTDA managed factories.. The results were as shown in Table 4.2.

**Table 4.2: Lean Management Practices of KTDA**

| | Mean | Std. Deviation |
|---|---|---|
| Quality objectives are integrated with production objectives | 4.452 | 0.506 |
| Control charts are plotted to measure quality | 3.968 | 0.706 |
| The factory is dedicated on the quality certification aspects | 4.452 | 0.506 |
| Labor productivity is improving over time | 4.032 | 0.706 |
| **Lean Management** | **4.226** | **0.606** |

According to the findings, the respondents indicated with a mean of 4.452 that quality objectives are integrated with production objectives to a very great extent. In addition, the respondents indicated with a mean of 4.452 that the factory is dedicated on the quality certification aspects to a great extent. Also, the respondents indicated with a mean of 4.032 that labor productivity is improving over time to a great extent. Further, the respondents indicated with a mean of 3.968 that control charts are plotted to measure quality to a great extent. The general lean management mean was 4.226, showing that lean management is practiced to a great extent, in the factories.

### 4.4.3 Constraints Practices at KTDA

The study sought to determine the constraints identified by the KTDA managed factories. The results were as shown in Table 4.3.

**Table 4.3: Constraints Practices at KTDA**

| | **Mean** | **Std. Deviation** |
|---|---|---|
| Production is sensitive to demand changes | 3.807 | 0.792 |
| Training on bettering production is regular | 4.097 | 0.7 |
| Workers are empowered | 4.032 | 0.706 |
| Workload is well structured and distributed to production stages | 4.194 | 0.654 |
| **Constraints** | **4.033** | **0.713** |

From the findings, the respondents indicated with a mean of 4.194 that workload is well structured and distributed to production stages to great extent. Further, the respondents indicated with a mean of 4.097 that training on bettering production is regular to a great extent. They also indicated with a mean of 4.032 that workers are empowered for, example, through work delegation to a great extent. In addition, the respondents indicated with a mean of 3.807 that production is sensitive to demand changes to a great extent. The general constraints mean was 4.033, showing that lean management is practiced to a great extent, in the factories.

### 4.4.4 Value Stream Mapping Practices at KTDA

The study sought to determine the value stream mapping practices in the KTDA managed factories. The results were as shown in Table 4.4.

**Table 4.4: Value Stream Mapping Practices at KTDA**

| | Mean | Std. Deviation |
|---|---|---|
| Automation level of production processes is high | 2.968 | 0.948 |
| The flow of information is from bottom to top and top to bottom | 3.742 | 0.682 |
| The materials arrive promptly on need | 3.484 | 0.962 |
| Leaf wastages in productions are declining | 3.968 | 0.752 |
| **Constraints** | **3.541** | **0.836** |

From the findings, the respondents indicated with a mean of 3.968 that leaf wastages in productions are declining to a great extent. They also indicated with a mean of 3.742 that the flow of information is from bottom to top and top to bottom to a great extent. Further, the respondents indicated with a mean of 3.484 that the materials arrive promptly on need to a great extent. Also, the respondents indicated with a mean of 2.968 that automation level of production processes is high to small extent. The general value stream mapping mean was 3.541, showing that constraints are considered to a great extent, in the factories.

### 4.4.5 Machine Maintenance Practices at KTDA

The study sought to determine the effect of machine maintenance practices adopted by the KTDA managed factories. The results were as shown in the Table 4.5.

**Table 4.5: Machine Maintenance Practices at KTDA**

| | Mean | Std. Deviation |
|---|---|---|
| Preventive maintenance is carried out on machines | 4.194 | 0.833 |
| Machine productivity is improving over time | 3.387 | 0.882 |
| Machine downtime is a regular feature | 2.936 | 0.814 |
| Replacement of a malfunctioning machine or equipment is prompt | 3.839 | 0.638 |
| **Constraints** | **3.589** | **0.792** |

From the findings, the respondents indicated with a mean of 4.194 that preventive maintenance is carried out on machines to a great extent. They further indicated with a mean of 3.839 that replacement of a malfunctioning machine or equipment is prompt is to a great extent. Also, the respondents indicated with a mean of 3.387 that machine productivity is improving over time to a moderate extent. Further, they indicated with a mean of 2.936 that machine downtime is a regular feature to a little extent. The general constraints mean was 3.541, showing that constraints are considered to a great extent, in the factories.

## 4.5 Relationship between Operations Management Practices and Operational Performance of KTDA

This section relays the method used to identify the relationship between operations management and operational performance. It contains the regression findings and the analysis of variance.

### 4.5.1 Coefficient of Determination

The R-Squared is the proportion of variance in the dependent variable (Organizational Performance) which can be explained by the independent variables. The R-squared in this study was 0.663, which shows that the five independent variables (supply chain, value stream mapping, constraints, machine maintenance and lean manufacturing) can explain 66.3% of the dependent variable. This shows that the other factors not studied in this study explain 33.7% of the dependent variable (Organizational performance in the tea industry). The findings were as shown in Table 4.6.

**Table 4.6: Coefficient of Determination**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .814[a] | .663 | .660 | .46045 |

### 4.5.2 Analysis of Variance (ANOVA)

The analysis of variance in this study was used to determine whether the model is a good fit for the data. From the findings seen in Table 4.7, the p-value was 0.000 which is less than 0.05 and hence the model is good in predicting how the five independent variables (supply chain, value stream mapping, constraints, machine maintenance and lean manufacturing) influence organizational performance in the tea industry. Further, the F-calculated (18.545) was more than the F-critical (2.46) which shows that the models were fit in predicting the influence of the independent variables on the dependent variable.

**Table 4.7: Analysis of Variance**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 15.727 | 4 | 3.932 | 18.545 | .000[b] |
| | Residual | 43.886 | 207 | .212 | | |
| | Total | 59.613 | 211 | | | |

### 4.5.3 Regression Equation

The regression coefficients and their significance are indicated in Table 4.8. The regression equation is:

$$Y = 2.563 + 0.317X_1 + 0.148X_2 - 0.011X_3 + 0.347X_4 + 0.476X_5$$

According to the intercept ($B_0$), when the four independent variables are held constant, the value of organizational performance in the tea industry will be 2.563. Holding all the other independent variables constant, a unit increase in the supply chain would lead to a 0.317 increase in organizational performance. The relationship was significant as shown by a p-value of 0.000. Further, holding the other independent variables constant, a unit increase in value stream mapping would lead to a 0.148 increase in organizational performance in the tea industry. The relationship was significant as shown by the p-value of 0.031.

Holding all the other variables constant, a unit increase in constraints would lead to a 0.011 decrease in organizational performance in the tea industry. However, the relationship is significant as shown by a p-value of 0.000. Further, the findings show that a unit increase in machine maintenance would lead to a 0.347 increase in organizational performance in the tea industry. The relationship was significant as shown by a p-value of 0.000. Lastly, the findings show that a unit increase in lean manufacturing would lead to a 0.476 increase in organizational performance in the tea industry.

From these findings, we can infer that lean manufacturing was influencing organizational performance in the tea industry most, followed by machine maintenance, supply chain and value stream mapping. However, the association between constraints and organizational performance was insignificant.

**Table 4.8: Regression Coefficients**

| | **Unstandardized Coefficients** | | **Standardized Coefficients** | **t** | **Sig.** |
|---|---|---|---|---|---|
| | **B** | **Std. Error** | **Beta** | | |
| (Constant) | 2.563 | 31.138 | | 1.656 | .002 |
| Supply chain | 0.317 | 0.063 | 0.115 | 5.032 | 0.000 |
| Value stream mapping | 0.148 | 0.053 | 0.059 | 2.792 | 0.031 |
| Constraints | -0.011 | 0.07 | -0.01 | -0.157 | 0.874 |
| Machine maintenance | 0.347 | 0.048 | 0.463 | 7.229 | 0.000 |
| Lean manufacturing | 0.476 | 0.204 | 0.561 | 2.333 | 0.000 |

## 4.6 Discussion of the Findings

In relation to supply chain on performance of KTDA, the study found that production is sensitive to demand changes. Paik and Bagchi, (2007) argues that each player's actions affect the whole chain, with problems in one affecting the strength of the supply chain. The study further found that production materials arrive promptly on need. In addition, the study revealed that inventory level over the passage of time shows declining trend to

a moderate extent. Regular review of chain programs also improves the performance of an organization. Varsei, (2014) indicates that a sustainable supply chain is necessary for the business to prosper.

With respect to lean manufacturing on the performance of KTDA, the study found that quality objectives are integrated with production objectives and that the factory is dedicated on the quality certification aspects. Karim and Arif-Uz-Zaman, (2014) indicated that many organizations have adopted lean manufacturing with the hope of optimizing their resources. Further, the study established that labor productivity is improving over time. Further, the study revealed that control charts are plotted to measure quality. Chauhan and Singh (2012) identify the benefits of lean manufacturing as bringing in automation, less inventory, less time wastage, and less space to produce quality products efficiently and economically.

Regarding constraints on the performance of KTDA, the study revealed that workload is well structured and distributed to production stages. Further, the study established that training on bettering production is regular and that workers are empowered, for example, through work delegation. In addition, the study established that production is sensitive to demand changes. Librelato (2014) indicated that companies must identify these limitations and eliminate them to attain smooth operations.

In relation to value stream mapping on the performance of KTDA, the study found that leaf wastages in productions are declining and that the flow of information is from bottom to top and top to bottom improves the performance of an organization. Further, the study found that the materials arriving promptly on need and high automation level of production processes lead to great performance of an organization. Mobley (2013) argues that Value Stream Mapping is a visual way of depicting and improving the flow of manufacturing and production process, also the information that controlling the flow of materials through the process.

Finally, on machine maintenance and the performance of KTDA, the study found that preventive maintenance is carried out on machine. The study further established that replacement of a malfunctioning machine or equipment is prompt and this improves

machine productivity over time. However, the study found that a regular machine downtime will lead to low production. According to Liyanage (2011) maintenance is a preventive measure that can be set up in the plant or outsourced and machine downtime can impact negatively on the performance of a plant.

# CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.1 Introduction

This chapter presents the conclusions and recommendations for practice and further research on the problem. The main objective of this study, which was to investigate the operations management practices of the KTDA managed factories. The study also sought to investigate the operational performance of the KTDA managed factories and finally to determine the relationship between operations management practices and operational performance of the KTDA managed factories.

## 5.2 Summary

The study established that there is a positive significant relationship between supply chain and performance of KTDA. The study found that production is sensitive to demand changes and that the production materials arrive promptly on need to a moderate extent. In addition, the study revealed that inventory level over the passage of time shows declining trend to a moderate extent and that the supply chain programs are regularly reviewed to a little extent.

The study revealed that there is a positive significant relationship between the operations management variables; lean management, value stream mapping, machine maintenance and the performance of KTDA. The constraints had a negative relationship to the KTDA performance.

## 5.3 Conclusion

The study aimed at identifying the operations management practices in the KTDA managed factories. It was found that the factories all practice the operations practices of supply chain, lean management, value stream mapping, constraints and machine maintenance. The operations practices and performance were analyzed using regression.

The study concluded that there was a positive significant relationship between supply chain, lean management, and performance of KTDA. Production was found sensitive to demand changes and that the arriving of production materials promptly on need to improve the performance of the KTDA. The study revealed that inventory level over the passage of time shows declining trend and that the supply chain programs are regularly reviewed. This depicts that regular reviewing of chain programs enhances production process thus improving the performance of an organization.

## 5.4 Limitations of the Study

The researcher encountered unwilling respondents to reveal information which may be classified as confidential and to minimize this, the researcher informed the respondents that the information they had offered would be treated with utmost confidentiality and a letter from the learning institution was attached to each questionnaire. The questionnaires were designed to be sent out and filled via the internet, leaving the researcher unable to answer some concerns the respondents had about filling out the questionnaire. Personal presence could have increased the response rate. These findings are more relevant to KTDA managed factories only and other factories that are privately owned or not under the management of KTDA were not included in the analysis to have a tea industry analysis.

## 5.5 Recommendations of the Study

The study revealed that supply chain management practices are applied in KTDA managed factories. It will be important for the tea factories to be urged to adopt all the practices under supply chain management in order to enhance performance. The companies should be encouraged to enhance adoption of these practices since they have the potential of improving their performance.

An increase in lean management would enhance performance of the KTDA managed factories. The study therefore recommends that quality objectives should be integrated with production objectives as this will improve labour productivity in the organization which will lead to improved performance of KTDA.

Increased constraints affect performance of KTDA negatively. The study therefore recommends that the management of various tea factories under KTDA should ensure that workload is well structured and distributed to production stages to improve the production performance of these companies. The study also recommends that all the staff involved in tea production should undergo training to better their skills in tea production process which will in turn improve the performance of the organization.

Increased value stream mapping improves the performance of KTDA. Declining leaf wastages in productions and flow of information is from bottom to top and top to bottom improves their performance of KTDA. The study thus recommends that a reliable communication channels should be enhanced among all the staff working in various organizations under KTDA which in turn will lead to accountability hence improved performance of the organization.

In relation to machine maintenance and performance of KTDA, the study revealed that preventive maintenance and replacement of a malfunctioning machine or equipment improves the production level. The study, thus recommends that all organizations under KTDA should have a skilled team to handle issues on machine maintenance and replacement as this will lead to continued production hence improved performance of the organizations.

### 5.6 Suggestion for Further Studies

The study collected data from the managerial and production assistant staff working at the KTDA managed factories. Data was collected on just five operations management variables of supply chain, lean management, value stream mapping, constraints and machine maintenance. These operations practices explained 66.3% of performance. Future studies should be directed towards identifying the other aspects affecting performance in these factories, representing 33.7% of their performance.

The study was directed only towards the tea industry. It was determined that operations management plays a major role in determining performance of the industry. There are many manufacturing industries in Kenya, dealing with various products. Future research

should be directed towards identifying the operations practices adopted in these industries and their relationship to their performance.

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# APPENDICES

## Appendix 1: Questionnaire

This questionnaire is intended to collect information aimed at understanding the practice of Operations Management in the tea industry. Honesty in responding to the questions will be highly appreciated. The information received will be treated with confidentiality and for academic purpose only.

### Section A – Employee Background

Region (East or West)…….....

Factory …….....

Year Established……

Title of Respondent …….....

### Section B - Operations Management Practices

This section aims to review the factory's operations management practices. Tick the on the box that best describes the extent to which the provided statements are practiced in your factory.

The choices are listed from 5 to 1 where: 5= Very Great Extent, 4= Great Extent 3= Moderate Extent 2= Little extent 1= Not at all.

| | **Operations management practices** | **Very Great Extent** | **Great Extent** | **Moderate Extent** | **Little extent** | **Not at all** |
|---|---|---|---|---|---|---|
| | | 5 | 4 | 3 | 2 | 1 |
| 1 | Automation of production processes is high | | | | | |
| 2 | Preventive maintenance is carried out on machines | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | Training on bettering production are regular | | | | | |
| 4 | Workers are empowered | | | | | |
| 5 | Workload is well structured and distributed to production stages | | | | | |
| 6 | Quality objectives are integrated with production objectives | | | | | |
| 7 | Quality checks are carried out on the raw materials acquired | | | | | |
| 8 | The rate of correction and repairs done is high | | | | | |
| 9 | Machine productivity is improving over time | | | | | |
| 10 | The flow of information is from bottom to top and top to bottom | | | | | |
| 11 | Production is sensitive to demand changes | | | | | |
| 12 | Control charts are plotted to measure quality | | | | | |
| 13 | Machine downtime is a regular feature | | | | | |
| 14 | Inventory level over the passage of time shows declining trend | | | | | |
| 15 | Wastages in productions are declining | | | | | |
| 16 | Replacement of a malfunctioning machine or equipment is prompt | | | | | |
| 17 | Labor productivity is improving over time | | | | | |
| 18 | The supply chain programs are regularly reviewed | | | | | |
| 19 | The materials arrive promptly on need | | | | | |
| 20 | The factory has quality certification | | | | | |

**Appendix 2: Operational Performance Data Collection Sheet**

| **Cost performance** | **Financial year** |
|---|---|
| | **2014-2015** |
| Produced kilograms in the year | |
| Total production cost for the year | |

## Appendix 3: List of KTDA Managed Factories

### Factories in the East

1 Nduti Tea Factory Co.Ltd

2 Gachege Tea Factory Co.Ltd

3 Gacharage Tea Factory Co.Ltd

4 Ikumbi Tea Factory Co.Ltd

5 Kambaa Tea Factory Co.Ltd

6 Kagwe Tea Factory Co.Ltd

7 Makomboki Tea Factory Co.Ltd

8 Mataara Tea Factory Co.Ltd

9 Ngere Tea Factory Co.Ltd

10 Njunu Tea Factory Co.Ltd

11 Theta Tea Factory Co.Ltd

12 Chinga Tea Factory Co.Ltd

13 Githambo Tea Factory Co.Ltd

14 Gathuthi Tea Factory Co.Ltd

15 Gitugi Tea Factory Co.Ltd

16 Gatunguru Tea Factory Co.Ltd

17 Iriaini Tea Factory Co.Ltd

18 Kiru Tea Factory Co.Ltd

19 Kanyenyaini Tea Factory Co.Ltd

20 Ragati Tea Factory Co.Ltd

21 Kimunye Tea Factory Co.Ltd

22 Kangaita Tea Factory Co.Ltd

23 Mungania Tea Factory Co.Ltd

24 Ndima Tea Factory Co.Ltd

25 Mununga Tea Factory Co.Ltd

26 Rukuriri Tea Factory Co.Ltd

27 Thumaita Tea Factory Co.Ltd

28 Kathangariri Tea Factory Co.Ltd

29 Githongo Tea Factory Co.Ltd

30 Imenti Tea Factory Co.Ltd

31 Kiegoi Tea Factory Co.Ltd

32 Kionyo Tea Factory Co.Ltd

33 Kinoro Tea Factory Co.Ltd

34 Michimikuru Tea Factory Co.Ltd

35 Weru Tea Factory Co.Ltd

36 Igembe Tea Factory Co.Ltd

37 Kuri Tea Factory Co.Ltd

**Factories in the West**

1 Kapkoros Tea Factory Co.Ltd

2 Kapset Tea Factory Co.Ltd

3 Litein Tea Factory Co.Ltd

4 Mogogosiek Tea Factory Co.Ltd

5 Momul Tea Factory Co.Ltd

6 Tegat Tea Factory Co.Ltd

7 Kapkatet Tea Factory Co.Ltd

8 Gianchore Tea Factory Co.Ltd

9 Kebirigo Tea Factory Co.Ltd

10 Kiamokama Tea Factory Co.Ltd

11 Nyamache Tea Factory Co.Ltd

12 Nyansiongo Tea Factory Co.Ltd

13 Nyankoba Tea Factory Co.Ltd

14 Ogembo Tea Factory Co.Ltd

15 Sanganyi Tea Factory Co.Ltd

16 Tombe Tea Factory Co.Ltd

17 Chebut Tea Factory Co.Ltd

18 Kapsara Tea Factory Co.Ltd

19 Mudete Tea Factory Co.Ltd

20 Rorok Tea Factory Co.Ltd

21 Kobel Tea Factory Co.Ltd

22 Itumbe Tea Factory Co.Ltd

23 Totor Tea Factory Co.Ltd

24 Chelal Tea Factory Co.Ltd

25 Rianyamwamu Tea Factory Co.Ltd

26 Tirgaga Tea Factory Co.Ltd

27 Eberege Tea Factory Co.Ltd

28 Kaptumo Tea Factory Co.Ltd