CAPACITY UTILISATION AND EFFICIENCY IN THE KENYAN TEA MANUFACTURING INDUSTRY

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DECLARATION

This research project is my original work and has not been presented for an academic award in any other institution of higher learning.

Signature..... Date..8th Nov 2012.....

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This research project has been submitted for examination with my approval as the University Supervisor.

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DEDICATION

I dedicate this research project to Keegwa and Boisabi I thank God for the blessing that you are. To my husband Edgar and my parents, thanks for holding my hand along the way.

ABSTRACT

This study sought to find out the relationship that exists between capacity utilisation and the organisation's efficiency in tea manufacturing and factors that determine the capacity utilisation and efficiency in tea manufacturing. Organisations are increasingly faced with the challenge of reconciling capacity of resources with business performance. With increased competition in almost all industries, organisations are striving to remain relevant and to have a competitive edge. Organisations are likely to capacity utilisation as a key measure of their performance efficiency because maintaining production capacity usually involves high level fixed costs, capacity utilisation is closely linked to production efficiency – a decline in utilisation might signal a problem with efficiency and also because too high a level of capacity utilisation might signal that a business cannot take full advantage of demand for its products and services.

The study adopted a descriptive survey design. The population of the study involved all tea manufacturers in Kenya. The study used primary data. A structured questionnaire was used to elicit perceptions, feelings and attitudes of the respondents. Respondents were presented with descriptive statements in likert scale and required to rate scoring extent to which they perceive a particular statement describes the variable. The questionnaire was administered through drop and pick and email method. Descriptive analysis was used to summarise and tabulate measurements of proportions, frequencies, percentages and associations or relationships. The data was tabulated using computer packages such as SPSS.

From the findings, the respondents indicated that change in weather patterns and equipment downtime highly affected business wastage. The respondents also indicated that change in weather patterns very highly affected the competitive advantage. The study collates with the literature review where Pieterse (2006) argues that efficiency measures should be used to identify waste, deficient problem areas as well as identify how best to stabilize the operating environment.

The respondents also indicated that by having a fluid not rigid business strategy and a bit of diversification to business close to tea in operation. Due to lack of enough time and financial

resources, the study focused on a sample of the tea manufacturers to gain an understating of the perception tea manufacturers had on capacity utilisation and efficiency.

The study concludes that government policy in the introduction of new taxes and lesser subsidy, power supply, inflation rate, interest rate, various types of tea clones, tea making experience, global oil prices and engineering services affected capacity utilisation rate in the tea manufacturing industry and other agricultural based organisations. The study further concludes that rigidity to change, capacity building strategy, skills upgrading, power ,supply, inflation rate, interest rate, auction prices, compliance to various standardization requirements, labor unrest, machine plucking and market dynamics affected the efficiency of tea manufacturing industry and other agricultural based organisations.

The study recommends that agricultural companies should increase their capacity flexibility in order to try and minimize costs at a time of low production and then be able to ramp up capacity in order to absorb the often high raw material that comes in during flash seasons. This way, they can still cancel out the effects of low production periods. This also goes hand in hand with improving and modernizing factory equipment, which is bound to increase efficiencies and cut cost, as well as train their employees in order to improve their quality of labour to cope with more modern machines and embrace new programs like TPM.

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ABBREVIATIONS

ANOVA	-	Analysis of Variance
BOL	-	Best Operating Level
CBK	-	Central Bank of Kenya
EU	-	European Union
GL	-	Green Leaf
KTDA	-	Kenya Tea Development Agency
KTGA	-	Kenya Tea Growers Association
IT	-	Information Technology
MSE	-	Medium and Small Enterprises
STDEV	-	Standard Deviation
TPM	-	Total Productive Maintenance
USA	-	United States of America
UTKL	-	Unilever Tea Kenya Limited
UTT	-	Unilever Tea Tanzania
VS	-	Versus

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Organisations are increasingly faced with the challenge of reconciling capacity of resources with business performance. With increased competition in almost all industries, organisations are striving to remain relevant and to have a competitive edge. Palmer and Torgerson (1999), support that economists' argument that the achievement of greater efficiency from resources should be a major criterion for priority setting.

Stochastic production frontier models have been used extensively to analyze efficiency of firms operating in agriculture and other industries (Kumbhakar and Lovell 2000). It is generally found that many firms fail to operate with full efficiency. One measure of the extent of an individual firm's inefficiency is excess capacity, defined as the difference between the frontier output for the firm's input vector and actual output of the firm (Fare, Grosskopf, and Kokkelenberg 1989). Blair (2005) emphasizes that capacity management is the bedrock of efficiency.

The Merriam – Webster Dictionary (2010) defines efficiency as the quality or degree of being efficient. It further defines efficiency as an efficient operation. Reps (1978) defines an efficient operation as the day by day, hour by hour, accomplishment of specified results, with minimum resources, or accomplishing maximum results with specified available resources. Potocan (2006) states that efficiency can be defined as the quantity of resources per result unit further stating that it presents the level of different goals achievement within the limited available resources. Borodoli (1999) summarises one of the contribution of capacity analysis being that improved efficiency is obtained in minimizing excess capacity and in achieving a smoother utilisation of capacities. Hosen, et al(2011) in the paper on the pharmaceutical industry, cited that there was increasing managerial pressure on managing capacity utilisation which is very important for the efficient operation of an organisation.

Capacity Utilisation and Efficiency

Capacity utilisation is a concept in economics which refers to the extent to which an enterprise or an organisation uses its installed productive capacity (Berndt and Morrison 1981). Capacity

utilisation thus refers to the relationship between actual output that is produced with the installed equipment and the potential output which could be produced with it if capacity was fully used. A firm's level of capacity utilisation determines how much fixed costs should be allocated per unit so as a firm's capacity utilisation increases the fixed costs per unit will decrease. It therefore follows that a firm should be most efficient if it is running at 100% capacity utilisation (Sheikh and Moudud, 2004).

As much as it is ideal for organisations to operate at full capacity the real situation is that this is not always achievable. Some of the reasons for this include new competitors taking market share, fall in market demand or seasonal demand like in the tourism industry (Riley, 2008). For agricultural based industries who are mainly dependant on favourable weather patterns for their resource inputs, the main cause of having a low capacity utilisation rate would be due to unfavourable climatic conditions resulting to reduced inputs and raw material.

Riley (2008) however also argues that a potential drawback to a firm running at full capacity is that there may not be enough time for routine maintenance so machine breakdowns may frequently occur. They also argue that firms in expanding markets are better able to cope with new orders if operating at low capacity utilisation. On the other hand he outlines challenges of operating at low capacity utilisation such as higher fixed costs per unit resulting in reduced profitability, likelihood of portraying a negative image to customers as the organisation is no longer busy as well as possible loss of morale for the staff.

In economic statistics, capacity utilisation is normally surveyed for goods producing industries at plant level. The results are presented as an average percentage rate by industry and economy wide where 100% denotes full capacity. This rate is also sometimes called the "operating rate". If the operating rate is high, this is called over capacity, while if the operating rate is low, a situation of "excess capacity" or "surplus capacity" exists (Crotty,2002). In order to adapt plant capacities to varying input resources, organisations can focus on capacity flexibility so as to save on costs incurred resulting from surplus capacity. Capacity flexibility may be achieved through flexible plants, flexible processes, flexible workers and also using capacities of other organisations where applicable (Chase et al., 2003).

One of the most important economic aspects in ensuring the competitiveness of a firm or a sector is the degree of efficiency in production (Gumbau – Albert and Maudos, 2000).To economists efficiency is a relationship between ends and means (Heyne,1990). When a situation is called efficient, it is claimed that the desired end could be achieved with less means or that the means employed could produce more of the ends desired. The writer further suggests that efficiency is measured not by the relationship between the physical quantities of ends and means, but by the relationship between the value of the ends and the value of the means. No matter what kind of a business a company is in, it must invest in assets to perform its operations. Efficiency ratios measure how effectively the company utilizes these assets as well as how well it manages its liabilities (Heyne,1990).

Mohamed et al (1999) in their attempt to find a relationship between capacity utilisation and efficiency in the European banking industry established that a significant excess capacity of approximately 15% to 20% on average continues to exist at the end of the period in the three European countries France, Germany and Italy. The writers also found no clear correlation in capacity utilisation and efficiency in the short run, over capacity does not clearly result in inefficiency in the short run. The writers however say that in the long run the relationship between capacity utilisation and efficiency is clearer where excess capacity explains a significant part of the long run costs inefficiency of the French and German banking industries.

Randiki (2000) attempted to fill the gaps identified by examining capacity utilisation decisions and factors influencing these decisions in small garment enterprises in the Nairobi City Council markets as well as examine the capacity management practices of MSEs in Nairobi. The study found out that managing capacity is only one of them which many have not yet considered to exploit and yet it has a lot of potential for growth.

In his study, Ochieng (2005) sought to establish Kenya Airways capacity management strategies for this expansion program. The researcher wanted to establish strategies for enhancing operations efficiency at Kenya Airways and consequently challenges in the Airline Industry. The researcher established that 56% of Kenya Airways Operations had the right capacity which was achieved mainly by a radical change and benchmarking of its decentralized operations.

Kenyan Tea Manufacturing Industry

The tea industry is one of Kenya's top foreign exchange earners. Approximately 93% of the country's tea production is being exported to various destinations worldwide (Tea Board of Kenya, 2009) The various tea producers have varying factory capacity depending on the size and location of the organisation as well as the technological investment that the respective organisations have made in their factories. Some of these organisations have their own tea plantations such as UTKL, James Finlay, whereas others depend solely on small holder and out grower farmers, specifically K.T.D.A.

Tea industry records indicate that most factories operate at 80% to 90% of their production capacity at a time however this decreases from time to time through the various seasons within the year. With the current occurrence of global warming, and the recent incidences of drought that have been experienced in Kenya, many tea producing organisations have had to run their operations with one or two of their factories remaining shut for more than half the production year. Between 2007 and 2009 tea production reduced by about 15% due to the dry spells in the North Rift and extreme cold conditions in the East of Rift. The end of 2010 saw the increase in the cash crop by approximately 27% (Tea Board of Kenya, 2011).

Kenya's tea industry has enjoyed good fortunes in recent years to register record growth. This is amply reflected in 2007 and 2010 impressive performances that saw the country produce record volumes to earn unprecedented revenues. The success of the tea industry has been achieved out of consistent effort and determination of stakeholders working in collaboration with the Tea Board of Kenya and the Government. This partnership has taken us through the historical development of the tea industry since introduction of tea into this country in 1903. Since then, we have travelled through legal, regulatory and production milestones, each step yielding positive results. Among the notable milestones include commencement of commercial cultivation in 1924, establishment of the Tea Board of Kenya in 1950 as the apex body for the industry and the freedom granted to indigenous Kenyans to grow tea in 1963. While the journey has not been without any challenges, it is the outcome that gives us more reason to be proud. Today the Kenya tea industry stands tall as a key pillar for the country's socio-economic development and a source of livelihood to millions of Kenyans (Tea Board of Kenya, 2011).

There are 105 registered tea manufacturers in Kenya as per the Tea Board of Kenya. The Tea Board of Kenya is mandated to license tea manufacturing factories; carry out of research on tea through its technical arm, the Tea Research Foundation of Kenya; the register growers, buyers, brokers, packers, management agents and any other person dealing in tea; and promote Kenya tea in both the local and the international markets. The Board also disseminates information relating to tea and advises the Government of all policy matters regarding the tea industry (Tea Board of Kenya, 2011).

1.2 Statement of the Problem

Organisations are likely to consider capacity utilisation as a key measure of their performance efficiency because maintaining production capacity usually involves high level fixed costs, capacity utilisation is closely linked to production efficiency – a decline in utilisation might signal a problem with efficiency and also because too high a level of capacity utilisation might signal that a business cannot take full advantage of demand for its products and services.

Excess capacity poses one of the most pressing problems that arise when industries exploit common-pool natural resources. It entails over-investment in the capital stock and excessive use of variable inputs, and places additional exploitation pressures on the resource stocks. Confusion persists over the appropriate definition and measurement of capacity and capacity utilisation for these industries. But understanding capacity and its measurement is necessary to properly design a capacity management program (Kirkley, Paul and Squires, 2002).

With the recent changes in climatic conditions; fluctuating temperatures and unpredictable rainfall patterns resulting to reduced farm productivity, most tea producing organisations find it a challenge to operate at their optimum capacity. Most tea manufacturers appear to have varying capacity utilisation rates resulting from the changing seasonality. From about 2006 Unilever Tea Kenya Ltd has had to shut at least two of their smaller factories for more than six months in a year. The company's other factories remain operational for approximately 75% of the year with some down time allowed for maintenance. Due to insufficient green leaf intake, one of these two factories in question has had to be permanently closed since the third quarter of this year (UTKL, 2009).

This raises the question as to whether it is financially viable for tea producing organisations to hold on to factories that are not fully utilised and also whether this varying capacity utilisation experienced by these organisations can be better managed so as to improve their productivity and efficiency. The question is on the coping mechanisms these organisations need to employ when raw material undershoots or overshoots the factory capacity.

If organisations engaged in ideal capacity planning and capacity utilisation rate, where they are able to match as closely as possible their capacity to their business requirements and prevailing production dynamics, they would be more than likely to realise an improvement in their efficiency. This improved efficiency would translate into customer loyalty and satisfaction, increased market share, increased profits and generally business growth. This is most definitely a position all businesses and organisations would like to be in (Lansik, 2009).

To this far, no known local or international study to the researcher has focused on capacity utilisation rate and efficiency studying within the tea manufacturers in Kenya. This study sought to determine the relationship between capacity utilisation and efficiency within the tea manufacturing industry in Kenya whilst being a modest attempt to bridge the gap built by the passage of time with major changes occurring in the operating environment and performance of companies. The study was guided by the following research questions:

i. What relationship exists between capacity utilisation rate and efficiency within the tea manufacturing industry?
ii. What factors determine the capacity utilisation rate?

1.3 Research Objectives

i. To establish the relationship that exists between capacity utilisation and the organisation's efficiency in tea manufacturing
ii. To establish the factors that determine the capacity utilisation and efficiency in tea manufacturing

1.4 Value of the Study

The study will highlight how tea manufacturers in Kenya will be able to manage their capacity utilisation, in spite of the challenges to increase their efficiency and gain competitive advantage within the industry.

The study will be of benefit to other agricultural based industries as they will have a better approach to their capacity utilisation considering the seasonality factor of the input resources.

The case study will add to the existing body of knowledge in operations management, more specifically to the study of capacity utilisation and will pave way for further research studies.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter summarizes the information from other researchers who have carried out their research in the same field of study. The specific areas covered here are capacity management, strategic capacity building, best operating level, capacity flexibility, business agility, efficiency, capacity utilisation, the balanced score card, bench marking, commitment of resources, challenges faced by the tea industry and a summary of the chapter.

2.2 Capacity Management

Capacity in the Oxford English dictionary is defined as the ability to hold, receive, store or accommodate. Reginald (2002), states that the capacity of an organisation represents its ability to do work and that it can be manifested in many ways including space, labour, equipment, technology and materials. He also states that companies buy the capacity to do work. (Chase, Jacobs and Aquilano2003), define capacity as the amount of output a system is capable of achieving over a specified period of time. Managing capacity is one of the most under estimated and poorly performed activities in organisational management. This involves measuring the amount of what the organisation has and uses to perform work. Various forms of capacity are combined to do work. The total capacity of an organisation is determined by how it combines and utilizes the capacity it has purchased to do work (Reginald, 2000).

Blair (2005) emphasises that capacity management is the bedrock of efficiency. He further states that it is one of the most important aspects of managing an organisation because apart from representing a significant majority of a firm's cost capacity represents a large amount of a firm's assets. Managing capacity impacts on the firm's overall ability to operate and perform and if capacity is improperly managed, it may limit the firm's cash flow.

To successfully tackle the issue of capacity management, organisations must understand fully the constraints of capacity. These constraints should be entirely avoided and should they occur, organisations should be able to totally eradicate them before their effects on a business are severe. In capacity management there are usually two potential constraints namely: Time and

Capacity. Time may be a constraint where a customer has a particular required delivery date. In this situation, capacity managers often plan backwards. In other words, they allocate the final stage (operation) of the production tasks to the period where delivery is required; the penultimate task one period earlier and so on. This process helps identify whether there is sufficient time to meet the production demands and whether capacity needs to be increased albeit temporarily. Capacity may be a constraint where the organisation/factory does not have the machinery, space, raw materials or even the human resource to fulfil the customer's requirement (Wisner, Tan and Leong, 2008).

The unused capacity in production facilities, distribution channels, marketing organisations, and so on are ordinarily not assigned to products or services on case-and-effect basis, so their inclusion in overhead rates may distort pricing decisions. Including the fixed costs of unused capacity in a cost-based price results in higher prices and in what is known as the downward (black hole) demand spiral (Siegel and Shim, 2006).

2.3 Strategic Capacity Planning

Strategic capacity planning is an approach for determining the overall capacity level of capital intensive resources including facilities, equipment and overall labour force size that best supports the firm's long range competitive strategy. (Chase, Jacobs and Aquilano (2003) state that these plans constrain the firm on volume and variety to deliver to the market. An increasing number of industrial companies are forced to reorganise their capacity planning as today's competitive environment renders traditional methods obsolete. Capacity planning plays a key role and is a precondition when rapid and cost efficient adjustments of capacity to market fluctuation are necessary (Bakke and Hellberg, 1993).

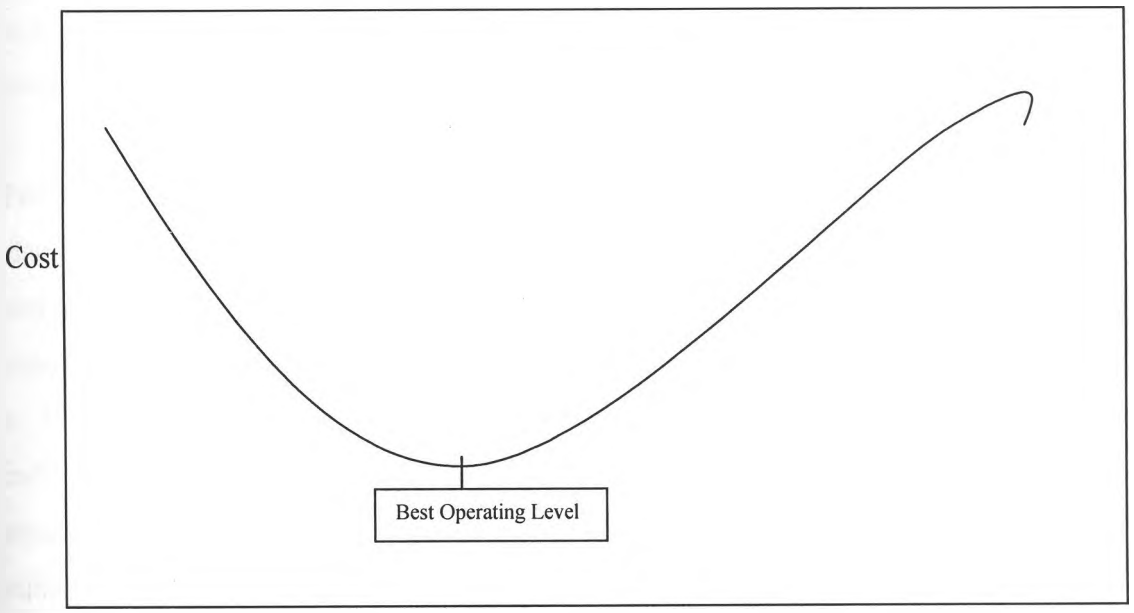
Capacity planning is generally viewed in three perspectives based on the duration for which those plans are made. Long range capacity plans are those for 2 – 5 years. These capacity plans are based on the productive resources. These plans take a long time to acquire and need top management participation and approval. Intermediate capacity plans are Monthly or quarterly plans for the next 6 to 18 months. The decisions made here include hiring, layoffs, new tools, minor equipment purchases and subcontracting. Short range capacity plans are for durations

lasting less than a month. Capacity issues here are addressed through overtime, personnel transfers and production routines (Wisner et al., 2008).

2.4 Best Operating Level

Capacity planning in itself has different meaning to individuals at different levels within the operations management hierarchy. However, when looking at capacity, operations managers need to look at both resource input and product outputs. The best operating level is the capacity for which the process was designed and is the level of capacity for which the average unit cost is minimized. BOL would be achieved by having capacity flexibility which can be attained by having a combination of flexible plants, flexible processes, flexible workers and strategies that use the capacity of other organisations (Chase et al.,2003).

Figure 2.1 Best Operating Level



Source: Chase R. B., Jacobs F. R., Aquilano N.J., (2003) Operations Management for Competitive Advantage Tenth Edition pp 220-285, Tata McGraw – Hill Publishing Ltd

2.5 Business Agility

Business agility is the ability of a business to adapt to a dynamic environment and changing customer needs. Businesses constantly seek ways to improve themselves, whether the goal is to increase shareholder value, increasing customer satisfaction, increasing revenues or reducing

costs. Today's global economy and market conditions require that companies in all areas optimise their performance in all areas. The requirement for continuous improvement drives the need for business agility. A company that can sense and react to changes in its internal and external environment more quickly than another can seize new revenue opportunities and control costs more efficiently than its competitors. First to market may not always be attractive, but first to react based upon sound judgement is always a positive (Evans, 2002).

2.6 Capacity Utilisation

This is the production by a company of a particular quantity of output using the minimum number of inputs. It is a situation where it is impossible for a firm to produce, with the given know how, a larger output from the same inputs, same output with less of one or more input without increasing the amount of other input. It is a concept which refers to the extent to which an enterprise or a state that a nation actually uses its installed productive capacity. Thus, it refers to the relationship between actual output produced with the installed equipment and he potential output which could be produced with it if capacity was fully used (Shaikh et al, 2004).

Perelman (1989), states that there has been debate among economists about the validity of statistical measures of capacity utilisation because much depends on the survey questions asked and on the valuation principles used to measure output. Also, the efficiency of production may change over time, sue to new technologies. Berndt and Morrison (2009), further state that prior to 1980s, American businesses carried a great deal of extra capacity. Running close to 80% indicated at the time of approaching capacity restraints. Since that time, firms have scrapped much of their most inefficient capacity. As a result, a 77% capacity utilisation now would be equivalent to a historical level of 70%.

Chase et al.,(2003), state that implicitly the capacity utilisation rate is an indicator of how efficiently the factors of production are being used. They also show that the capacity utilisation rate is calculated using the below formula:

Capacity utilisation rate = (Capacity used / Best operating level) x 100

Statistical evidence shows many industries in the developed capitalist economies suffer from chronic excess capacity. Critics of market capitalism therefore argue the system is not as efficient as it may seem since at least 1/5 more output could be produced and sold, if buying power was better distributed. However, a level of utilisation somewhat below the maximum prevails, regardless of economic conditions. The average utilisation rate of installed productive capacity in industry, in some major areas of the world was estimated in 2003/2004 as follows: USA – 79.7%, Japan 83 – 86%, EU – 82% Australia – 81%, Brazil 60 – 80%, India 70%, China 60%, Turkey – 79.8% and Canada 87% (Shaikh et al .2004). With the varying utilisation rates, it is not exactly clear at what rate maximum efficiency is achieved. The definition of capacity, in an operations management context, makes no distinction between efficient and inefficient uses of capacity.

In the USA, the Federal Reserve Board constructs estimates for capacity and capacity utilisation for industries in manufacturing, mining and electric and gas utilities. For a given industry, the capacity utilisation rate is equal to an output index (seasonally adjusted) divided by a capacity index. The Federal Reserve's Board capacity indexes attempt to capture the concept of sustainable maximum output – the greatest level of output a plant can maintain within the framework of a realistic work schedule, after factoring normal downtime and assuming sufficient availability of inputs to operate the capital in place. The current capacity utilisation rate within the USA manufacturing industry stands at 78.9% (Federal Reserve Statistical Release, 2012).

Vrouvas (2011), identifies the factors affecting the utlisation rate as: equipment in use, work force, and availability of goods (raw materials). She further explains that the concept of capacity utilisation rate, assumes that entities, like companies, industries or even countries, can operate at a certain production level. The percentage of that total production level they actually reach is quantified into the Capacity Utilisation Rate, expressed as a percentage. Murkhejee et al (2012) attempted to identify a suitable method of estimating capacity utilisation in Indian industries through a comparative analysis of the time series and survey method and a study of the international practices. The findings of the study reveal that time series estimates of capacity utilisation can capture the business cycle fluctuations and the inflationary pressures in the economy fairly well.

Factors affecting capacity utilisation

It is a general phenomenon that developing countries are not only in shortage of capital stock but are also characterised with the existence of ideal stock in capital. Taking an example of Pakistan, the rate of capacity utilisation is quite low (Rukhsana, 1998). Owing to the scarcity of capital in developing countries it is suggested that better utilisation of the existing capacity would not only increase output and employment but will also reduce capital intensity (Winston, 1971). In his attempt to identify the factors affecting capacity utilisation in the Pakistan manufacturing industry, Rukhsana (1998), established load shedding as a major factor affecting the capacity utilisation rate.

Chase et al (2003), state that level of automation affects the utilisation rate of an organisation. They further state that minimising equipment downtime is essential in operations with large capacity pieces of equipment providing an example of M & M Mars as being highly automated where a packaging line moves 2.6 million M & Ms each hour. Even though the direct labour to operate the equipment is very low, the labour required to maintain the equipment is high.

Capacity flexibility means having the ability to rapidly increase or decrease production levels, or to shift production capacity quickly from one product or service to another. Such flexibility is achieved through flexible plants, processes and workers as well as through strategies that use the capacity of other organisations (Chase et al., 2003). Flexible systems may alleviate the unfavourable effects of supply and demand uncertainties; however they require higher investment costs compared to dedicated systems (Ceryan, 2009).

The ultimate in plant flexibility is the zero-changeover time plant. Using movable equipment, knockdown walls, and easily accessible and re-routable utilities, such a plant can quickly adopt to change. Flexible processes are epitomised by flexible manufacturing systems on one hand and simple, easily set up equipment on the other. Both of these technological approaches permit rapid low-cost switching from one product line to another, enabling what are sometimes referred to as the economies of scope; this means that multiple products can be produced at a lower cost in combination than they separately can. Flexible workers have multiple skills and the ability to switch easily from one kind of task to another. They require broader training than specialized

workers and need managers and staff support to facilitate quick changes in their work assignments (Chase et al., 2003).

In their paper on capacity and capacity utilisation in common-pool resource industries, Kirkley, Paul and Squires (2002), the writers define a sequence of technological-economic definitions of capacity and excess capacity for fishing industries. They established that for capacity utilisation in the fishing industry, number of days fished was a primary constraint on capacity output rather than resource levels or even capital characteristics although evaluating production at stock levels at the margin or outside the range of observed values amplifies the stock effect.

2.7 Efficiency

The best day to day operational measures are efficiency and availability (Pieterse, 2006). It is a ratio between the inputs and outputs. Bordoli (1999) defines efficiency from an operations management perspective as the level of total cost incurred.

Efficiency = (Total Output/Total Input) x 100

In the past efficiency as a measure had been discounted because it was argued that an over-emphasis on efficiency can lead to negative long term performance High efficiency ratios lead to a lack of agility. Process engineers accept that there is a point in any system beyond which efficiency reduces its sustainability. Two preconditions exist for measuring efficiency; Firstly, efficiency has to operate within the context of another performance measure like return on investment or effectiveness and secondly efficiency must be measured relative to a standard (Pieterse, 2006).

Efficiency measures should be used to identify waste, deficient problem areas as well as identify how best to stabilize the operating environment (Pieterse, 2006). Business efficiency is a situation in which an organisation maximises benefit and profit whilst minimising effort and expenditure. Maximisation of business efficiency is a balance between two extremes and managed correctly reduces costs, waste and redundancy (Webster Dictionary, 2009). Max Weber, who developed the concept of the bureaucracy, believed that efficiency was the goal of

all bureaucratic organisations, which were designed to run like smooth machines. The greater the efficiency, the more impersonal, rational and emotionally detached a bureaucracy becomes. The flatter organisations more prevalent today attempt to be more customer-responsive than efficient in this sense, and the notion of such an ordered and impersonal efficiency has lost favour in an era when creativity and innovation are valued as a competitive advantage (Kilcullen, 1999).

In an attempt to analyse the efficiency in the Indian manufacturing industry Dimitriu and Savu (2010) state that the performance in the manufacturing sector, in relation to productivity growth, scale efficiency and technical efficiency in India is dichotomous in nature depending on whether the firm in question functions in the formal or informal sector. The writers concluded that there had been a decline in the efficiency for the industries in the unorganised sector and the government's intervention was required to improve the productivity and efficiency in the unorganised sector.

In their attempt to identify the determinants of efficiency in the Spanish industry, Gumbau – Albert and Maudos, (2000) established that efficiency increases with the size of the firm and with the greater volume of investment made and that efficiency increases in those firms that are most subjected to the pressure of external completion. The writers also established that on the other extreme, the lower levels of efficiency are manifested by firms operating in more concentrated markets where there is presumably less completion and by firms with greater public participation in the firm's capital.

2.8 Benchmarking

Bench marking is the practice of being humble enough to admit that someone else is better at something and being wise enough to learn how to match them and even surpass them at it. Andersen et al., (1999), point out that measurement of own and the benchmarking of partners' performance level is useful both for comparison and for registering improvements. Lysons and Gillingham (2003), go ahead to state that benchmarking provides information on what standards must be surpassed in order to achieve competitive advantage.

External benchmarking enables the organisation to examine what industry competitors and excellent performers outside of the industry are doing. Benchmarking mainly two steps: Identifying processes needing improvement and data analysis. For the first step, the organisation needs to identify a firm that is the world leader in performing a certain process or practise. For many processes, this may be a company that is not in the same industry. The second step entails looking at gaps between what the organisations under study is doing what the benchmarking company is doing. This study entails comparing the actual processes and comparing the performance of these processes according to a set of measures (Chase et al., 2003).

2.9 Commitment of Resources

An irreversible commitment of resources is defined as the loss of future options. It applies primarily to non-renewable resources, such as minerals or cultural resources, and to those factors that are renewable only over long time spans, such as soil productivity. Irretrievable commitments represent the loss of production, harvest, or use of renewable resources. These opportunities are foregone for the period of the proposed action, during which other resource utilisation cannot be realized. These decisions are reversible, but the utilisation opportunities foregone are irretrievable (Griffin, 2001).

Commitment of resources in many agricultural industries and the tea industry specifically, can be seen as irretrievable commitment. This is normally a long term process involving a lot of planning and top management level decision making. Resources are committed into assets like tea plantations, factories, pilot plants (for research and development purposes), employees and so on. It is therefore a very challenging situation when the investments, specifically factory investments, are not used for the due purpose to generate income as they were intended to; hence loss in production. Decisions have to be made on how to turn around the situation so as to channel the invested resources to a more profitable venture and enhance business efficiency. (Kenya Tea Growers Association 2010)

2.10 The Tea Industry

The Tea industry is one of Kenya's top foreign exchange earners. Approximately 93% of the country's tea production is being exported to various destinations worldwide (Tea Board of

Kenya, 2010) The various tea producers have varying factory capacity depending on the size and location of the organisation as well as the technological investment that the respective organisations have made in their factories. Some of these organisations have their own tea plantations such as UTKL, James Finlay, whereas others depend solely on small holder and out grower farmers, specifically K.T.D.A.

Tea industry records indicate that factories' operating capacities decrease or increase from time to time through the various seasons within the year. With the current occurrence of global warming, and the recent incidences of droughts and floods that have been experienced in Kenya, many tea producing organisations have been unable to properly plan for their production capacities. Between 2007 and 2009 tea production reduced by about 15% due to the dry spells in the North Rift and extreme cold conditions in the East of Rift and approximately half of the tea manufacturers had to run their operations with one or two of their factories remaining shut for more than half the production year. (Tea Board of Kenya 2009). The end of 2010 saw the increase in the cash crop by approximately 27%, with a few players in the industry struggling to cope due to insufficient capacity (Tea Board of Kenya 2011).

Challenges faced in the Tea Industry

Being an agricultural based industry, the tea industry is heavily dependent on the seasonal patterns within the year and climatic changes from time to time. Natural calamities such as drought, frost impact very negatively on the crop production reducing the volumes by a significant amount. During the hot and dry season, the crop production is very low, forcing organisations to operate at about 50% of their total capacity. The drought experienced in 2006 and 2007, took a toll on the tea producers where most of them were operating at about 20% of their total capacity. Whereas 2010 a record tea production year, saw many producers throw away their green leaf due to insufficient capacity. The prevalent weather conditions characterised by unpredictable rainfall patterns and temperatures has resulted in fluctuating tea production. Modern technology in tea production, without a reciprocating increase in raw material, in some seasons, is also a challenge to tea producers as these results in excess manufacturing capacity. UTKL upgraded one of its key factories, with advanced manufacturing machinery, enabling it to approximately double its original handling capacity (UTKL, 2009).

The influence of the Collective Bargaining Agreement has brought forth an increase in labour costs and this has been a major challenge in the tea industry. Many producers have been forced to lay off some of their workers and venture into mechanised operations as a way of reducing their costs of production. As well, past increases in fertilizer costs have resulted to some tea producers having to skip fertilizer application seasons resulting in decreased productivity and less tea production (Tea Board of Kenya, 2011).

On a large scale basis, both locally and internationally, the tea trade is carried in the US dollar currency. Depending on the country's state of inflation, this can result in either exchange gains or exchange earnings for the tea producers. In 2009 and 2010 the exchange rates were mixed with the Kenya Shilling starting out strong against the major currencies and then weakening towards the close of the year, whereas 2011 has seen a very weak Kenya shilling, currently at KSH 93.7 against 1USD (CBK 2011). In addition, the original tea buying markets are getting saturated at a faster rate than that at which new markets are opening up (Tea Board of Kenya, 2011).This means that the tea industry is very competitive and the players within need to operate efficiently in order to retain a competitive edge.

2.11 Summary of Literature Review

In the local studies, Randiki (2000) identified managing capacity as one of the factors which many have not yet considered to exploit and yet it has a lot of potential for growth in the MSEs. Ochieng (2005) sought to establish Kenya Airways capacity management strategies for this expansion program and established that the airlines operations have the right capacity which was achieved mainly by a radical change and benchmarking of its decentralized operations.. The study however, recommended further increase in capacity beyond the current level by addressing some of its shortfalls by hiring and training more technical and flight crew meant to improve the current low level of quality assurance and customer focus while sustaining a high level of safety and efficiency bound to deteriorate with time.

Internationally, Federal Reserve Statistical Release (2012), indicated the current capacity utilisation rate within the USA manufacturing industry stood at 78.9% , we also see that in the Indian manufacturing industry Dimitriu and Savu (2010) stated that the performance in the

manufacturing sector, in relation to productivity growth, scale efficiency and technical efficiency in India is dichotomous in nature depending on whether the firm in question functions in the formal or informal sector and in the Spanish industry, Gumbau – Albert and Maudos, (2000) established that efficiency increases with the size of the firm and with the greater volume of investment made and that efficiency increases in those firms that are most subjected to the pressure of external completion.

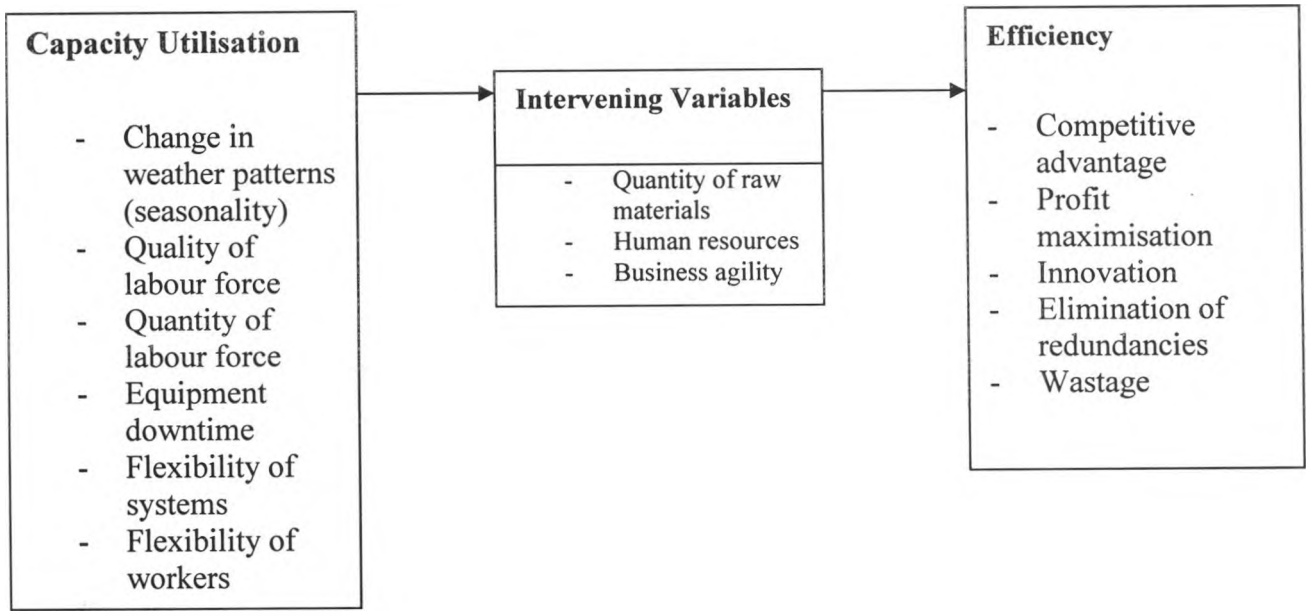
The foregoing analysis shows that there is gap in establishing the ideal capacity utilisation rates in agricultural based industries both in Kenya and internationally. The varying capacity utilisation rates in different countries also underscores that there is a knowledge gap in making a clear distinction between efficient and inefficient use of capacity and this is worth addressing through further research. To address this gap in the literature, this particular study has been conducted to specifically explore the factors affecting the utilisation rates in the tea industry and the impact of the same on the organisation's efficiency.

2.12 Conceptual Framework

Capacity utilisation in a firm is mainly affected by levels of automation, quality and quantity of labour used, equipment downtime, agility and flexibility of systems and workers. In the tea manufacturing industries capacity utilisation rate is greatly affected by the seasonality of its inputs which results in very low and very high capacity utilisation rates. The result in this relationship determines the efficiency of the organisation which can be measured by the level of the organisation's wastage, competitive positioning, benchmarking, profit maximisation innovations and omission of redundancies.

Figure 2.2: Conceptual Framework

Independent Variable **Dependent Variable**



CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methods that were employed to provide answers to the research questions in this study as listed in chapter one. The following aspects of research methodology were discussed; research design, study population, research instruments, validity and reliability, data collection procedure and data analysis.

3.2 Research Design

This study adopted a descriptive survey design which according to Churchill (1991) is appropriate where the study seeks to describe the characteristics of certain groups, estimate the proportion of people who have certain characteristics and make predictions. Khan (1993) recommends descriptive survey design for its ability to produce statistical information about aspects of education that interest policy makers and researchers.

Descriptive survey research designs are used in preliminary and exploratory studies to allow researchers to gather information and summarize, present and interpret data for the purpose of clarification Orodho (2003). According to Mugenda and Mugenda (2003) the purpose of descriptive research is to determine and report the way things are and it helps in establishing the current status of the population under study. The descriptive survey design was chosen for this study due to its ability to ensure minimization of bias and maximization of reliability of evidence collected. Furthermore, descriptive survey design raises concern for the economical completion of the research study. The method is rigid and focuses on the objectives of the study (Gay 1992).

3.3 Population

The population of the study involved all tea manufacturers in Kenya. Kenya has 105 companies involved tea production according to directory of tea manufacturers in Kenya (Tea Board of Kenya, 2011).

3.4 Sampling and Sampling Procedure

Purposive sampling was used. There is no cap of how many informants should make up a purposive sample so long as the needed information is obtained. Seidler (1974) studied different samples of informants and found that at least 5 informants were needed for the data to be relevant. Best and Khan (1993) warn that there is no fixed number of percentages of subjects that determine the size of an adequate sample. Best and Khan (1993) state the ideal sample is large enough to serve as an adequate representation of the population about which the researcher wishes to generalize and small enough to be selected economically in terms of subject availability, expense in terms of time and money and complexity of data analysis. A sample of 60 companies was selected. This was tabulated using the Raosoft sample size calculator, with a margin error of 3%, confidence level 95% and response distribution of 50%. The selection was done based on the companies' 2011 volume production. The source of this information was the Tea Board of Kenya and the top 60 tea producing companies selected.

It is especially important to be clear on informant qualifications when using purposive sampling (Allen 1971). The respondents were operations managers who are individuals knowledgeable with the questions at hand, literate and in management level.

3.5 Data Collection Procedure

The study used primary data. A structured questionnaire was used to elicit perceptions, feelings and attitudes of the respondents. Respondents were presented with descriptive statements in likert scale and required to rate scoring extent to which they perceive a particular statement describes the variable. The questionnaire was administered through drop and pick and email method. The questionnaire, divided into three parts A, B and C, was intended to be self-administered to reduce interviewer bias. Part A of the questionnaire sought employment information. Part B and C address various aspects of capacity utilisation rate and efficiency.

3.6 Data Analysis

The initial step in the data analysis was to edit the raw data to ensure accuracy, consistency, uniformity and completeness. Descriptive analysis was used to summarise and tabulate measurements of proportions, frequencies, percentages and associations or relationships.

Descriptive techniques employ factual information about a situation to provide an understanding of performance levels. This is supported by the works of Ngau (2004). Charts and graphs supplemented statistical analysis as these were particularly appropriate for comparison of nominal data. The latter was used largely to present secondary data.

The mean, mode, median and standard deviation were the main tools for data evaluation. To check the relationship between capacity utilisation and efficiency non regression analysis was carried out. Sykes (2000) states that regression analysis is a tool for the investigation of relationships between variables where usually the investigator seeks to ascertain the causal effect of one variable over another. The data was tabulated using SPSS and content analysis.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents analysis and findings of the study as set out in the research methodology. The study findings are presented to establish the factors that determine the capacity utilisation and efficiency in the Kenyan tea manufacturing industry.

4.2 Response Rate

In-depth information was gathered from operations managers who were individuals knowledgeable with the questions at hand, literate and in management level. 60 responses out of 83 questionnaires representing 72% of the population were received.

4.3 Demographic information

60% of the respondents indicated that their area of operation was in the factory while 40% of the respondents indicated that their area of operation was in the supply chain. 60% of the respondents indicated that they had worked in the tea industry for more than 14 years while 40% of the respondents indicated that they had worked in the tea industry for between 5-14 years. 38% of the respondents indicated that they were in the senior and middle management respectively while 24% of the respondents indicated that they were in the non- management respectively, 80% of the respondents indicated that they had prior experience on working in a factory while 20% of the respondents indicated that they didn't have any prior experience on working in a factory, 40% of the respondents indicated that they had prior experience of between 0-12 months and 1-10 years respectively while 20% of the respondents indicated that they had prior experience of between 11-20 years. 80% of the respondents indicated that their organisation was privately owned while 20% of the respondents indicated that their organisation was publicly owned. All the respondents indicated that their organisation made annual tea production of between 250000-50000 tonnes.

4.4 Capacity Management Dynamics

Table 4. 1: Respondents were asked to indicate the level of agreement with the following statements on capacity management dynamics

Statement	Mean	Stdev
What is your current factory utilisation?	3.4	0.8
What percentage of time in the year does your factory remain shut for scheduled maintenance?	1.2	0.4
What percentage of time in the year does your factory remain shut for unscheduled maintenance?	1.0	0.0
What is your targeted factory utilisation?	2.0	1.2
What is your minimum acceptable capacity utilisation for a factory to remain operational?	2.4	0.5
What is your maximum allowable factory utilisation?	2.2	0.4
By what percentage does factory capacity utilisation affect your service delivery to customers?	2.2	1.1
By what percentage does your factory capacity utilisation affect your overall business effectiveness?	2.6	1.3
By what percentage does your capacity utilisation influence your business waste?	2.4	1.1
By what percentage does your capacity utilisation affect your ROI?	3.2	1.1
your factory is agile (ability to switch between processes and products)?	2.2	1.1

According to the findings the respondents indicated that their current factory utilisation was between 71-80% as indicated by a mean of 3.4,the respondents indicated that their capacity utilisation affected their ROI by a percentage of between 51-60% as indicated by a mean of

3.2,the respondents indicated that factory capacity utilisation affected their overall business effectiveness by a percentage of between 51-60% as indicated by a mean of 2.6,the respondents indicated that their capacity utilisation influenced their business waste and that is their minimum acceptable capacity utilisation for a factory to remain operational was by a percentage of between 51-60% as indicated by a mean of 2.4 respectively, the respondents indicated that their maximum allowable factory utilisation, that the factory capacity utilisation affected their service delivery to customers and that their factory was agile (ability to switch between processes and products by a percentage of between 51-60% as indicated by a mean of 2.2, the respondents indicated that their targeted factory utilisation was of a percentage of between 51-60% as indicated by a mean of 2.0,the respondents indicated that their factory remained shut for scheduled maintenance for a time percentage of Below 50% as indicated by a mean of1.2 ,finally, the respondents indicated that their factory remained shut for unscheduled maintenance for a time percentage of Below 50% as indicated by a mean of 1.0.

These findings relate with the literature review where Blair (2005) emphasises that capacity management is the bedrock of efficiency. He further states that it is one of the most important aspects of managing an organisation because apart from representing a significant majority of a firm's cost capacity represents a large amount of a firm's assets. Managing capacity impacts on the firm's overall ability to operate and perform and if capacity is improperly managed, it may limit the firm's cash flow.

From the findings in Table 4.2., the respondents indicated that change in weather patterns and equipment downtime highly affected business wastage as indicated by a mean of 4.40 respectively, the respondents indicated that quality of labor highly affected business wastage as indicated by a mean of 4.00, the respondents indicated that levels of automation very highly affected business wastage as indicated by a mean of 3.80, the respondents indicated that flexibility of workers and quantity of labor averagely affected business wastage as indicated by a mean of 3.60 respectively, the respondents indicated that flexibility of systems averagely affected business wastage as indicated by a mean of 3.20.

4.5 Possible Remedies and analysis of variables

Table 4.2: The respondents were asked to indicate to which extent they felt the following factors impact an organisation's efficiency

	Mean	Stdev
Business Wastage		
Change in weather patterns	4.40	1.30
Quality of labour	4.00	0.70
Quantity of labour	3.60	1.10
Equipment Downtime	4.40	0.90
Flexibility of workers	3.60	0.90
Flexibility of systems	3.20	1.10
Levels of Automation	3.80	1.30
Competitive Advantage		
Change in weather patterns	4.40	0.90
Quality of labour	4.20	0.80
Quantity of labour	3.20	1.50
Equipment Downtime	3.80	0.80
Flexibility of workers	3.80	1.10
Flexibility of systems	3.40	1.10
Levels of Automation	3.80	1.30
Profit Maximisation		
Change in weather patterns	4.60	0.90
Quality of labour	4.20	0.80
Quantity of labour	3.40	1.50
Equipment Downtime	3.60	1.30
Flexibility of workers	3.60	0.90
Flexibility of systems	4.00	0.70
Levels of Automation	4.40	0.90

Innovation		
Change in weather patterns	2.80	1.50
Quality of labour	4.20	1.10
Quantity of labour	3.60	1.10
Equipment Downtime	3.00	1.20
Flexibility of workers	3.00	1.20
Flexibility of systems	3.20	1.10
Levels of Automation	4.00	1.00
Elimination of redundancies		
Change in weather patterns	3.80	0.80
Quality of labour	3.40	0.90
Quantity of labour	3.00	1.20
Equipment Downtime	3.40	0.90
Flexibility of workers	3.80	0.80
Flexibility of systems	4.00	1.00
Levels of Automation	3.20	1.10

The respondents also indicated that change in weather patterns very highly affected the competitive advantage as indicated by a mean of 4.40, the respondents indicated that quality of labor highly affected the competitive advantage as indicated by a mean of 4.20, the respondents indicated that equipment downtime, flexibility of workers and levels of automation very highly affected the competitive advantage as indicated by a mean of 3.80 respectively, the respondents indicated that Flexibility of systems averagely affected the competitive advantage as indicated by a mean of 3.40,finally the respondents indicated that Quantity of labor highly affected the competitive advantage as indicated by a mean of 3.20.

The respondents further indicated that change in weather patterns very highly affected the profit maximization as indicated by a mean of 4.60, the respondents indicated that levels of automation very highly affected the profit maximization as indicated by a mean of 4.40, the respondents indicated that quality of labor highly affected the profit maximization as indicated

by a mean of 4.20, the respondents indicated that flexibility of systems highly affected the profit maximization as indicated by a mean of 4.00, the respondents indicated that equipment downtime and flexibility of workers averagely affected the profit maximization as indicated by a mean of 3.60 respectively. Finally, the respondents indicated that quantity of labor highly affected the profit maximization as indicated by a mean of 3.40.

Moreover, the respondents indicated that quality of labor very highly affected innovation as indicated by a mean of 4.20, the respondents indicated that levels of automation very highly affected innovation as indicated by a mean of 4.00, the respondents indicated that quantity of labor highly affected innovation as indicated by a mean of 3.60, the respondents indicated that flexibility of systems averagely affected innovation as indicated by a mean of 3.20,finally, the respondents indicated that equipment downtime and flexibility of workers averagely affected innovation as indicated by a mean of 3.00.

Finally, the respondents indicated that flexibility of systems highly affected elimination of redundancies as indicated by a mean of 4.00, the respondents indicated that change in weather patterns and flexibility of workers very highly affected elimination of redundancies as indicated by a mean of 3.80 respectively, the respondents indicated that quality of labor and equipment downtime averagely affected elimination of redundancies as indicated by a mean of 3.40 respectively, the respondents indicated that levels of automation averagely affected elimination of redundancies as indicated by a mean of 3.20,finally, the respondents indicated that Quantity of labor averagely affected elimination of redundancies as indicated by a mean of 3.00.

Factors Affecting Capacity Utilisation in the Tea Manufacturing Industry and other Agricultural Based Organisations: The respondents indicated that government policy in the introduction of new taxes and lesser subsidy, power supply, inflation rate, interest rate, various types of tea clones, tea making experience, global Oil prices and engineering services affected capacity utilisation rate in the tea manufacturing industry and other agricultural based organisations.

Factors Affecting the Efficiency of Tea Manufacturing Industry and other Agricultural Based Organisations: The respondents indicated that rigidity to change, capacity building strategy,

skills upgrading, power ,supply, inflation rate, interest rate, auction prices, compliance to various standardization requirements, labor unrest, machine plucking and market dynamics affected the efficiency of tea manufacturing industry and other agricultural based organisations.

Factors Affecting Capacity Utilisation that are Very Specific to the Organisation: The respondents indicated that lack of reliable power supply lead to failure in production which in turn leads to poor capacity utilisation and that introduction of mechanization in tea harvesting with reduced leaf quality and the need to upgrade machinery to cope with this reduced leaf quality are some of the factors that affected capacity utilisation specifically in their organisation.

Factors Affecting Efficiency that Are Very Specific to the Organisation: The respondents indicated that old machinery and equipment downtime which lead to loss of production, hence poor capacity utilization, were some of the factors affecting efficiency specifically in their organisation.

Key Drivers to Efficiency in the Tea Industry: The respondents indicated that quality of machinery, quality of labour, business strategy, volume vs price for tea industry, cost management, quality of capex, process automation, skilled labour, innovation, Consistent power supply, leaf transport system and balanced capacity were some of the key drivers to efficiency in the tea industry.

Changes That the Company Should Make To Further Enhance Its Efficiency: The respondents indicated that the company to enhance its efficiency it should purchase newer, modern machinery, offer continuous training of labor force, Introduce focus improvement programs e.g. TPM, align business strategy of volume vs. prices to reality in the market place and improve on quality of capex.

How Other Players Manage their Capacity Utilisation Rate : The respondents indicated that agricultural companies will have increased their capacity flexibility in order to try and minimize costs at a time of low production and then be able to ramp up capacity in order to absorb the often high raw material that comes in during flash seasons. This way, they can still cancel out the

effects of low production periods. This also goes hand in hand with improving and modernizing factory equipment, which is bound to increase efficiencies and cut cost, as well as train their employees in order to improve their quality of labour to cope with more modern machines and embrace new programs like TPM. The respondents also indicated that by having a fluid not rigid business strategy and a bit of diversification to business close to Tea in operation.

4.6 Regression Analysis

The researcher conducted a linear multiple regression analysis so as to test the relationship among variables (independent) on efficiency(competitive advantage, profit maximisation ,innovation, elimination of redundancies, wastage).The researcher applied the statistical package for social sciences (SPSS) to code, enter and compute the measurements of the multiple regressions for the study.

Table 4. 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.826[a]	.890	.145	.3678

Source: Research, 2011

Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable :(efficiency) that is explained by all the six independent variables: capacity utilisation (Change in weather patterns (seasonality), quality of labour force, quantity of labour force, Equipment downtime, Flexibility of systems, Flexibility of workers). The six independent variables that were studied, explain only 89.0% of the efficiency as represented by the R^2. This therefore means that other factors not studied in this research contribute 11.0% of the efficiency. Therefore, further research should be conducted to investigate on capacity utilisation and efficiency in the Kenyan tea manufacturing industry. From the ANOVA Table 4.4 the significance value is .0077 which is less that 0.05 thus the model is statistically significant in predicting capacity utilisation. The F critical at 5% level of significance was 3.23. Since F

calculated is greater than the F critical (value = 48.500), this shows that the overall model was significant.

Table 4. 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.456	9	2.786	48.500	.0077
	Residual	120.456	51	2.123		
	Total	132.912	60			

Table 4. 5: Coefficient of determination

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant	3.980	1.987		0.789	0.256
	Quality of labour force	2.765	0.233	0.167	1.109	0.005
	Quantity of labour force	1.876	0.145	0.098	0.898	0.002
	Equipment downtime	1.324	0.098	0.156	0.979	0.004
	Flexibility of systems	0.998	0.023	0.294	0.334	0.032
	Flexibility of workers	0.789	0.043	0.229	0.556	0.001
	Change in weather patterns (seasonality)	0.457	0.012	0.234	0.634	0.003

Source: Research, 2011

The researcher conducted a multiple regression analysis so as to determine the relationship between efficiency and the six variables. As per the SPSS generated table 4.13, the equation ($\mathbf{Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \varepsilon}$) becomes:

$Y=3.980+2.765X_1+ 1.876X_2+ 1.324X_3+ 0.998X_4 + 0.789\ X_5+0.457\ X_6$

Where Y is the dependent variable (efficiency), X_1 is the Quality of labour force, X_2 is Quantity of labour force variable, X_3 is equipment downtime, X_4 is the Flexibility of systems, X_5 Flexibility of workers and X_6 is change in weather patterns (seasonality).

According to the regression equation established, taking all factors into account (Change in weather patterns (seasonality), Quality of labour force, Quantity of labour force, Equipment downtime, Flexibility of systems, Flexibility of workers) constant at zero, efficiency will be 3.980. The data findings analyzed also show that taking all other independent variables at zero, a unit increase in Quality of labour force will lead to a 2.765 increase in efficiency ,a unit increase in Quantity of labour force will lead to a 1.876 increase in efficiency, a unit increase Equipment downtime will lead to a 1.324 increase in efficiency, a unit increase in Flexibility of systems will lead to a 0.789 increase in efficiency and a unit increase in Change in weather patterns (seasonality) will lead to 0.457 increase in efficiency . This infers that Quality of labour force contributes more to the efficiency followed by the Quantity of labour force.

At 5% level of significance and 95% level of confidence, Quality of labour force had a 0.005 level of significance; Quantity of labour force showed a 0.002 level of significant, Equipment downtime at 0.004 level of significant, Flexibility of systems had a 0.032 level of significant, Flexibility of workers 0.001 and Change in weather patterns (seasonality) had 0.003 level of significance hence the most significant factor is Flexibility of systems.

4.7 Discussions

The study collates with the literature review where Pieterse (2006) argues that efficiency measures should be used to identify waste, deficient problem areas as well as identify how best to stabilize the operating environment. Business efficiency is a situation in which an organisation maximises benefit and profit whilst minimising effort and expenditure. Maximisation of business

efficiency is a balance between two extremes and managed correctly reduces costs, waste and redundancy. The greater the efficiency, the more impersonal, rational and emotionally detached a bureaucracy becomes. The flatter organisations more prevalent today attempt to be more customer-responsive than efficient in this sense, and the notion of such an ordered and impersonal efficiency has lost favour in an era when creativity and innovation are valued as a competitive advantage.

CHAPTER FIVE: SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides the summary of the findings from chapter four, and it also gives the conclusions and recommendations of the study based on the objectives of the study. The objective of this study was to establish the factors that determine the capacity utilisation and efficiency in the Kenyan tea manufacturing industry.

5.2 Summary of the Findings

The study aimed at establishing the factors that determine the capacity utilisation and efficiency in the Kenyan tea manufacturing industry.

Capacity Management Dynamics

The study found out that the respondents indicated that their current factory utilisation was between 71-80% as indicated by a mean of 3.4,the respondents indicated that their capacity utilisation affected their ROI by a percentage of between 51-60% as indicated by a mean of 3.2,the respondents indicated that factory capacity utilisation affected their overall business effectiveness by a percentage of between 51-60% as indicated by a mean of 2.6,the respondents indicated that their capacity utilisation influenced their business waste and that is their minimum acceptable capacity utilisation for a factory to remain operational was by a percentage of between 51-60% as indicated by a mean of 2.4 respectively, the respondents indicated that their maximum allowable factory utilisation, that the factory capacity utilisation affected their service delivery to customers and that their factory was agile (ability to switch between processes and products by a percentage of between 51-60% as indicated by a mean of 2.2, the respondents indicated that their targeted factory utilisation was of a percentage of between 51-60% as indicated by a mean of 2.0,the respondents indicated that their factory remained shut for scheduled maintenance for a time percentage of Below 50% as indicated by a mean of1.2 finally, the respondents indicated that their factory remained shut for unscheduled maintenance for a time percentage of Below 50% as indicated by a mean of 1.0.

Possible Remedies

The study found out that the respondents indicated that change in weather patterns and equipment downtime highly affected business wastage as indicated by a mean of 4.40 respectively, the respondents indicated that quality of labor highly affected business wastage as indicated by a mean of 4.00, the respondents indicated that levels of automation very highly affected business wastage as indicated by a mean of 3.80, the respondents indicated that flexibility of workers and quantity of labor averagely affected business wastage as indicated by a mean of 3.60 respectively, the respondents indicated that flexibility of systems averagely affected business wastage as indicated by a mean of 3.20.

The respondents also indicated that change in weather patterns very highly affected the competitive advantage as indicated by a mean of 4.40, the respondents indicated that quality of labor highly affected the competitive advantage as indicated by a mean of 4.20, the respondents indicated that equipment downtime, flexibility of workers and levels of automation very highly affected the competitive advantage as indicated by a mean of 3.80 respectively, the respondents indicated that Flexibility of systems averagely affected the competitive advantage as indicated by a mean of 3.40,finally the respondents indicated that Quantity of labor highly affected the competitive advantage as indicated by a mean of 3.20.

The respondents further indicated that change in weather patterns very highly affected the profit maximization as indicated by a mean of 4.60, the respondents indicated that levels of automation very highly affected the profit maximization as indicated by a mean of 4.40, the respondents indicated that quality of labor highly affected the profit maximization as indicated by a mean of 4.20, the respondents indicated that flexibility of systems highly affected the profit maximization as indicated by a mean of 4.00, the respondents indicated that equipment downtime and flexibility of workers averagely affected the profit maximization as indicated by a mean of 3.60 respectively. Finally, the respondents indicated that quantity of labor highly affected the profit maximization as indicated by a mean of 3.40.

Moreover, the respondents indicated that quality of labor very highly affected innovation as indicated by a mean of 4.20, the respondents indicated that levels of automation very highly

affected innovation as indicated by a mean of 4.00, the respondents indicated that quantity of labor highly affected innovation as indicated by a mean of 3.60, the respondents indicated that flexibility of systems averagely affected innovation as indicated by a mean of 3.20,finally, the respondents indicated that equipment downtime and flexibility of workers averagely affected innovation as indicated by a mean of 3.00.

Finally, the respondents indicated that flexibility of systems highly affected elimination of redundancies as indicated by a mean of 4.00, the respondents indicated that change in weather patterns and flexibility of workers very highly affected elimination of redundancies as indicated by a mean of 3.80 respectively, the respondents indicated that quality of labor and equipment downtime averagely affected elimination of redundancies as indicated by a mean of 3.40 respectively, the respondents indicated that levels of automation averagely affected elimination of redundancies as indicated by a mean of 3.20,finally, the respondents indicated that Quantity of labor averagely affected elimination of redundancies as indicated by a mean of 3.00.

5.3 Conclusions

The study concludes that government policy in the introduction of new taxes and lesser subsidy, power supply, inflation rate, interest rate, various types of tea clones, tea making experience, global oil prices and engineering services affected capacity utilisation rate in the tea manufacturing industry and other agricultural based organisations.

The study further concludes that rigidity to change, capacity building strategy, skills upgrading, power ,supply, inflation rate, interest rate, auction prices, compliance to various standardization requirements, labor unrest, machine plucking and market dynamics affected the efficiency of tea manufacturing industry and other agricultural based organisations.

Finally, the study concludes that lack of reliable power supply lead to failure in production which in turn lead to poor capacity utilisation and that introduction of mechanization in tea harvesting with reduced leaf quality and the need to upgrade machinery to cope with this reduced leaf quality are some of the factors that affected capacity utilisation specifically in their organisation.

5.4 Recommendations

The study recommends that agricultural companies should increase their capacity flexibility in order to try and minimize costs at a time of low production and then be able to ramp up capacity in order to absorb the often high raw material that comes in during flash seasons. This way, they can still cancel out the effects of low production periods. This also goes hand in hand with improving and modernizing factory equipment, which is bound to increase efficiencies and cut cost, as well as train their employees in order to improve their quality of labour to cope with more modern machines and embrace new programs like TPM. The respondents also indicated that by having a fluid not rigid business strategy and a bit of diversification to business will help to increase productivity in the tea manufacturing operations.

5.5 Limitations of the Study

Due to lack of enough time and financial resources, the study focused on a sample of the tea manufacturers to gain an understating of the perception tea manufacturers had on capacity utilisation and efficiency. It was also acknowledged that respondents' bias had been an inevitable part of the study given that the employees were required to give a judgment on their performance. This was however be minimized by encouraging anonymous responses.

5.6 Recommendations for Further Research

This study has investigated the factors that determine the capacity utilisation and efficiency in the Kenyan tea manufacturing industry. To this end therefore a further study should be carried out to assess the challenges faced in determining the capacity utilisation and efficiency. Moreover, a further study should be carried out on other industries to find out if the same results will be obtained.

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APPENDICES

Appendix I: Letter of Introduction

Anne Kilimatinde,
P.O BOX 18674-00500,
Nairobi, KENYA.
Dear Respondents,

RE: DATA COLLECTION

This questionnaire is designed to a survey of **capacity utilisation and efficiency in the Kenyan Tea Manufacturing Industry.** The information provided by the organisations will enable me to make conclusions concerning the above subject.

Please note that the study will be conducted as academic research and the information you provide will be treated in strict confidence. Strict ethical principles will be observed to ensure confidentiality and the study outcomes and report will not include reference to any individuals or organisations, in order to ensure comprehensive analysis of the findings, it is important that each questionnaire to be completed and returned.

The researcher requests that you kindly spare the next 10 minutes to complete the attached questionnaire.

Thank you in advance for your co-operation.

Yours Faithfully,

Anne Kilimatinde

Appendix II: Questionnaire

Instructions: ***Kindly complete the following questionnaire using the instructions provided for each set of question. Tick appropriately.***

Confidentiality: ***The responses you provide will be strictly confidential. No reference will be made to any individual(s) or organisation in the report of the study.***

Part A

Please write or tick where appropriate.

1. Please indicate by a tick (√) your area of operation. (Tick one)

Factory ( )
Estate ( )
Customer Development ( )
Supply Chain ( )

2. How many years have you been working in tea industry? (Tick one).

Less than 5 years ( )
5 to 14 years ( )
Above 14 years ( )

3. Please indicate your job level (Tick one)

Non Management ( )
Lower to Middle Management ( )
Senior Management ( )

4. Please indicate if you have had any experience working in a factory (Tick one)

Yes ( )
No ( )

If yes, please state for how long.....

5. Please indicate if your organisation is privately or publicly owned (Tick one)

Publicly Owned ( )

Privately Owned ( )

6. What is the size of your organisation in terms annual made tea production (in tonnes).....

Part B: Capacity Management Dynamics

7. Please tick (√) in the appropriate box to indicate the level to which you agree or disagree with the below statements.

1) Below 50% 2) 51-60% 3) 61-70% 4) 71-80% 5) 81- 100%

	Item	**1**	**2**	**3**	**4**	**5**
1	What is your current factory utilisation?					
2	What percentage of time in the year does your factory remain					
3	What percentage of time in the year does your factory remain shut for unscheduled maintenance?					
4	What is your targeted factory utilisation?					
5	What is your minimum acceptable capacity utilisation					
6	What is your maximum allowable factory utilisation?					
7	By what percentage does factory capacity utilisation					
8	By what percentage does your factory capacity utilisation					

	affect your overall business effectiveness?					
9	By what percentage does your capacity utilisation influence					
10	By what percentage does your capacity utilisation affect your ROI?					
11	What percentage of your factory is agile (ability to switch between processes and products)?					

PART C: Possible Remedies

8. Below are some factors affecting capacity utilisation; please indicate to which extent you feel these factors impact your organisation's efficiency, where efficiency is being measured by business wastage, profit maximization, competitive advantage, innovation and reduction of redundancies

1. Very Low 2. Low 3. Average 4. High 5. Very High

		Rate				
	Business Wastage	1	2	3	4	5
a)	Change in weather patterns					
b)	Quality of labour					
c)	Quantity of labour					
d)	Equipment Downtime					
e)	Flexibility of workers					
f)	Flexibility of systems					
g)	Levels of Automation					
	Competitive Advantage					
a)	Change in weather patterns					
b)	Quality of labour					
c)	Quantity of labour					

d)	Equipment Downtime					
e)	Flexibility of workers					
f)	Flexibility of systems					
g)	Levels of Automation					
	Profit Maximisation					
a)	Change in weather patterns					
b)	Quality of labour					
c)	Quantity of labour					
d)	Equipment Downtime					
e)	Flexibility of workers					
f)	Flexibility of systems					
g)	Levels of Automation					
	Innovation	1	2	3	4	5
a)	Change in weather patterns					
b)	Quality of labour					
c)	Quantity of labour					
d)	Equipment Downtime					
e)	Flexibility of workers					
f)	Flexibility of systems					
g)	Levels of Automation					
	Elimination of redundancies					
a)	Change in weather patterns					
b)	Quality of labour					
c)	Quantity of labour					
d)	Equipment Downtime					
e)	Flexibility of workers					
f)	Flexibility of systems					
g)	Levels of Automation					

9. Please any other factors, not listed in Q1 above, you feel affect capacity utilisation rate in the tea manufacturing industry and other agricultural based organisations. (Rank according to significance)

a) .....

b) .....

c) .....

10. Please list any other factors, not listed in Q1 above, you feel affect the efficiency of tea manufacturers and other agricultural based organisations?

a) .....

b) .....

c) .....

11. Are there any factors affecting capacity utilisation rate that you feel are very specific to your organisation?

If your answer is yes to this, please explain

.....

.....

.....

12. Are there any factors affecting efficiency that you feel are very specific to your organisation.?

If your answer to this is yes, please explain

.....

.....

13. In your opinion what are the key drivers to efficiency in the tea industry (Rank according to priority)

a).....

b).....

c).....

14. What changes do you feel your company should make to further enhance its efficiency?

.....

.....

.....

15. In your opinion, how best do you think other players in the tea and entire agricultural based industry can manage their capacity utilisation rate to adapt to varying production dynamics in order retain efficiency?

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THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION