EFFECTIVENESS OF LEAN SIGMA STRATEGY ON CONTINUOUS IMPROVEMENT AT GLAXOSMITHKLINE

BY

FREDRICK M. WAFUKHO

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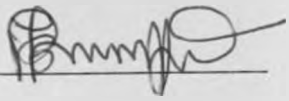
DECLARATION

This management project is my original work and has not been submitted for another degree qualification from this or any other University or institution of learning.

Signature  Date: 15/11/2011

Fredrick M Wafukho

REG NO. D61/7112/2006

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

Signature  Date: 19/11/11

Supervisor

Dr. Gakuru

Department of Business Administration

Faculty of Commerce

School of Business

University of Nairobi

DEDICATION

I dedicate this project to my family for their continued support, love and encouragement. You all are a true blessing and I love you very much. Thank you and God bless you abundantly.

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I am truly grateful to all the people who assisted me in various ways in order to complete this study. First I am very thankful to God for enabling me to be in good health and being able to carry out the project successfully. Many thanks also go to my supervisor Dr. Gakuru for dedicating his time and effort to guide me. This undertaking would not have been possible without his comments, advise, criticism and suggestions. I would like to say a big thank you to my parent Mary N. Wafukho, my children and my beloved wife Flora Fedha Mukhwana whose love, belief, encouragement and prayer were invaluable and of great support to my successful completion of this project. I cannot forget the respondents who enabled me collect data that I needed.

ABSTRACT

Lean Sigma strategy implementation has improved organizations and delivered savings and continuous improvement in performance. GlaxoSmithKline is one of the leading pharmaceutical companies with about 180 employees and product portfolio in the category of oral care and emulsions, over the counter medicines, nutritional health drinks and prescription products. To better its way of doing business and align to the current practices and environmental change, the organization has continued to change through Mergers and introduction and subsequent implementation of Lean Sigma continuous improvement strategy.

The research used a case study research design to establish the effectiveness of Lean Sigma strategy on continuous improvement at GlaxoSmithKline. Both primary and secondary sources of data were used to obtain information for the study. Respondents were eight (8) employees with each from production, supply and logistics, Engineering, quality and compliance, operational excellence departments, one works council representative, the site director and general manager consumer. The researcher used descriptive and content analysis to analyze the data. This is because content analysis involves observation and detailed description. The research findings show that GlaxoSmithKline has a strategic plan which consists among others Lean Sigma implementation which was introduced in 2002 and effectively delivered performance improvement in waste reduction, financial savings, overall equipment effectiveness, stock availability to customers, quality, productivity, culture change, knowledge sharing and communication, empowerment of employees as well as reduction in customer complaints. The strategy brought together two cultures brought about by the merger integration of the former Smith Kline Beecham and Glaxo welcome into one culture. Indeed tangible savings were achieved and hence improvement in the bottom line of the business. The management believes Lean Sigma plays a big role in achievement of GlaxoSmithKline strategic intent. Lean Sigma strategy should be proactively extended to marketing, sales and distribution. A related study could be carried out using the entire population to get each and every one's feedback on Lean Sigma strategy.

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CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Lean Sigma is a customer-focused, enterprise change strategy to deliver accelerated results that creates rapid transformational improvement in customer service delivery, Quality and cost. Lean sigma is an innovative combination of two process disciplines that have revolutionized modern business - lean production and Six Sigma continuous improvement. Lean production is an improvement approach to improve flow and eliminate waste (Toyota, 1950). The concept dates back in 1950s and was developed by Toyota. Lean is basically about getting the right things to the right place, at the right time, in the right quantities, while minimizing waste and being flexible and open to change. Lean brings into many industries, including healthcare, new concepts, tools and methods that have been effectively utilized to improve process flow. Lean tools that address workplace organization, standardization, visual control and elimination of non-value added steps are applied to improve flow, eliminate waste and exceed customer expectations. The aim of lean production is to totally eliminate waste, or "muda", which can arise in seven forms – Defects, overproduction, Transportation, Waiting, Inventory, Motion and Processing time. Six Sigma continuous improvements seek to eliminate variation in processes. The term *Six Sigma* originated from a terminology associated with manufacturing, specifically terms associated with statistical modeling of manufacturing processes. The maturity of a manufacturing process can be described by a *sigma* rating indicating its yield, or the percentage of defect-free products it creates. A six sigma process is one which has 3.4 defects per million.

Lean Sigma uses the Define, Measure, Analyze, Improve and Control (DMAIC) approach to process improvement. The abbreviation DMAIC is the project flow of every Six Sigma effort: define the problem, understand how to measure the effects of the project, analyze the process through experimentation, and improve the processes based on the solution and put controls in place to maintain the improvement. Lean is the "IC" of DMAIC. Lean's techniques of optimizing a process fit into DMAIC as the foundation of sustaining improvements. By implementing things such as standard work, improved work patterns and better work organization, chances of falling back into the "bad" process are reduced. Lean has proven itself a good fit with Six Sigma, so it is taught throughout the levels of Six Sigma certification. Thus, Lean Sigma is a process improvement methodology that focuses on eliminating waste and reducing variation. 'Lean' refers to removing non value added steps i.e. cutting out steps that provide no benefit. The "Six Sigma" portion is statistically based and represents an occurrence rate of only 3.4 defects per million opportunities. When you combine the two, the result is a process that saves time and money and improves customer satisfaction. It is appropriate to apply the principles of Lean Sigma when working with a repeatable process. Thus, Lean Sigma provides a method to accelerate a company's decision-making processes, while both reducing production inefficiencies as well as increasing product quality. The lean manufacturing business management strategy strives to optimize an organization's production process by reducing costs during product development. Lean manufacturing considers the value of a product from a customer's perspective, and questions the necessity of all costs associated with product development. Based on principles derived from the Japanese manufacturing industry, concepts of lean manufacturing became popular after being adopted by the Toyota Motor Corporation.

1.1.1 Lean Sigma Theory

Lean Sigma is a marriage of two otherwise distinct business management strategies, lean manufacturing and Motorola's Six Sigma system. While the lean manufacturing methodology concentrates on creating more value with less work, the Six Sigma system strives to identify and eliminate defects in product development. Sigma is the Greek symbol for standard deviation. Six Sigma means six standard deviations from the average. When speaking of quality, it means 99.996 percent out of 100 percent accuracy; traditional quality calls for 99.73 percent accuracy. For some perspective, tradition quality (Three Sigma) means residents have unsafe drinking water for two hours per month. Six Sigma quality means that residents have unsafe drinking water one second every 16 years. Six Sigma is a continuous quality improvement program that is customer focused and provides a problem-solving methodology using statistical tools. Six Sigma uses steps that lead the organization through the improvement process: define measure, analyze, improve and control (DMAIC).

1.1.2 GlaxoSmithKline in Kenya

GlaxoSmithKline Nairobi site occupies about 33,000m^2 of land situated on Likoni Road in Industrial Area, and is currently home to about 180 employees. The site was originally opened in 1960's as an Over the Counter (OTC) medicine factory, producing brands such as Hedex, Panadol and gastro-intestinal powders. In 1995 the site was extended a soft credit of £2.5 million pound to expand the Nairobi consumer health care site to cater for the consolidation of manufacturing facilities upon the acquisition of Sterling Health by SmithKline Beecham. This therefore enabled the construction of the current Lucozade and Ribena fill-pack line, the installation of the Aseptic Tetrabrik machine, the current oral care

& emulsions section and the expansion of warehousing capacity. In 2002 operations were consolidated on Likoni site after the GlaxoWellcome and SmithKline Beecham merger and Pharmaceutical liquids were introduced. The site houses three business units; Global Manufacturing & Supply, Pharma and Consumer commercial. Key brands on the site portfolio are in the following categories: Over The Counter Medicines; Panadol range, Hedex range, Gastro-intestinals; Actal Tums, ENO and Andrews Liver Salt, Respiratory track; Cofta, Toothpaste; Aquafresh range and Extreme Clean, Pharmaceutical Liquids & Emulsion; Piriton expectorant and Syrup and Scotts range, Nutritional Health drinks; Lucozade energy and Ribena range both in bottle and tetrapak form.

Prior to merger integration, traditional approach to operational improvement was in use to drive Continuous Improvement. Tools mainly used were; quality control (QC), Total Quality Management (TQM), and Zero Defects. These strategies were disjointed, costly and mainly focused on cost cutting. This led to the ever increasing challenges in the environmental arena. Total Quality Management (TQM) is a management approach to long-term success through customer satisfaction. In a TQM effort, all members of an organization participate in improving processes, products, services and the culture in which they work. The methods for implementing this approach come from the teachings of such quality leaders as Philip B. Crosby, W. Edwards Deming, Armand V. Feigenbaum, Kaoru Ishikawa and Joseph M. Juran. A core concept in implementing TQM is Deming's 14 points, a set of management practices to help companies increase their quality and productivity: Create constancy of purpose for improving products and services. Adopt the new philosophy. Cease dependence on inspection to achieve quality. End the practice of awarding business on price alone; instead, minimize total cost by working with a single supplier. Improve constantly and

forever every process for planning, production and service. Institute training on the job. Adopt and institute leadership. Drive out fear. Break down barriers between staff areas. Eliminate slogans, exhortations and targets for the workforce. Eliminate numerical quotas for the workforce and numerical goals for management. Remove barriers that rob people of pride of workmanship, and eliminate the annual rating or merit system. Institute a vigorous program of education and self-improvement for everyone. Put everybody in the company to work accomplishing the transformation.

Quality control, or QC for short, is a process by which entities review the quality of all factors involved in production. This approach places an emphasis on three aspects: Elements such as controls, job management, defined and well managed processes, performance and integrity criteria, and identification of records. Competence such as knowledge, skills, experience and qualifications. Soft elements, such as personnel integrity, confidence, organizational culture, motivation, team spirit, and quality relationships. The quality of the outputs is at risk if any of these three aspects is deficient in any way. Quality control emphasizes testing of products to uncover defects and reporting to management who make the decision to allow or deny product release, whereas quality assurance attempts to improve and stabilize production (and associated processes) to avoid, or at least minimize, issues which led to the defect(s) in the first place.

Zero Defects, pioneered by Philip Crosby, is a business practice which aims to reduce and minimize the number of defects and errors in a process and to do things right the first time. The ultimate aim will be to reduce the level of defects to zero. However, this may not be possible and in practice and what it means is that everything possible will be done to eliminate the likelihood of errors or defects occurring. The overall effect of achieving zero

defects is the maximization of profitability. More recently the concept of zero defects has led to the creation and development of Six Sigma pioneered by Motorola and now adopted worldwide by many other organizations. Zero Defects approach has been criticized to be very costly.

In 2002, there was merger integration between Smith Kline Beecham and Glaxo Welcome to form GlaxoSmithKline. At the time, the organization was faced with the ever increasing challenges of intense competitor activity, reduction in growth and market share losses, tighter margins and profit erosion, execution shortfalls, in spite of solid business strategies failure to sustain gains from improvement activities and resistance to culture change essential to continuous improvement.

Lean Sigma strategy was introduced and implemented in the manufacturing site of GlaxoSmithKline in 2002 to address the ever increasing challenges. This study specifically was to find out the effectiveness of the strategy in tackling the challenges.

1.2 Research Problem

GlaxoSmithKline was faced with the ever increasing challenges of intense competitor activity, reduction in growth and market share losses, tighter margins and profit erosion, execution shortfalls, in spite of solid business strategies failure to sustain gains from improvement activities and resistance to culture change essential to continuous improvement. Lean Sigma strategy was introduced and implemented in the manufacturing site of GlaxoSmithKline in 2002 to address the ever increasing challenges. This study specifically was to find out the effectiveness of the strategy in tackling the challenges. Studies have been carried out on continuous Improvement initiatives in organizations and institutions in Kenya.

Musau (2006). "Continuous quality improvement climate survey. A case study of Colgate Palmolive Kenya" established that the total quality management improvement initiatives did not achieve significant improvement in quality and performance. Hence there was a gap as no study was conducted to establish its effectiveness on continuous improvement. Odero (2000) sought to establish the existence of non-quality situations in the training process at Kabete Technical Training college. She identified the root causes of poor examination performance in Diploma courses and came up with improvements in Total quality Management – a pre-requisite of Lean Sigma. Many organizations struggle with their continuous improvement (CI) efforts. Achieving real bottom line improvements whether in real cost savings or rising revenues has proven to be difficult. In spite of the widespread implementation of Lean and Six Sigma principles, poor results persist. That's not to say there are pockets of success; some implementations *do* deliver a competitive edge. It's just that these projects are the exception, not the rule. Continuous improvement initiatives such as Total quality management, Zero defects and quality control were in place in GlaxoSmithKline prior to merger integration in 2002, but did not achieve significant improvement in performance. This led to high cost of goods, waste, poor quality, and low sales margin. GlaxoSmithKline claimed it had implemented Lean Sigma in 2002 to meet the challenge. To the researchers' knowledge, no study has been conducted to establish the effectiveness of Lean Sigma strategy in GlaxoSmithKline in Kenya, since its inception in 2002. This study specifically was to find out the effectiveness of the strategy in tackling the challenges at GlaxoSmithKline.

1.3 Research Objective

The objective of the study was to establish the effectiveness of Lean Sigma strategy implementation on continuous improvement as adopted by GlaxoSmithKline, Kenya.

1.4 Value of the Study

From customer's perspective, the study adds value by providing what they want (quality and innovative products or services), when they want it (on time, every time), where they want it (nearest to the point of use), and at a competitive price (value driven). In other words, whenever quality, service or innovation increase while cost or time decrease, additional value is realized by the customer.

Value from an employee's perspective is a result of creating a culture of respect among employees that includes training and development focused on transforming every employee into managers of their processes and skilled problem solvers and problem preventers. By understanding non-value-adding activities and the influence of variation in their processes, highly-skilled and actively involved employees provides products and services valued by customers. The skills learnt can as well be applied at home.

From a stake holder's perspective, the study further adds value by creating long-term stability benefiting customers, suppliers, employees and owners. It includes return-on-investment and long-term wealth maximization greater than other opportunities can provide. By truly understanding value as perceived by customers (voice of the customer), and delivering products and services more effectively and efficiently than the competition, the

resulting financial gains will delight stakeholders and they will smile all the way to the bank.

Researchers; This study adds value to the field of knowledge and provides further insight in the area of Lean Sigma as a strategy to drive continuous improvement in organizations. It will also inspire other researchers to carry out research in this area.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This literature review chapter discusses issues that the study seeks to address. The chapter will specifically review literature on the various theories and concepts relating to Lean Sigma process as a continuous improvement strategy.

2.1.1 Evolution of Lean Sigma

Lean Sigma was created by merging aspects of Lean and Six Sigma, successful quality management initiatives in their own right. Each of these evolved in turn from a series of prior initiatives in different industries and companies throughout the world. Total Quality Management (TQM) continually evolved beginning in the 1950s, with a focus on process management, customer quality, and use of data and systematic procedures for understanding and resolving problems. Six Sigma grew in the 1980s, beginning at Motorola and spreading to companies including General Electric and AlliedSignal. It incorporated TQM as well as Statistical Process Control (SPC) and expanded from a manufacturing focus to other industries and processes. Lean developed from the concepts comprising the Toyota Production System (TPS): elimination of waste of all types, including excess inventory and increased process speed. It established a focus on the customer definition of value and used that to determine the proper process timing and flow. Lean Sigma Originated in the late 1990s, both AlliedSignal and Maytag independently designed programs which combined

aspects of both Lean and Six Sigma. They cross-trained employees in both methodologies, creating project frameworks that combined the two techniques.

The Toyota Production System (TPS) is an integrated socio-technical system, developed by Toyota that comprises its management philosophy and practices. The Toyota Production System (TPS) organizes manufacturing and logistics for the automobile manufacturer, including interaction with suppliers and customers. The system is a major precursor of the more generic "Lean manufacturing." Taiichi Ohno, Shigeo Shingo and Eiji Toyoda developed the system between 1948 and 1975. Originally called "Just-in-Time Production," it builds on the approach created by the founder of Toyota, Sakichi Toyoda, his son Kiichiro Toyoda, and the engineer Taiichi Ohno. The founders of Toyota drew heavily on the work of W. Edwards Deming and the writings of Henry Ford. When these men came to the United States to observe the assembly line and mass production that had made Ford rich, they were unimpressed. While shopping in a supermarket they observed the simple idea of an automatic drink re-supplier; when the customer wants a drink, he takes one, and another replaces it. The principles underlying the Toyota Production System (TPS) are embodied in The Toyota Way. The main objectives of the Toyota Production System (TPS) are to design out overburden (muri) and inconsistency (mura), and to eliminate waste (muda). The most significant effects on process value delivery are achieved by designing a process capable of delivering the required results smoothly; by designing out "mura" (inconsistency). It is also crucial to ensure that the process is as flexible as necessary without stress or "muri" (overburden) since this generates "muda" (waste). Finally the tactical improvements of waste reduction or the elimination of muda are very valuable. There are seven kinds of muda that are addressed in the Toyota Production System (TPS). These are: Defects, over-production,

Transportation (conveyance), waiting (of operator or machine), inventory (raw material), motion (of operator or machine), and processing. The elimination of waste has come to dominate the thinking of many when they look at the effects of the Toyota Production System (TPS) because it is the most familiar of the three to implement. In the Toyota Production System (TPS) many initiatives are triggered by inconsistency or overburden reduction which drives out waste without specific focus on its reduction. This system, more than any other aspect of the company, is responsible for having made Toyota the company it is today. Toyota has long been recognized as a leader in the automotive manufacturing and production industry.

Toyota received their inspiration for the system, not from the American automotive industry (at that time the world's largest by far), but from visiting a supermarket. This occurred when a delegation from Toyota (led by Ohno) visited the United States in the 1950s. The delegation first visited several Ford Motor Company automotive plants in Michigan but, despite Ford being the industry leader at that time, found many of the methods in use to be not very effective. They were mainly appalled by the large amounts of inventory on site, by how the amount of work being performed in various departments within the factory was uneven on most days, and the large amount of rework at the end of the process. However, on a subsequent visit to a Piggly Wiggly, the delegation was inspired by how the supermarket only reordered and restocked goods once they had been bought by customers. Toyota applied the lesson from Piggly Wiggly by reducing the amount of inventory they would hold only to a level that its employees would need for a small period of time, and then subsequently reorder. This would become the precursor of the now-famous Just-in-Time (JIT) inventory

system. While low inventory levels are a key outcome of the Toyota Production System, an important element of the philosophy behind its system is to work intelligently and eliminate waste so that inventory is no longer needed. Many American businesses, having observed Toyota's factories, set out to attack high inventory levels directly without understanding what made these reductions possible. The act of imitating without understanding the underlying concept or motivation may have led to the failure of those projects.

2.1.2 William Edwards Deming philosophy

Deming (October 14, 1900 – December 20, 1993) was an American statistician best known for his work in Japan. From 1950 onward, he taught top management how to improve service, product quality, testing and sales through various methods, including the application of statistical methods. Deming made a significant contribution to Japan's later reputation for innovative high-quality products and its economic power. He is regarded as having had more impact upon Japanese manufacturing and business than any other individual not of Japanese heritage. Despite being considered something of a hero in Japan, he was only just beginning to win widespread recognition in the U.S at the time of his death. The philosophy of W. Edwards Deming has been summarized as follows:

"Dr. W. Edwards Deming taught that by adopting appropriate principles of management, organizations can increase quality and simultaneously reduce costs (by reducing waste, rework, staff attrition and litigation while increasing customer loyalty). The key is to practice continual improvement and think of manufacturing as a system, not as bits and pieces."

The Deming System of Profound Knowledge "The prevailing style of management must undergo transformation". A system cannot understand itself. The transformation requires a

view from outside. It provides a map of theory by which to understand the organizations that people work in. "The first step is transformation of the individual. This transformation is discontinuous. It comes from understanding of the system of profound knowledge. The individual, transformed, will perceive new meaning to his life, to events, to numbers, to interactions between people. "Once the individual understands the system of profound knowledge, he will apply its principles in every kind of relationship with other people. He will have a basis for judgment of his own decisions and for transformation of the organizations that he belongs to. The individual, once transformed, will: Set an example and is a good listener, but will not compromise; continually teach other people; and help people to pull away from their current practices and beliefs and move into the new philosophy without a feeling of guilt about the past." Deming advocated that all managers need to have what he called a System of Profound Knowledge, consisting of four parts: *Appreciation of a system*: understanding the overall processes involving suppliers, producers, and customers (or recipients) of goods and services, *Knowledge of variation*: the range and causes of variation in quality, and use of statistical sampling in measurements, *Theory of knowledge*: the concepts explaining knowledge and the limits of what can be known, *Knowledge of psychology*: concepts of human nature. Deming offered fourteen key principles for management for transforming business effectiveness. The points were first presented in his book *Out of the Crisis.* (p. 23-24). Although Deming does not use the term in his book, it is credited with launching the Total Quality Management movement.

Deming came up with the Seven challenges often called The "Seven Deadly Diseases" they include: Lack of constancy of purpose, emphasis on short-term profits, evaluation by

performance, merit rating, or annual review of performance, mobility of management, running a company on visible figures alone, excessive medical costs and excessive costs of warranty, fueled by lawyers who work for contingency fees. "A Lesser Category of Obstacles" includes: Neglecting long-range planning, relying on technology to solve problems, seeking examples to follow rather than developing solutions, excuses, such as "our problems are different", obsolescence in school that management skill can be taught in classes, reliance on quality control departments rather than management. supervisors, managers of purchasing, and production workers, placing blame on workforces who are only responsible for 15% of mistakes where the system desired by management is responsible for 85% of the unintended consequences and relying on quality inspection rather than improving product quality. Deming's advocacy of the Plan-Do-Check-Act cycle, his 14 Points, and Seven Deadly Diseases have had tremendous influence outside of manufacturing and have been applied in other arenas, such as in the relatively new field of sales process engineering

2.2 The Concept of Strategy

The term strategy originated from a Greek word strategia which means general ship. The concept of strategy was borrowed from military and it referred to manoeuvring of troops into position to engage the enemy. Hart (1967) defined strategy as an art of distributing and applying military means to fulfil the ends of policy. This concept of strategy was adapted for use in the business world to refer to the use or combination of resources to achieve a competitive edge. Porter (1996) argued that strategy is about competitive position. He thus defined competitive strategies as "a combination of the ends (goals) for which the firm is striving and means (policies) by which it is seeking to get there. There is however no one

way of defining strategy that can be complete and satisfactory, it can be viewed in many different ways. Mintzberg (1994) captured this in his work and listed five common ways of looking at strategy, he said that strategy can be used as a plan, pattern, position, perspective or ploy. As a plan, he said that strategy can be used as a means of getting from here to there. Also that it can be seen as a pattern of action overtime. He further mentioned the use of strategy as a position that reflects decisions to offer particular products or services to a particular market. As a ploy, it can be used as a tactic or manoeuvre against competitors. Lastly he described strategy as a perspective that is giving a vision and direction to the organization. Mintzeberg argued that strategy emerged overtime and was a result of intentions colliding with changes in reality.

Another scholar Steiner (1979) said that strategy was what one did to counter competitors' actual or predicted moves. He looked at strategy from a different dimension but based it on his belief that there is no one meaning of strategy .He pointed out that strategy could be defined in various ways for example: - strategy could be looked at as that which the top management does that is of great importance to the organization .He said that strategy could be used to answer a number of questions such as what ends the organization seeks and how it should achieve them, or what the organization should be doing. Steiner said that strategy refers to the purpose and mission of an organization that is its basic directional decisions and also the important decisions necessary to realise there directions. As a result of the existence of the various dimensions of strategy, it would be more accurate to describe strategy as being a complex web of thoughts, ideas, insights, experiences, goals, expertise, memories perceptions and expectations that provide guidelines generally for specific actions in pursuits of particular ends. Thus strategy could be summarized as a means to an end.

Spany (2003) talked about strategic achievements through different levels of an organization. Strategy thus do exist at different levels of an organizational structure .At the top most level is the corporate strategy which defines the purpose and scope of the business to meet stakeholders expectations. This in essence is the mission statement which gives the general direction of the overall business. Then there are strategic decisions that are concerned with how an organization competes successfully in a particular market. These decisions fall under Business unit strategy and are concerned with the choice of products, creation and exploration of new opportunities, how customers need's can be met and generally how to gain advantage over competitors. At the lowest level is the operational strategy that focuses on issues of resources, people and processes, it is concerned with how a business organizes itself to achieve its strategy.

Strategies can be looked at as consisting of competitive moves and business approaches to produce successful performance. There are two types of strategy that is collaborative strategy and competitive strategy, collaborative strategy is where two or more organizations join forces instead of competing against each other, in order to create and build know-how into product innovation. Competitive strategy is the strategy a firm chooses to defend itself against outside forces. Porter (1980) suggested generic strategies that could be adopted in order for organization to gain competitive advantage. These strategies are: Cost leadership, differentiation, focus or market segmentation. In this strategy the organization seeks to gain competitive advantage through effectiveness rather than efficiency.

Treacy and Wiesema, (1993) modified porters generic strategies to come up with value disciplines that create customer value and operational excellence. In product innovation /leadership the main concern is to develop very strong innovation by focusing on development, innovation, design, customer attention and customer intimacy which is where a company excels in customer attention and customer service, product and services are tailored to individual customers. Operational excellence on the other hand focuses on supply chain management, efficiency and streamlined operations so as to provide reasonable quality at low prices.

2.3 Lean Sigma

As its name suggests, Lean Sigma is a combination of Lean methods and Six Sigma approach. It is also sometimes referred to as Lean Six Sigma or Six Sigma Lean. Lean Sigma builds on the knowledge, methods and tools derived from decades of operational improvement research and implementation. Lean approaches focus on reducing cost through process optimization. Six Sigma is about meeting customer requirements and stakeholder expectations, and improving quality by measuring and eliminating defects. The Lean Sigma approach draws on the philosophies, principles and tools of both Lean and Six Sigma. Lean Sigma's goal is growth, not just cost-cutting. Its aim is effectiveness, not just efficiency. In this way, a Lean Sigma approach drives organizations not just to do things better but to do better things. Lean Sigma approach has applications far beyond process improvement; the strategy is being used to innovate in all areas of businesses – operations, products and services and even business models.

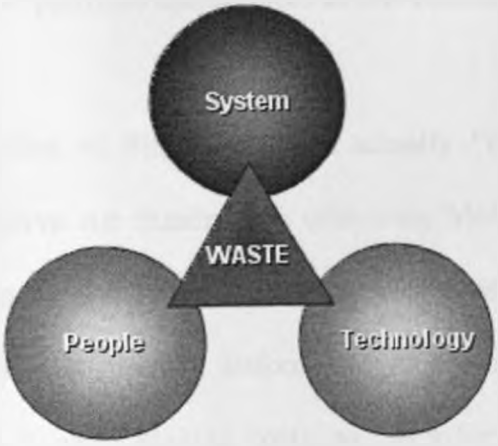
2.4 Lean Sigma and Effectiveness

Effectiveness of Lean sigma can be determined by increased expectations of improved quality, cost and responsiveness simultaneously. Responsiveness (Speed) is achieved by identifying and eliminating waste and variation in processes, innovation and decision making.

2.5 Lean Sigma and Strategy

Figure: 2.1 System, Technology and People

A three-pronged strategy involving **System, Technology and People** is deployed to eliminate waste with the customer value is given priority and appropriate IT technology such ERP or MRP II is chosen to link up information and material flow.



System	Level Loading with Balanced Flow	Total Productive Maintenance	Pull Demand with Kanban	Six Sigma Quality
Technology	SMED	Small Lot Size	Cellular Layout	Poka-Yoke
People	Standardized Work	Visual Management	Good Housekeeping	Employee Involvement
Customer's Value	Voice of the Customer	Value Stream Map	Motion and Time Study	Lean Accounting

From www.SixSigma Institute 1998

Successful elements to a Lean Sigma deployment include; Senior Management Commitment , Culture Change and Communication, Resources, Training, Project Management and Financial Validation Infrastructure. Lean Sigma strategy is driven from the top and implementation from the bottom of the organization. It indeed begins with microscopic understanding of what the customer really want and aligning all the effort to deliver products and services at low cost than competition to the customer.

The idea of Six Sigma was actually "born" at Motorola in the 1970s, when senior executive Art Sundry was criticizing Motorola's bad quality. Through this criticism, the company discovered the connection between increasing quality and decreasing costs in the production process. Before, everybody thought that quality would cost extra money. In fact, it was reducing costs, as costs for repair or control sank. Then, Bill Smith first formulated the particulars of the methodology at Motorola in 1986. Six Sigma was heavily inspired by six preceding decades of quality improvement methodologies such as quality control, TQM, and Zero Defects, based on the work of pioneers such as Shewhart, Deming, Juran, Ishikawa, Taguchi and others.

Like its predecessors, Six Sigma doctrine asserts that: Continuous efforts to achieve stable and predictable process results (i.e., reduce process variation) are of vital importance to business success. Manufacturing and business processes have characteristics that can be measured, analyzed, improved and controlled.

Achieving sustained quality improvement requires commitment from the entire organization, particularly from top-level management. Features that set Six Sigma apart from previous

quality improvement initiatives include: A clear focus on achieving measurable and quantifiable financial returns from any Six Sigma project. An increased emphasis on strong and passionate management leadership and support. A special infrastructure of "Champions," "Master Black Belts," "Black Belts," "Green Belts", etc. to lead and implement the Six Sigma approach. A clear commitment to making decisions on the basis of verifiable data, rather than assumptions and guesswork. The term "Six Sigma" comes from a field of statistics known as process capability studies. Originally, it referred to the ability of manufacturing processes to produce a very high proportion of output within specification. Processes that operate with "six sigma quality" over the short term are assumed to produce long-term defect levels below 3.4 defects per million opportunities (DPMO). Six Sigma's implicit goal is to improve all processes to that level of quality or better.

2.6 Strategic planning and strategic objectives

Strategic planning can be seen as defining objectives and developing strategies to achieve these objectives. It is mainly concerned with trying to create a desirable future by adapting current actions to external environment. Strategic planning can be both long term and short term. Long term involves pre-empting and preparing for the future whereas short term involves managing the present. Abelle (1993) claimed that balancing the temporal aspects of strategic planning required the use of dual strategies simultaneously. Steiner (1997) pointed out that strategy is that which top management does and it refers to basic directional decisions. The intention of strategic planning is for the organization to develop capability to achieve desired objective through adapting to changing situation by properly fitting the organization's resources and competencies to the external environment .A strategic plan

maps where the firm is headed by defining short and long range performance targets and how management intends to achieve these outcomes. It consists of a strategic vision and business mission, strategic and financial performance objectives and comprehensive strategy for achieving these objectives.

Strategic planning process includes three steps processes that is the situation, the target and the path as explained by Mohammadi (1997).The situation where the organization is currently and how it got there. The target is the main objective that is concrete goals that the organization seeks to achieve. How to achieve this goal is what is referred to as the path, it is how the organization intends to get there. Strategic planning is a continuous process since the business environment is dynamic and there are constant changes that often affect an organization. This is why Mark ides (1999) described strategy formation and implementation as an on- going never ending integrated process that requires continuous reassessment and reformation. Also because of this dynamic nature, Strategy can be both deliberate and unplanned. Moncrieff (1999) stressed this and further illustrated that unplanned strategy comes from two sources: adhoc actions by many people from all parts of the organization which is referred to as strategies in action and emergent strategies which result from emergence of opportunities and threats in business environment.

Strategic objectives lay the foundation for strategic planning in an organization without them it is difficult to have a basis by which planning will be done because they act as a framework. Lynch (1997) talked of prescriptive strategy which resulted from strategic objectives whose elements were defined before strategy began. The purpose of setting objective is to create

yardsticks in order to track performance and hence to push the organization to be more focused, intentional inventive. Strategic objectives help convert the mission of the organization into performance targets which guards against status quo, performance, complacency, internal confusion. An example of a management system that maps an organization's strategic objectives into performance metrics is the balanced scorecard which was published by Kaplan and Norton (1992). The balanced scorecard looks at four perspectives; financial, internal processes, customer and learning and growth which provide relevant feedback as to how well strategic plan is being executed so that necessary adjustment can be made .The tool quantifies performance measures while balancing between long term and short term objectives, financial measures and non-financial measures, internal performance and external performance perspectives and leading indicators and lagging indicators.

2.7 Strategic management

Strategic management is a field that deals with the major intended and emergent initiatives taken by general managers on behalf of owners, involving utilization of resources, to enhance the performance of firms in their external environments. It entails specifying the organization's mission, vision and objectives, developing policies and plans, often in terms of projects and programs, which are designed to achieve these objectives, and then allocating resources to implement the policies and plans, projects and programs. A balanced scorecard is often used to evaluate the overall performance of the business and its progress towards objectives. Recent studies and leading management theorists have advocated that strategy

needs to start with stakeholders expectations and use a modified balanced scorecard which includes all stakeholders.

CHAPTER THREE: RESEARCH METHODOLOGY

Introduction

chapter provides the methodology of the study. It gives the specific procedures that e followed in undertaking the study. The research design, research procedure, data ection methods and data analysis used are described in this chapter.

Research Design

research used a case study research design to establish the effectiveness of Lean Sigma continuous improvement at GlaxoSmithKline. Bell (1999) states "a case study approach is ticularly appropriate for individual researchers because it gives an opportunity for one ect of a problem to be studied in some depth within a limited time scale". The main son why this design was most appropriate was because this research was based on a single se that is GlaxoSmithKline. This design helped to bring an understanding of complex sues and add strength to what is already known through previous research. By using this ethod it was easier to obtain in-depth data that described the research case as accurate as ossible.

3.3 Data collection

The study used both primary and secondary data. Primary data was collected by means of interview and observation. A total of eight (8) people were interviewed, the site director, the general manager consumer who is the customer, Head of Production, Head of Quality

assurance and compliance, Head of Supply and logistics, Head of Engineering, operational excellence expert and one works council representative. The observation method was done for a week through value stream mapping of key value streams for purposes of obtaining more accurate data in terms of actual flow in the supply chain. This helped capture information that was not easily obtained through an interview (the hidden waste). An interview guide (Appendix II) with structured questions was used to guide the interview. The supply chain process was observed to determine whether there is reality in faster delivery of Product and service to customers as a result of introduction of Lean Sigma. For secondary data, the researcher used content analysis, that is, the researcher carried out desk review of relevant documents over the last ten years on performance at GlaxoSmithKline as a result of Lean Sigma reforms. Such documents included, reports on waste, Cost of poor quality, production lead-times, overall equipment effectiveness, productivity, tangible Financial & non financial savings, training and revenue to establish a comparison between the period before and after Lean Sigma strategy implementation. Not all months were considered, a period with more objective data was chosen depending on the macro-environment issues that were taking place. The period deemed to be more subjective and representative of the influence of Lean Sigma was considered more suitable for research.

3.4 Operationalization of effectiveness

Effectiveness is not tangible matter that can be easily seen or measured in it. The study however will look at how effectiveness can be operationalized. Thus what is considered to be effective Lean Sigma in Continuous Improvement would be if the implementation of this strategy has improved service delivery to customers, improved the bottom line, improved

performance, improved culture, reduced customer complaints and in summary improved Business unit value drivers (BUVDs).

3.5 Data analysis

Data collected was both Quantitative and qualitative. Quantitative data was collected from several sources of documents. Data was mainly statistics on Value stream overall equipment effectiveness, savings, productivity, product availability, out of stock index, customer complaints, rate of illness and Injury, sustainability metrics on energy and water usage and profits during Lean Sigma implementation. Descriptive statistics was used to analyse this data in terms of distribution of metrics during different phases of implementation of Lean Sigma. Also mean scores, percentage response rates, variance and standard deviation were used to analyse the effect of Lean Sigma on Continuous Improvement at GlaxoSmithKline. Qualitative data was used to expand understanding of the research questions and to identify plausible investigative questions. Content analysis was used to analyse primary data. The researcher carried out desk review of relevant documents over the last ten years. Quality assessment was done by reviewing customer complaints.

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter covers the summary of the data from the study. The data is analyzed and presented in a form of tables and percentage as well as charts. It covers the summary of the effectiveness of Lean Sigma strategy on continuous improvement at GlaxoSmithKline. Data collection was done from GlaxoSmithKline manufacturing plant with respondents being mainly value stream leaders, OE Experts and department managers. Also the site director and General Manager Consumer were interviewed and data collected. Secondary data was collected from other historical sources.

4.2 The analysis method

Mean, standard deviation and percentage response rate of data collected was tabulated. Content analysis was done on primary data.

4.3 Response rate and degree of understandability of Lean Sigma Technique.

The response rate was 100 % with all the eight respondents interviewed. The employees interviewed were knowledgeable with regard to Lean Sigma process and technique.

4.4 Main problems experienced with the old system

The study sought to find out the problems experienced by the company prior to the introduction of Lean Sigma. The response is as indicated in table 4.1. These were the issues that necessitated the introduction of Lean Sigma strategy in GlaxoSmithKline.

Table 4.1 Main problems experienced with the old system

Respondent Feedback	Number of respondents	% Response rate
Lean Sigma was introduced at the time of the merger between Smith Kline Beecham & Glaxo welcome hence it has always been used by Glaxo welcome company	2	25%
High Waste in production processes	8	100%
A lot of process variation	4	50%
Lack of logical flow in processes	4	50%
Factory very disorganized	4	50%
Delays and procrastination	2	25%
Lack of Clear visibility of plans	2	25%
High Inventory on the floor shop	2	25%
Lack of focus	2	25%
Lack of close monitoring	2	25%
No Business improvement	2	25%
Lack of knowledge	2	25%

Source: Author, (2011).

The study established wastage in production processes as the main problem with 100% respondents. Other main problems noted with each having 50% respondents were; a lot of process variation, Lack of logical flow in processes and disorganized factory in terms of flow of processes. Other problems cited with each having 25% respondents include delays and procrastination, Lack of Clear visibility of plans, high Inventory on the floor shop, Lack of focus, Lack of close monitoring, No business improvement, Lack of knowledge and the fact

that Lean Sigma was introduced at the time of the merger between Smith Kline Beecham & Glaxo welcome hence it has always been used by Glaxo welcome company. These responses show that there were quite a number of problems and therefore the company had to take measures to reduce them and in particular ways of reducing waste.

4.5 Main reasons why Lean Sigma was introduced

The study sought to find out the main reasons why Lean Sigma was introduced at GlaxoSmithKline. The responses are as indicated in table 4.2.

Table 4.2 Main reasons why Lean Sigma was introduced

Respondent Feedback	Number of respondents	% response rate
Elimination of bottlenecks in manufacturing	6	75%
Reduce waste	8	100%
Avail product to customer at right time	6	75%
Improve factory productivity	8	100%
Reduce variations in process	4	50%
Enhance flow and reduce delays	4	50%
Enhance housekeeping	2	25%
Introduce visual factory	2	25%
Increase overall equipment effectiveness	6	75%

Source: Author, (2011).

The study established that respondents were in agreement on the main reasons being reduction of waste with 100% respondents, improvement in factory productivity with 100% respondents, elimination of bottlenecks with 75% respondents, increase in overall equipment

effectiveness and availing product to customers at the right time with 75% respondents. On further probing, other reasons cited as necessitating its introduction include; reducing variation in processes with 50% respondents, enhancing flow and reduction of delays with 50% respondents, enhancing housekeeping with 25% respondents and introduction of visual factory with 25% respondents. Accordingly therefore, Lean Sigma has managed to streamline processes, reduced the process variability and hence minimizing on delays and wastage.

4.6 Effectiveness of Lean Sigma introduction

To further find out on Lean Sigma's effectiveness, respondents were asked to rate the effectiveness of Lean Sigma as a strategy and in the areas where it has been effective. The responses were as shown in table 4.3.

Table 4.3 Effectiveness of Lean Sigma introduction

Respondent Feedback	Number of respondents	% Response rate
Improved performance and waste elimination	6	75%
Focus is on value adding activities	2	25%
Effective in control of resources	2	25%
Employees have acquired knowledge	2	25%
Improved service delivery to customers	4	50%
Whole process Quite effective	8	100%
Reduced customer complaints	2	25%

Source: Author, (2011).

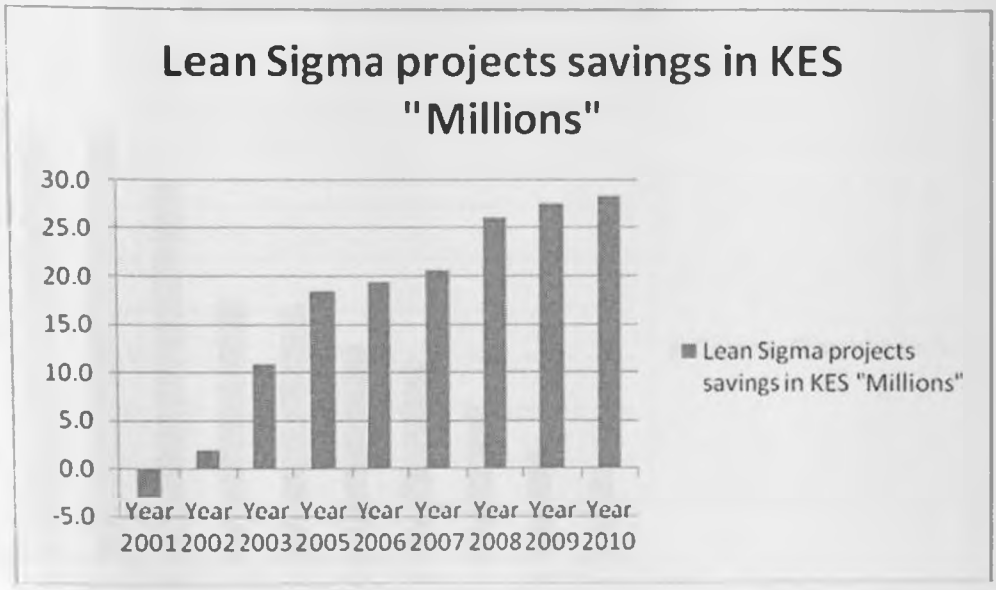
The study established that 100% of the respondents were in agreement that the strategy was quite effective in terms of improved performance and waste elimination with 75% respondents, improved service delivery to customers with 50% of respondents, reduced customer complaints with 25% respondents, employees acquiring knowledge with 25% respondents, focusing on value added activities with 25% respondents and effective in control of resources as confirmed by 25% of respondents. Therefore it is notable from these respondents that effectiveness had been achieved as feedback cuts across all production processes. This is further illustrated using secondary data collected to assess effectiveness of the strategy as follows: Table 4.4, Table 4.5 and Figures 4.1 to 4.6.

Table 4.4 Lean Sigma Project Savings

	Year	Year 2001	Year 2002	Year 2003	Year 2005	Year 2006	Year 2007	Year 2008	Year 2009	Year 2010
	Lean Sigma projects savings in KES "Millions"	-3.0	2.0	10.9	18.5	19.4	20.6	26.0	27.5	28.3
Mean	17,506,256									
Median	20,040,741									
STD DEV	10,861,594									

Source: GlaxoSmithKline, Savings.

Figure 4.1 Lean Sigma Project Savings



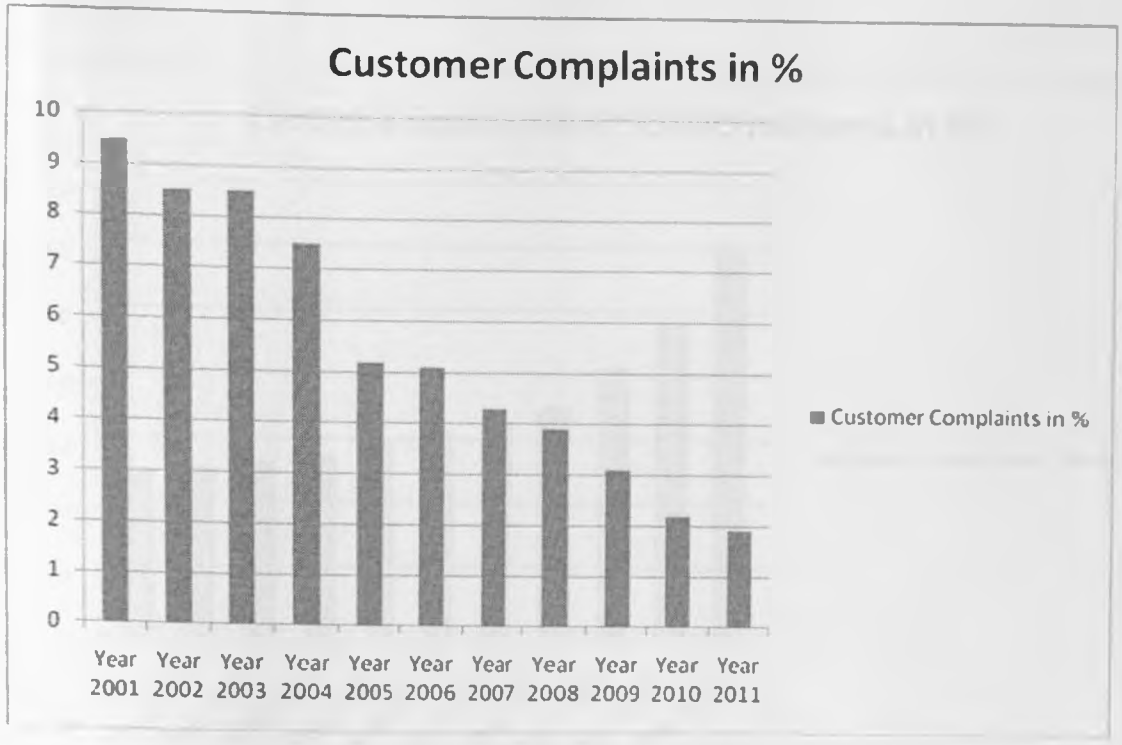
Source: GlaxoSmithKline, Savings.

Table 4.5 Customer complaints

Year	Year 2001	Year 2002	Year 2003	Year 2004	Year 2005	Year 2006	Year 2007	Year 2008	Year 2009	Year 2010	Ye 20
Customer Complaints in %	9.5	8.5	8.5	7.5	5.2	5.1	4.3	3.9	3.1	2.19	1.
Customer Service in %	88.8	90.3	93.4	93.9	94.5	94.8	95.1	95.9	96	97	
Overall Equipment Effectiveness in %	25	26	27	28	30	32	34	36	42	49	
Stock availability in %	84	85	86	89	91	91.5	92	92.5	94.2	98.1	96
Volume Growth in units (Million)	15.9	17.0	18.0	19.2	20.4	21.7	23.1	24.6	26.2	27.8	29

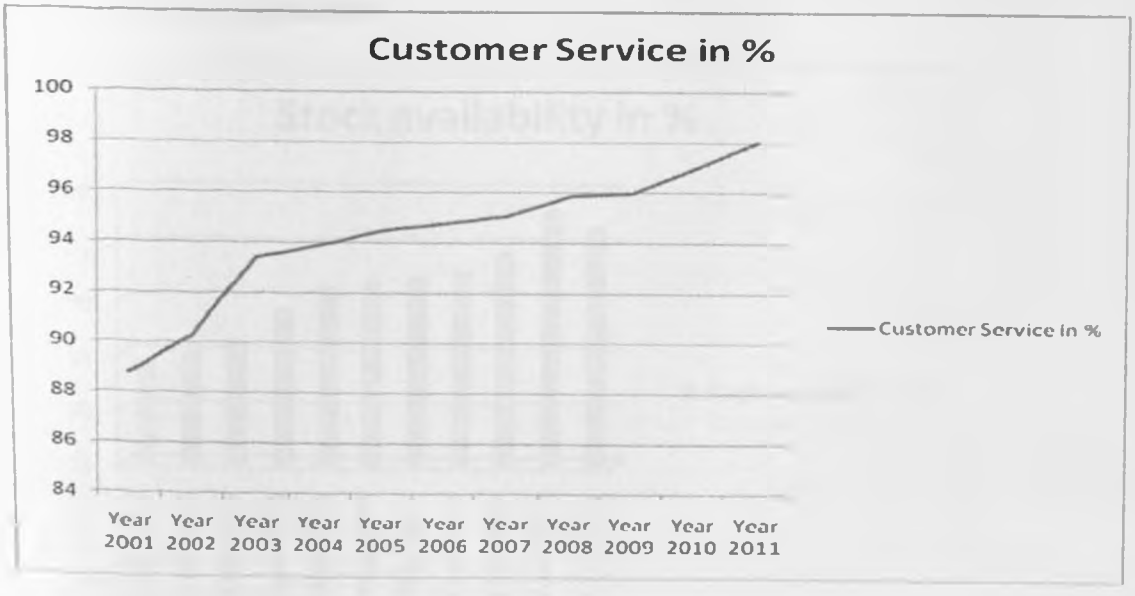
Source: GlaxoSmithKline, Customer complaints.

Figure 4.2 Customer complaints



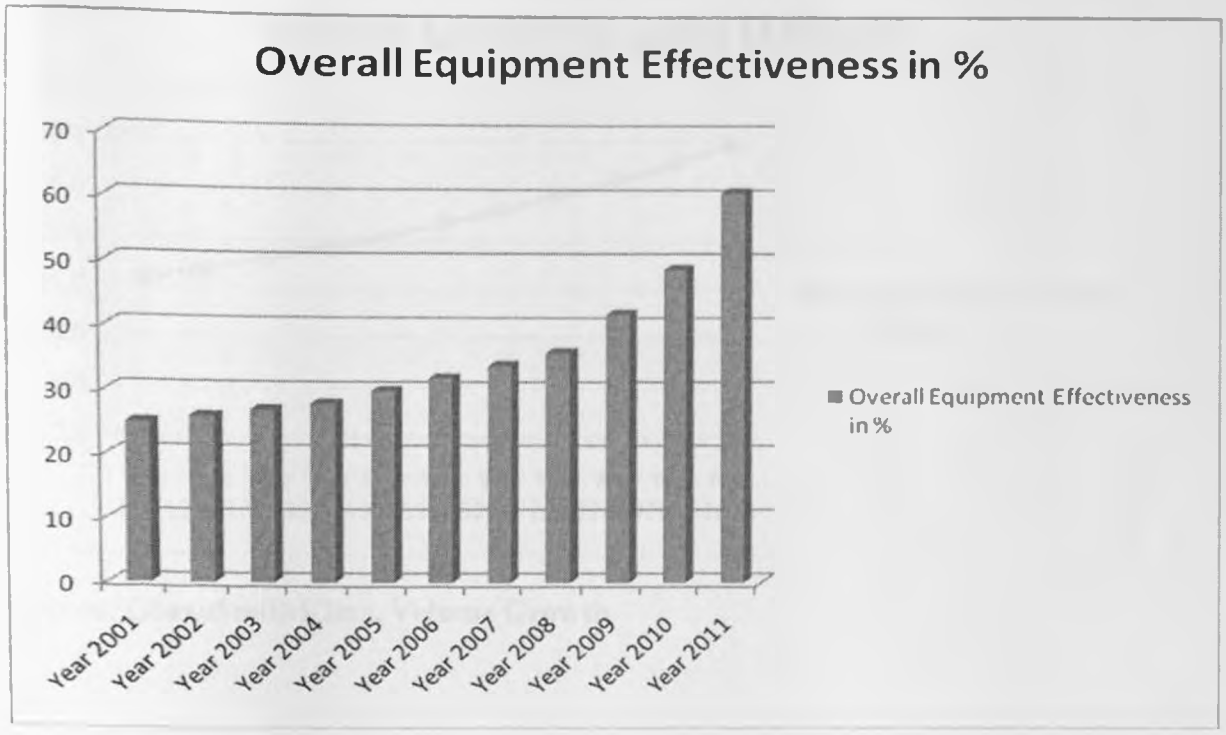
Source: GlaxoSmithKline, Customer complaints.

Figure 4.3 Customer Service



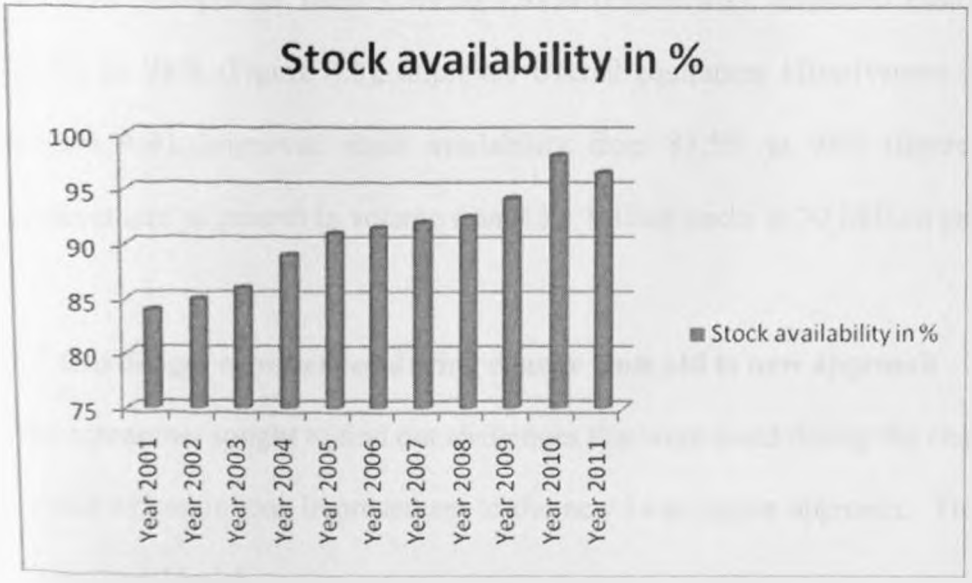
Source: GlaxoSmithKline, Customer service.

Figure 4.4 Overall Equipment Effectiveness



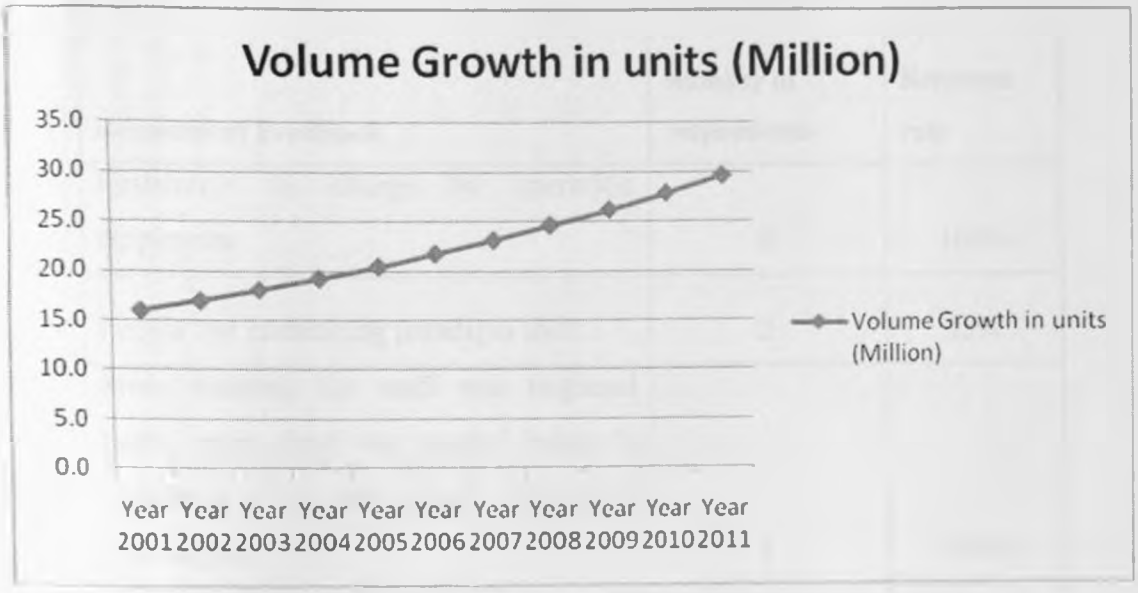
Source: GlaxoSmithKline, Overall equipment effectiveness.

Figure 4.5 Stock availability



Source: GlaxoSmithKline, Stock availability.

Figure 4.6 Volume Growth



Source: GlaxoSmithKline, Volume Growth

The study established as shown above, that Lean Sigma implementation strategy at GlaxoSmithKline has effectively delivered incremental project savings (Figure 4.1), reduced customer complaints from 9.5% to 1.92% (Figure 4.2), improved customer service from 88.5% to 98% (Figure 4.3), improved overall equipment effectiveness from 25% to 61% (Figure 4.4), improved stock availability from 83.5% to 98% (figure 4.5) and led to achievement of growth in volume from 15.1 Million packs to 30 Million packs (Figure 4.6).

4.7 Challenges experienced during change from old to new approach

The researcher sought to find out challenges that were faced during the change over from old system of continuous improvement to the new Lean Sigma approach. The responses are as shown in table 4.6.

Table 4.6 Challenges experienced during change from old to new approach

Respondent Feedback	Number of respondents	% Response rate
Resistance to charge by operation employees	8	100%
People not embracing paradigm shift	2	25%
More training for staff was required hence more time was needed being (a challenge all to have people change to new ways)	2	100%
Lack of trained expert team to run and manage the program	2	25%

Source: Author, (2011).

The study found out that resistance to change by employees and the need for more staff training was needed. These were the key challenges as rated by all those interviewed with the respondent rate of 100% as shown in table 4.6. The employees preferred to maintain the status quo and resisted to embrace the paradigm shift with 25% of the interviewees response rate and lack of trained expert team to run and manage the program with 25% respondents.

4.8 Challenges experienced during Lean Sigma implementation

The researcher further wanted to know challenges faced in the system during the implementation of Lean Sigma. The responses are as shown in table 4.7.

Table 4.7 Challenges experienced during Lean Sigma implementation

Respondent Feedback	Number of respondents	% Response rate
Challenge of time	4	50%
Lack of knowledge in specific areas that needed improvement	4	50%
Fear of unknown hence resistance. It involved cost cutting and many thought this would affect them in a way	4	50%
Resources were limited hence had to work within tight budget	2	25%
Culture change	2	25%

Source: Author, (2011).

The study established that the challenge of time needed to implement the strategy, lack of knowledge on the tools needed to drive improvement and fear of unknown and hence resistance were greatly cited with each having 50% of the respondents. Reason given for resistance after further probing was that the employees feared for the unknown as it all involved cost cutting and many knew they were either going to be affected in form of staff declared redundant. 25% of the respondents further confirmed that resources were limited hence they had to work within a tight budget and further 25% of respondents confirmed culture change as a challenge during implementation. These challenges confirms the findings from literature review that implementation of a new strategy always comes along with challenges that need to be addressed.

4.9 Benefits accrued from implementation of Lean Sigma

Despite the challenges during implementation of Lean Sigma, the researcher went further to inquire on any benefits accrued during and after the implementation of the strategy and the responses are shown in table 4.8.

Table 4.8 Benefits accrued from implementation of Lean Sigma

Respondent Feedback	Number of respondents	% Response rate
Yearly bonus as result of cost cutting	4	50%
Elimination of manufacturing bottlenecks/waste reduction and waste reduction.	8	100%
Improved productivity, Customer Service, stock availability and high quality products.	6	80%
Improved overall equipment effectiveness.	4	50%
Reduced machine break downs	2	25%
Reduced customer complaints and hence Quality.	4	50%
Less delays in processes	2	25%
Lean processes in place.	2	25%
Empowerment tool.	2	25%
Increased level of accountability and communication.	2	25%

Source: Author, (2011).

The study established employees to have confirmed that elimination of manufacturing bottlenecks and waste reduction was among the main benefits to the company by a rating of 100%. The study further established the benefits of improved productivity, customer service, stock availability and high quality products as cited by 80% of the respondents.

The employees were happy because of the yearly bonus given out as a result of the savings achieved with 50% respondents. Similarly, 50% of the respondents confirmed that there was improved quality of products and overall equipment effectiveness. Other benefits rated at 25% each included: Reduced machine break downs, less delay in processes, Lean processes in place, Empowerment tool and increased level of accountability and communication.

This shows that despite the challenges faced during initial implementation, the benefits as cited by employees, shows that the strategy has impacted positively especially in overall improvement of productivity.

4.10 Techniques used to measure success of implementation

For any strategy to succeed techniques used are an important area and this research therefore sought to find out techniques used to measure success of Lean Sigma strategy. The responses are shown in table 4.9.

Table 4.9 Techniques used to measure success of implementation

Respondent Feedback	Number of respondents	% Response rate
Takt time and overall equipment effectiveness	6	75%
Door to door Time (Days forward Cover)	2	25%
Tabulation of Key Performance Indicators (KPIs)	2	25%
Waste to cost of goods sold ratio	4	50%
Productivity measure	2	25%
Customer satisfaction surveys and process capability measurement	2	25%
Customer complaints	2	25%
Visual controls	2	25%
Trend analysis	2	25%
Dashboard and inventory control	2	25%

Source: Author, (2011).

From the responses, takt time and overall equipment effectiveness were rated at 75%, the use of waste to cost of goods sold ratio at 50%, and others were rated at 25%. This included door to door time, Tabulation of Key performance indicators, productivity measure, customer satisfaction surveys and process capability measurement, customer complaints, visual controls, Trend analysis and Dashboard and inventory controls.

4.11 Gauging the success of the implementation of Lean Sigma strategy

The study sought to find out the success of Lean Sigma strategy implementation. A Likert Scale was used to assess overall rating of interviewees in gauging the success of implementing Lean Sigma Strategies in continuous improvement at GlaxoSmithKline. The responses are as shown in table 4.10.

Table 4.10 Success response rate

Respondent Feedback	Number of respondents	% Response rate
Very successful	5	62.5%
Moderately successful	3	38.5%
Almost successful -	0	0%
Failure -	0	0%

Source: Author, (2011).

The study established that 62.5% of the respondents rated the implementation as very successful and 38.2% rating it as moderately successful as shown in table 4.10 above. This shows that the strategy has impacted positively as all are in agreement on success of implementation at GlaxoSmithKline.

4.12 Areas requiring improvement

The researcher further sought areas that could be improved on for the strategy to achieve and continue to impact positively to the business. The responses are as shown in table 4.11.

Table 4.11 Areas requiring improvement

Respondent Feedback	Number of respondents	% Response rate
Train more advocates in processes to drive continuous improvement	4	50%
Ensure Proper coordination with stakeholders	1	12.5%
Introduce incentives for employees who excel in Lean Sigma improvement	2	25%
Ensure Machine and equipment availability	1	12.5%
Strict adherence to Lean Sigma strategies and extend the scope	2	25%
Lean Sigma is about change and it keeps evolving hence there is need for continuous training and information sharing so that all employees can keep up with the pace of change and most importantly embrace the change initiatives in a positive way.	4	50%

Source: **Author, (2011).**

The study established that there is need to train more advocates in processes to drive continuous improvement and to carry out training and more information sharing as cited by 50% respondents. 12.5 % of the respondents cited Proper coordination with stakeholders and ensuring machine and equipment availability as an area of improvement while 25% of respondents cited management to introduce incentives for employees who excel in Lean Sigma improvement and the need for strict adherence by all employees to Lean Sigma Strategies.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter of the study discusses the summary of the findings in chapter four. Conclusion and recommendations drawn from these findings are discussed in relation to the objective of the study which is to establish the effectiveness of Lean Sigma strategy on continuous improvement at GlaxoSmithKline.

5.2 Summary of findings

The objective of the study was to establish the effectiveness of Lean Sigma strategy on continuous improvement at GlaxoSmithKline. This study sought the establishment of the relationship between introduction of Lean Sigma strategy and continuous improvement in performance at GlaxoSmithKline. The study revealed that a majority of respondents cited that the implementation of Lean Sigma strategy on continuous improvement at GlaxoSmithKline was very successful. On the issue of techniques used to measure success of implementation of Lean Sigma strategy, most respondents cited takt time and overall equipment effectiveness, the use of waste to cost of goods sold ratio as the main techniques used to measure success of implementation. Others cited included, door to door time, tabulation of Key performance indicators, productivity measure, customer satisfaction surveys and process capability measurements, customer complaints, visual controls, Trend analysis and Dashboard and inventory controls.

On the topic of the benefits accrued from the implementation of Lean Sigma, majority of respondents gave reduction in waste, improved overall equipment effectiveness and productivity, good inter-departmental communication, one culture, improved customer service, quality and stock availability to customers as the main benefits to the organization. With regard to challenges experienced during the implementation of Lean Sigma, majority of respondent cited resistance to change, lack of knowledge and the fear of the unknown as the main challenges.

On the issue of effectiveness of Lean Sigma on continuous improvement in performance and service delivery to customers, majority of respondents cited Lean Sigma to have been very successful. However a few respondents cited Lean Sigma to have been moderately successful.

The study revealed that wastage in production processes, a lot of process variation, Lack of logical flow in processes and disorganized factory in terms of flow of processes, delays and procrastination, Lack of Clear visibility of plans, high Inventory on the floor shop, Lack of focus and close monitoring, and business improvement, Lack of knowledge were the main problems facing GlaxoSmithKline. The study also established that reduction of waste with, improvement in factory productivity, elimination of bottlenecks, increase in overall equipment effectiveness and availing quality products to customers at the right time were the main reasons why lean Sigma was introduced and implemented in GlaxoSmithKline. The study also established that Lean Sigma strategy incorporated and pulled together the good practices that were being applied in the legacy companies (Smith Kline Beecham and Glaxo

Welcome). The Lean Sigma concepts have so far been successful in delivering the intended results. Through value stream process observation, the researcher established that GlaxoSmithKline global and manufacturing and supply team have put in place three tiered accountability visual boards and has a stand up meeting everyday with every one involved and participating. The Factory team has already performed diagnostics in productivity and inventory reduction (Working Capital reduction). Plans are in place to carry out Lean Laboratory and Engineering diagnostics.

5.3 Conclusion

The study concludes that introduction of Lean Sigma strategy in GlaxoSmithKline greatly improved productivity, overall equipment effectiveness, waste reduction, quality, customer service and stock availability. The strategy brought together two cultures brought about by the merger integration of the former Smith Kline Beecham and Glaxo welcome into one culture. Indeed tangible savings were achieved and hence improvement in the bottom line of the business.

5.4 Recommendation

The recommendations to the study include both suggestions to GlaxoSmithKline management as well as other organizations that wish to employ Lean Sigma strategy. The overall organization strategy needs to be effectively communicated to employees. The organization should do thorough training to ensure all employees understand the strategic goals and objectives and indeed the burning platform. The study recommends that for continuous improvement to be driven to another level, Lean Sigma needs to be inducted

directly to new employees joining the organization and the strategy to be rolled out in other functional areas like marketing, sales and distribution. The study also recommends that an elaborate and regular reward system to be put in place for people who excel as Lean Sigma practitioners. Lean Sigma is about change and it keeps evolving hence there is need for continuous training and information sharing so that all employees can keep up with the pace of change and most importantly embrace the change initiatives in a positive way.

5.5 Area of further study

This study laid emphasis on the effectiveness of Lean Sigma strategy on continuous improvement in GlaxoSmithKline manufacturing plant. Further research needs to be carried out in other organizations and institutions to bring out the comparative effect of the effectiveness of the strategy.

5.6 Limitation of the study

All respondents were managers with one works council representative. This left out valuable contribution from all employees on the Factory floor shop and across departments. The other respondents could have added more information to the study. The study focused on only one organization GlaxoSmithKline. It therefore may not be representative of all organizations in the country. However it has taken into account other views along theoretical analysis.

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UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS
MBA PROGRAMME

Telephone: 020-2059162
Telegrams: "Varsity", Nairobi
Telex: 22095 Varsity

P O Box 30197
Nairobi, Kenya

DATE 06/10/2011

TO WHOM IT MAY CONCERN

The bearer of this letter FREDRICK MUKHWANA WAFUKHO

Registration No. D61/7112/2006

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

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

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

Thank you.

UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS
MBA OFFICE
P. O. Box 30197
NAIROBI

JUSTINE MAGUTU
ASSISTANT REGISTRAR
MBA OFFICE, AMBANK HOUSE

APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

September, 2011

RE: COLLECTION OF RESEARCH DATA BY FREDRICK M. WAFUKHO MBA STUDENT, UNIVERSITY OF NAIROBI

I am a post graduate student in the Faculty of Commerce, School of Business, University of Nairobi. In order to fulfil the degree requirements, I am required to undertake a research project on real management problems and situations affecting organizations in Kenya.

Kindly assist me in my data collection by according me some of your time for a short discussion. Any information you will provide will solely be used for my academic study and will be treated with utmost confidentiality. I am willing to avail a copy of my final report, should you request for one.

Thanking you for your cooperation.

Yours faithfully,

.....

FREDRICK M. WAFUKHO

.....

DR. GAKURU

LECTURER / SUPERVISOR

APPENDIX II: INTERVIEW GUIDE

EFFECTIVENESS OF LEANSIGMA STRATEGY ON CONTINUOUS IMPROVEMENT AT GLAXOSMITHKLINE

1. What were the problems you experienced with the old system of Continuous Improvement before Lean Sigma introduction?
2. What is the main reason why Lean Sigma was introduced in GlaxoSmithKline? How effective do you think each reason has been addressed?
3. How effective has the introduction of Lean Sigma been in terms of Continuous Improvement (performance), service delivery to customer?
4. What are some of the challenges experienced during the change over from old Continuous Improvement to the new Lean Sigma approach?
5. What are some of the challenges experienced during implementation of Lean Sigma?
6. In your opinion what are the benefits accrued from the implementation of Lean Sigma?
7. What are some of the techniques used to measure success of implementation of Lean Sigma Strategy?

8. In your opinion how would you gauge the success of the implementation of the Lean Sigma strategy in Continuous Improvement in GlaxoSmithKline?

    - Very successful
    - Moderately successful
    - Almost successful
    - A failure

9. In your opinion, which areas require improvement?