UNIVERSITY OF GHANA

IMPROVING OPERATIONAL EFFICIENCY IN GHANAIAN GOVERNMENT HOSPITALS USING THE SIX SIGMA MODEL

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DECLARATION

I do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any university. All references used in the work have been fully acknowledged.

I bear sole responsibility for any shortcomings.

…… …….

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DATE

CERTIFICATION

I hereby certify that this thesis was supervised in accordance with procedures laid down by the University.

…….. ……

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DEDICATION

I dedicate this work to God almighty for bringing me this far. I also dedicate it to my Dad, Mr. Edward K. Agozie, my Mum, Mrs. Comfort Agozie and my only course mate Mr. Abeeku Sam Edu. You people have been a wonderful source of inspiration to me. I am very grateful to you all!

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LIST OF ABBREVIATIONS

CTQ'S	Critical to Quality Characteristics
DEA	Data Envelopment Analysis
DMAIC	Define, Measure, Analyze, Improve and Control
HRM	Human Resource Management
MOH	Ministry of Health
NHIS	National Health Insurance Scheme
OECD	Organization for Economic Co-operation and Development
SOE's	State Owned Enterprises
TQM	Total Quality Management
QFD	Quality Function Deployment
QM	Quality Management
WHO	World Health Organization

ABSTRACT

In today's complex healthcare environment, a focus on quality is of particular importance. Hospitals are increasingly realizing the need to focus on improved efficiency as a means of eliminating poor quality of services, and as well, improve on their competitive position. Within any industry, organizations must strive to continuously improve on their efficiency while dealing with the complex and dynamic business environment. Reports have shown that efficiency levels in the healthcare delivery systems of many developing countries are relatively low (Ali, 2011). This assertion is seemingly true in the Ghanaian case (Kwakye, 2004). This research attempts to reduce the numerous quality problems existing in some Ghanaian hospitals in specific categories for better understanding and as well improve on these problems using the Six Sigma quality improvement model. Three hospitals were used in this study. Two sets of questionnaires were used to collect data from both patients and staff of these hospitals. The expectations and opinions of staff and patients were sought using eleven service quality determinants. An analysis covering 103 patients and 56 staff revealed that cleanliness, responsiveness and communication were the most considered quality characteristics by patients in these hospitals. Factor analyzing these responses further revealed eight categories of the problems identified by patients and four categories of the problems identified by staff. It was concluded that most of the prevalent quality problems in the hospitals were related to the functional aspects of the hospitals operations. The study revealed that the challenges facing the staff were centered on information flow, internal controls, financing and poor staffing issues. The Six Sigma DMAIC model is recommended to eliminate most of these functional problems to improve on quality in these hospitals. An illustration of the use of the DMAIC to solve the problem of crowding is given in chapter 6 of the thesis.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Healthcare is a fundamental human right. This has made healthcare a key issue of concern across the globe (Mcglynn, 2011). Many countries both developing and the developed are constantly making efforts at improving healthcare services rendered to its people (Mcglynn, 2011). In the U.S for instance, the healthcare reform debate has been the 'Affordable Care Act' also known as the 'Obama care' (Mcglynn, 2011). This is a national healthcare plan aimed at reducing spending on healthcare while allowing a larger portion of Americans access healthcare. This instance and others in other countries confirm the fact that healthcare is a big issue that is given critical attention across the globe. Quality of healthcare has been assessed as varying from place to place. Even in the case of the developed countries, quality of healthcare has been found to be inconsistent (Mcglynn, 2011).

In the case of developing countries poor quality of healthcare is not an unusual phenomenon (Harrison 2011). The industry has been operating on its own traditional economic sphere of influence, ignoring current emerging factors such as competition, patient safety, rising healthcare cost, liability from malpractice (lawsuits) and more government expenditure on healthcare payment (Hansson, 2000). In recent years, these factors have become more prevalent and competition within the industry has been intensified, and many hospitals are becoming increasingly aware of the critical need of controlling their operating costs and meeting the expectations of patient care quality (Chow-Chua et.al, 2000). In the current competitive environment, many healthcare organizations are taking steps to ensure that they are providing the absolute best care at the lowest possible costs. However, many hospital

administrators still have to learn how to lower operating costs without compromising on providing consistent good quality patient care (Griffith, 2000).

Upon the introduction of the National Health Insurance Scheme in 2003 in Ghana, assessing healthcare in recent times is easy (Myjoyonline.com/health/statistics); many Ghanaians now visit the hospitals and clinics more frequently than it used to be, this has led to increased healthcare demands of the people. The increased demand for healthcare poses a challenge of quality healthcare delivery.

Quality healthcare delivery has always been an issue of concern in most developing countries, of which Ghana is no exception. Harrison (2011) attests to this fact, by suggesting that there is poor quality of healthcare in South Africa, while NHIS report, (2010) and Ayimbillah et al. (2011) also suggest similar finodings in Ghana. Over a decade now, the evaluation of efficiency in healthcare delivery has increasingly caught the attention of academics (Jones and Peters, 1992; Morey and Dittman 1995). These authors have examined ways in which improved healthcare delivery can be achieved in order to improve on the life expectancy of people, especially the aged in the society. According to Sorgaard (2010), countries who tend to consciously improve quality healthcare delivery agree to its benefits as reduced mortality rates, increased efficiency, lower operating costs, socio – economic development and many others. Quality healthcare ought to be viewed as a continuous phenomenon to be explored not a problem to be controlled (Van den Heuvel et al. 2008). A continuous approach to dealing with inefficiencies and quality issues in the healthcare system is needed to eliminate poor quality healthcare in the industry. Hence an integrative quality improvement technique such as the Six Sigma technique as suggested by some researchers (Van den Heuvel et al. 2008; Schutte, 2005, Arah et al. 2003) in recent times could be adopted to significantly improve on the inefficiencies and poor quality in healthcare experienced in the healthcare sector.

Six Sigma has been widely adopted by American businesses because it works (Van den Heuvel et al. 2008). It has been the engine of improvement in the methodology of major corporations since 1994, and has produced incredible results over and over again (Van den Heuvel et al. 2008). Healthcare provision and delivery institutions can achieve these same amazing breakthroughs by applying Six Sigma to their operations to improve on their efficiency and quality of healthcare delivered to their clients. Six Sigma approaches aim to improve quality and have been used in many organizations since its inception. In Motorola Corporation for instance in the 1980s, it was used to measure and improve product and service quality. Six Sigma is focused on defects per million opportunities (Van den Heuvel et al. 2008). Six Sigma is based on a quality statistics that equates to 2 to 3 defects per million opportunities (Jayanta and Karen, 2005). This is the target level of performance for a process. The Six Sigma process is highly measurement and data driven. Data has to be gathered to determine the baseline performance of a process in order to validate that an improvement has been made. Decisions are made based on statistics and facts, rather than instinct or past history.

To improve technical efficiency, hospitals should be able to identify poorly performing areas of its operations and look at the available alternatives that will enable them to make better use of their resources. One question to ask, therefore, is how can a hospital become efficient in practice? The answer depends on our ability to identify the sources of inefficiency in hospital operations. The study will investigate how to achieve this.

1.2 Statement of the problem

Quality in contemporary nature is seen as a continuous phenomenon (Edward Denimg). It can be said that what is quality today, will or may not be quality tomorrow, hence quality cannot be achieved fully at a particular point. It is appropriate to say that a similar approach should be adopted in the healthcare industry to address quality issues stalling progress in the industry.

The Ghanaian healthcare industry is showing positive growth as the Ministry of Health (MOH) is investing large amounts of capital into the revitalization of all public hospitals. Coupled with this, the introduction of the National Health Insurance Scheme (NHIS) implemented by the Ghanaian government in 2003 has made healthcare goods and services relatively more affordable and accessible to Ghanaians (Ayimbillah et al 2011). In spite of these positive signs of growth of the healthcare industry, the sector is still bedeviled with a variety of healthcare delivery problems. Most prevalent of these problems is the high rate of inefficiency and poor quality of healthcare delivered in the industry (Ayimbillah et al 2011). The system is unable to meet the quality expectations and increasing demands of its patients. Efforts at replacing or refurbishing healthcare equipments and facilities, improving working conditions and salaries of healthcare workers as well as building new facilities have all been made over the years under past and present governments, yet the issue of poor healthcare delivery continues to prevail (Ayimbillah, et al. 2011). It is justifiable to assume that, addressing these quality problems in the healthcare system in Ghana does not always need such reactive approaches to be eradicated entirely. Studies have shown that relatively more reactive approaches have been adopted in practice than the proactive continuous approach of addressing quality problems (Park et al. 2011; Sanjeev, 2009; Ozcan 2008; Anarcani, 2009). In fact it has been suggested that, quality healthcare ought to be viewed as a continuous phenomenon to be explored and not a problem to be controlled (Van den Heuvel et al. 2008).

This call in recent times has been given some significant consideration as some healthcare professionals and researchers have tried adopting this approach (Van den Heuvel et al. 2008; Arah et al. 2003). A number of studies have been conducted adopting the Six Sigma model in healthcare mostly in the developed economies (Van den Heuvel et al. 2008; Schutte, 2005). Results have shown significant and considerable contributions of this technique to improving efficiency and quality in these cases. The Red Cross Hospital in Belgium and quite a number of hospitals in the United States have shown tremendous results on adopting this Six Sigma technique. If this technique actually works as proven, why hasn't it been adopted in the case of developing economies like Ghana? Again if evidence exists that the Ghanaian healthcare delivery system is grappling with efficiency and poor quality issues, then it is necessary to adopt this proven technique to help improve the quality of healthcare provided in Ghana.

1.3 Objectives of the Study

The primary objective of the study is to improve on the operational efficiency of three hospitals under the Ghana health service (GHS) using the Six Sigma model. Each hospital was chosen carefully from three distinct regions in the country.

The secondary objectives are;

i. To identify the critical service quality determinants in the Ghanaian healthcare delivery system.
ii. To identify and analyse the quality problems affecting efficiency in the Ghanaian healthcare delivery system.
iii. To demonstrate the application of the Six Sigma DMAIC model to solve one of the causes of operational inefficiency in the hospitals. This is aimed at improving efficiency and the quality of care delivered in the hospitals.

1.4 Research Questions

i. What are the critical service quality characteristics/determinants in the Ghanaian healthcare delivery system?
ii. What are the kinds of quality problems affecting efficiency in the Ghanaian healthcare delivery system?
iii. How can the Six Sigma model be used to improve efficiency in the healthcare delivery system in Ghana?

1.5 Scope and Limitations of the study

This study considered three government hospitals in Ghana. These were the Winneba government hospital, Dodowa general hospital and the Mampong (Tetteh Quarshie) government hospital. These hospitals were carefully selected for some particular reasons outlined below.

- The Dodowa hospital for instance is an already familiar place because of past research experiences of the researcher at the hospital. The researcher has conducted quite a number of data gathering exercises at the hospital and has already created the necessary rapport with the management and personnel at the hospital, for this reason, data collection and or assessing information relevant to this study would not be a problem at all. Hence the higher possibility of easily assessing necessary information or data for this study is the main reason for this choice of hospital.
- Proximity to the Tetteh Quarshie or Mampong Government Hospital was the main reason behind the choice of this hospital. The researcher is currently resident in Manfe Akuapem, located very close to the hospital. Considering the kind of study being conducted, frequent visits to the site of study will be very necessary to attain first hand information or data needed for this study, therefore given the degree of proximity the researcher thought it wise to choose this hospital to reduce the financial burden since it is easier and faster visiting this hospital at virtually no cost.

- The reason for the choice of the Winneba Government Hospital is similar to that of the Dodowa Hospital. Added to this reason, the hospital has just been relocated to a new operational site with new buildings, equipments and materials that can significantly improve on the level of efficiency at the hospital. A study of this nature can best be done here to help further improve the efficiency in their healthcare delivery to acceptable standards

Some limitations anticipated in the course of doing this research include,

- Some staff or workers for some reasons did not avail themselves or corporate appropriately with the researcher. To minimize the effect of this on the research results, the researcher begun his visitation much earlier to create the necessary rapport that enabled him schedule appointments with these staff to meet them anytime at their own convenience.
- Another major constraint is the huge financial obligation required for this exercise. This is so because it requires frequent visits to the hospitals for the data collection as well as other vital information sources needed for the successful completion of this work. With regards to this problem, the researcher will resorted to the use of phone calls, e-mailing and other cost effective means of scheduling appointments with respondents in order to minimize its impact on the research results.
- This study was also constrained by the fact that it must be completed within one academic year. This made it necessary for the researcher to concentrate on only three hospitals in Ghana.

1.6 Significance of the Study

As this study evaluates operational efficiency in the Ghanaian healthcare delivery system and seeks to propose the Six Sigma model as a means of improving on the efficiency and quality

of healthcare delivered, hospital administrators and the ministry of health (MOH) as a whole will benefit from the findings and recommendations of this research.

Furthermore, this study will be of great significance to the government. It will enable the government to formulate policies and strategies to further improve on the efficiency and quality of healthcare delivered in the country.

Again, this study will also be a contribution to academia. The findings would serve as a source of knowledge for future researchers on the improvement of quality healthcare delivery. The findings will also serve as a secondary source of data for further research work.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Literature

The last decade or so has seen a growing interest amongst both academics and practitioners in the emergence of a new production paradigm (Hossein, 2007). It is depicted as the pivot on which the move towards knowledge driven economies should turn and is similarly eulogized as one of the ways to address the perennial quality productivity lag (Hossein, 2007). Any change to the organization of work has wide ranging micro and macro implications. Unsurprisingly, the purported transformation has stimulated an increased number of researches from a variety of academic disciplines. This review seeks to offer a succinct and critical summary of some key theoretical debates in this field.

2.1.1 Concept of Efficiency

Within any industry, managers must strive to maximize stakeholder value while dealing with the complex and dynamic business environment. Additionally, they must attempt to maximize shareholder wealth in an environment where consumers insist on products possessing increasing levels of both quality and value. Buzzell and Gale (2002) noted that not only is the customer focus on quality important; it is a key driver of market share and leads to higher financial performance. More specifically, a focus on efficiency and quality is of particular importance in the service industry which consistently faces a chaotic business environment. Because of this, and the fact that achieving a high level of efficiency significantly affects performance in today's global economy, many service firms adopt a quality oriented operations philosophy. Such an adoption gives businesses a competitive advantage by creating customer satisfaction through superior value. One of the major concerns of mainstream economic theory is the efficient use of scarce resources (Rutherford, 2002). Measuring efficiency is said to be a useful tool for making choices between

alternatives. In other words, resources go into a decision making unit to be converted into products or useful outputs (Chang et al, 2004).

In economic terms, the concept of efficiency can be defined as the relationship between scarce factor inputs and outputs (Chang et al, 2004). It examines how well scarce resources are converted into products. There are quite a number of definitions for efficiency, which are mainly centered on technical, operational and allocative efficiency.

Technical efficiency usually describes the best possible combinations of factor inputs to produce a given output (Rutherford, 2002).

Rutherford (2002) further describes technical efficiency as a measure of the ability of a micro level unit to avoid waste by producing as much output as input usage will allow, or using as little input as an output level requires. Technically inefficient organizations use relatively excessive quantity of inputs when compared with peer groups achieving the same amount of output.

Allocative efficiency is an aspect of market performance that denotes the optimum allocation of scarce resources between end users, in order to produce the optimum combination of goods and services which best accords with the pattern of consumer demand (Hossein, 2007). This in other words can be interpreted as producing with the minimum use of scarce resources, the amount and type of product preferred by consumers.

This concept is significant with Pareto's welfare-based notion of efficiency that refers to an allocation of resources such that no resource reallocation could make anyone better off without making someone worse off (Hossein, 2007).

In some literature, this raises the concern of equity in distribution, which is often discussed in terms of a trade-off between efficiency and equity. According to Field and Emrouznejad, (2003) equity and efficiency should both be used to find the optimal allocation of resources. This is particularly important in the case of a healthcare system in which efficiency

improvements should be assessed in the context of equity and the healthcare needs of the community in question. Operational efficiency talks about the combination of factor inputs that minimize the cost of producing a given output (Rutherford, 2002). It can also be said to be concerned with the minimization of the cost of achieving a given output.

2.1.2 Operational Efficiency

Operational efficiency according to investopedia dictionaries refers to a market condition that exists when participants can execute transactions and receive services at a price that equates fairly to the actual costs required to provide them.

Operational efficiency is not a new concept in business and management literature. Some scholars posit that the inference by Drucker (1954) that the customer must be the focus of organization's operations and the subsequent support given to this idea by Levitt (1960) that the customer is the reason for the organization's existence were all pointing to the fact that operationally efficient activities were necessary at that time. Following these developments, operational efficiency has received a great deal of attention from many scholars who have developed, tested and advanced scales for measuring the degree of operational efficiency that organizations exhibit (Ge and Soliman 2007; Demerjian et al. (2009); Morey and Dittman (1995); Banker et al. (1984)., Thanassoulis and Dyson (1992), Zhu (1996), Seiford and Zhu (1998), and Chen (2003). As such, some researchers have found positive connections between operational efficiency and business performance (Covin, 1991).

An operationally efficient organization or firm is one which successfully applies the efficiency concept (Pavitt, 1998; Cummins and Xie, 2008). For instance, according to Blankson and Cheng (2005), the marketing concept holds that the key to organizational success is through the determination and satisfaction of the needs, wants and aspirations of target markets. They noted that these must be pursued more effectively and efficiently than that of competitors and with the intention of achieving profitability and or satisfying

objectives. From the strategic management literature, operational efficiency involves the use of superior organizational skills in understanding and satisfying customers (Day, 1990), as well as achieving management goals at the most minimum of cost. In essence, operational efficiency is derived from the application of efficiency ideas and it requires firms to monitor rapidly changing customer needs and wants, determine the impact of these changes on customer satisfaction, increase the rate of product innovation, and implement strategies that build the firms' competitive advantages (Ge and Soliman 2007).

Operational efficiency should be seen as an integral part of an organization and its processes. For this assertion, some researchers have proposed categories of organizational factors that can help determine and, or promote operational efficiency. For instance, Kohli and Jaworski (1990) in their conceptual study proposed three categories of organizational factors that determine the level of marketing orientation in any organization; top management, interdepartmental dynamics and organization wide systems. This concept can as well be adopted in ensuring operational efficiency in organizations. In that, all the three factors outlined equally play vital roles in ensuring operational efficiency in an organization. Among these three, the most critical and relevant to this study is the management; that is, the critical role of management in fostering production processes (Webster, 1988; Kohli & Jaworski, 1990).

2.1.3 The state of operational efficiency in developed and developing countries

The last 20 years have witnessed increased efficiency programs on a global scale in both developed and developing countries. Different leaders of countries with different ideological backgrounds have strongly pursued the change from mediocre states of efficient productivity to highly improved and very efficient market based methods of production. Megginson and Netter (2000) cited that the OECD in 2003 estimated that over the past two decades, more than 100 countries worldwide have adopted improved efficiency policies. Megginson and

Netter (2000) further emphasized that revenues realized from improved efficiency programmes implemented by firms throughout the United States have reached about US $400 billion since 1999 and are expected to grow at an equal pace (Van den Heuvel et al. 2008).

Many European countries have also launched various efficiency programs since1998. Among them, Great Britain is referred to as the origin of modern efficiency in operations: British organizations such as British Petroleum in 1979, British Telecom and British Airways among others were among the few European organizations that experienced the early introduction of efficiency programmes in their operations.

In most industrialized or developed economies, instituting efficiency policies have been promoted through privatization. This has been on the grounds that, improved efficiency of firms increases firm performance and profitability which are the main motives of privately owned firms (Netter, 2000).

Many studies have also examined the impact of privatization on privatized firms' operating efficiency by comparing efficiency ratios pre- and post-privatization as measured by sales per employee, and net income per employee. These studies include different firms from different sectors and different countries, most of these conducted in developed economies. These studies found significant increases in efficiency, (Boubakri et al., 2005; Wei et al., 2003; D'Souza et al., 2001; Dockner et al., 2005; Boardman et al., 2002).

Furthermore, a number of existing studies examined the impact of privatization and other determinants such as economic development, trade liberalization, capital market development, firm size and corporate governance on privatized firms' operating efficiency. These studies document that privatization significantly increased privatized firms' operational efficiency. They found also, that trade liberalization, economic development, stock market development, and foreign ownership have a positive impacts on efficiency

especially for the firms privatized before reforming process (Bortolotti et al., 2002; Okten and Arin, 2006; Boubakri et al., 2005; Naceur et al.,2007).

The literature reviewed above gives a clear indication that, operational efficiency has been an activity widely adopted by most developed countries. It can thus be suggested that the state of operational efficiency in these developed economies is significantly visible in their competitive abilities and capabilities. Comparing the state of operational efficiency in these developed economies to the developing ones, the situation is relatively not similar in most developing economies. Adoption of the idea of operational efficiency is gradually gaining grounds in the developing economies but has not been fully embraced as it has been suggested in the case of the developed economies in most of the extant literature reviewed. A study conducted on the operating efficiency and market value of Jordanian Privatized Firms by Ali (2011), found significant inefficiencies in the operations of majority of the firms selected for the study. Nonetheless, it was also found that, significant efforts were being made one way or the other to improve on the efficiency of these firms. But it cannot be said that, there has been a full adoption or a holistic implementation of efficiency improvement mechanisms.

2.1.4 Operational efficiency in the healthcare sector of Ghana

Healthcare executives and managers are always searching for better ways to improve production capacity for medical treatment and thereby improving operational efficiency.

Service capacity is a perishable commodity. Once an event is over, the revenue generating capability seems to be lost. For instance, a hospital with vacant beds loses the opportunity of generating revenue from admitting the potential additional patients for a specific day, even though the same beds may be utilized the next day. Contrary to this, physical products can be stored in a warehouse for future consumption. Service is an intangible personal experience that cannot be transferred from one person to another. Service is produced and consumed

simultaneously. Thus, whenever demand for a service drops below capacity to offer the service, it results in idle servers and facilities. Variability in service demand is quite unpredictable.

The provision of healthcare in Ghana is one of intense competition between public and private service providers and this has placed service quality firmly on the agenda of national policies on healthcare. The country has about 3,217 public and private health facilities. Out of this number, 1590 facilities are government owned (Ghana Health Service Facts and Figures, 2010). Thus, the public sector alone is responsible for approximately 50 percent of service provision and accounts for two-thirds of health personnel in the health sector. This indeed requires public facilities to improve on their efficiency in order to compete favorably with their private counterparts.

A number of studies conducted in public hospitals in Ghana over the years have provided convincing evidence that efficiency in health services delivered in Ghana is inadequate both by objective measures and in the opinion of patients and healthcare providers (Ghana Health Service, 2003; MoH, 2007).

One of the most significant studies conducted in this field in Ghana was that by Kwakye, (2004). In this study the researcher assessed the relative efficiency of some selected hospitals in the Accra – Tema metropolis, using the Data Envelopment Analysis (DEA). Kwakye, (2004) used some services as the output against which some inputs were measured. The reason for selecting these outputs according to the author was the ability of these variables or outputs to cover the main activities of the hospitals. The inputs selected were, the number of beds, physicians, nurses, administrative technicians and other staff.

Findings from the study by Kwakye, (2004) suggested significant degrees of inefficiency in the operations of these hospitals. For instance, a variable like physicians and nurses were

found to be very stressed and over worked, this to a large extent affected their effectiveness in delivering healthcare.

Ayimbillah et al, (2011), also conducted a research on "Managing Healthcare Quality in Ghana". Findings from this study were quite similar to that of Kwakye (2004). Ayimbillah et al, (2011) used variables as waiting time, flow of information or communication between hospital workers, patient – provider relationship and environment to predict or determine customer satisfaction in the selected hospitals used for the study. Findings revealed that, customer satisfaction was low in majority of the selected hospitals. Customers/patients spent very long times in queues to be attended to, the hospital environment was relatively uncomfortable and this was caused by overcrowding of the facilities. Coupled with the aforementioned, hospital staff were also overstressed causing poor or limited patient – provider relationship and poor communication at the hospitals.

An NHIS report released in 2010 also revealed significant causes of inefficiencies in the healthcare delivery system in Ghana. From the report, the introduction of the NHIS in 2003 has caused a significant increase in the demand for healthcare services, while healthcare facilities, personnel and infrastructure in general has not increased to meet the increase in demand for healthcare needs. This has resulted in the worsening of the already existent inefficiencies in the healthcare delivery system in the country. This report further suggests the worsening state of operational inefficiencies in the healthcare delivery system in the country.

These research works and a few others not reviewed in this literature have shown that there are inefficiencies in the Ghanaian healthcare delivery system coupled with this; others have also shown the causes of these inefficiencies in the system.

In the face of these arguments on to the state of healthcare delivery in Ghana, further studies are needed to change the position of service provision especially in the public hospitals. In particular, monitoring and evaluating customer satisfaction with quality of healthcare is

necessary for efficiency improvement purposes and to provide some kind of feedback to health professionals and policy makers (Bara et al., 2002). It is also important to continuously examine customer satisfaction with efficiency of hospital operations because, as argued, unless the patient is satisfied with the care delivered at reasonable cost and risk of adverse effect minimized, healthcare organizations could face the peril of going out of business (Chattopadhay and Szydlowski, 1999)

2.2 Characteristics of healthcare system in Ghana

The healthcare system in Ghana is characterized by quite a number of critical issues; most pertinent and dominant of these issues are;

- Accessibility
- Healthcare financing

2.2.1 Accessibility

An operational definition for accessibility to suit the context of this study is "the quality of being at hand when needed". With regards to this definition, healthcare accessibility means how readily healthcare facilities are available within range for citizens to access.

A study by van den Boom et al. compiled in 2004 noted that access to health facilities remained a problem in Ghana: Medical facilities were not evenly distributed across the country, with most rural areas lacking basic facilities such as hospitals and clinics as well as doctors and nurses. The study further said that Ghanaians on average live about 16 km from a healthcare facility where they can consult a doctor, but half of the population lives within a 5 km radius.

2.2.2 Healthcare financing

Coupled with the problems of accessibility of health facilities by patients, the most extreme of the problems of accessing quality healthcare in Ghana is financing of healthcare services by healthcare providers. Improving citizen's health remains an important social objective for most countries in the world. Improved health does not only benefit individuals but also benefits the broader society, accelerating economic growth and development.

Unfortunately, Ghana like many low-and middle-income countries, relies heavily on patients' out-of-pocket health payments to finance their healthcare systems (Xu et al. 2007). According to the World Health Organization (WHO), empirical evidence indicates that out-of-pocket health payment is the least efficient and most inequitable means of financing healthcare and prevents people from seeking medical care and may worsen poverty (WHO, 2000; Xu et al. 2003; Hjortsberg, 2003). As a result of this there is considerable interest in exploring the potential of social health insurance to increase access to and affordability of healthcare in Ghana. Social health insurance is seen as one of the health financing approaches with a strong potential to share risks across population groups and time (Wagstaff, 2009). As membership is mandatory, it avoids many of the problems of adverse selection which smaller, voluntary health insurance schemes face.

Effective solutions for the problem of escalating healthcare costs and under-funding in poor sub- Saharan African countries such as Ghana remain elusive. In the immediate post-independence era, Ghana provided 'free' medical services to all citizens. However, by the early 1980s, under the impression of difficult economic challenges, deteriorating health infrastructure, and massive emigration of health workers, the government implemented a cost recovery scheme (or *cash and- carry* system), as part of its IMF- and World Bank-sponsored Structural Adjustment Programs (Mensah et al., 2006). Access and utilization of health services dropped sharply, as did health indicators. Facing very high treatment costs, many

low-income households regularly postponed medical treatment, resorted to self-treatment, or used alternatives provided by unregulated healers, spiritualists, and travelling drug vendors, often with disastrous results (Oppong, 2001).

2.3 Conceptual matters

In recent years there has been an exponential growth in research conducted in the area of operational efficiency (Ge and Soliman, 2007, Butler, et al. 2004; Chang et al. 2004; Zideldin, 2006). In these works, various models of operational efficiency have been proposed. Thus, there is no convergence to a single operational efficiency model. Lloyd and Payne (2004) observed, 'not only is there no clear definition of a model, but there is also a fundamental lack of agreement about the specific practices that should and should not incorporate, as well as the meanings that are ascribed to those practices'.

For example, high performance work systems (Danford et al., 2004); high involvement work systems (Harmon et al., 2003); high commitment management (Baird, 2002) and similar formulations represent not just significant variations in terminology, but attest to large scale conceptual confusion. The significance of this observation extends beyond mere semantics. For example, a focus on high performance work systems suggests a mechanistic route to sales and revenue growth through quality management (QM) techniques such as statistical process control and conformity evaluation. This is the agenda popularized by successive generations of quality gurus; Philip Crosby, Dr. Edwards Deming, Armand V. Feigenbaum, and Dr Joseph Juran (Dale, 2003). Under this formulation, the significant roles are those occupied by senior managers and quality professionals. Conversely high commitment management, given formal theoretical expression via the concept of human resource management (HRM), emphasizes the importance of all organizational players. Especially from the perspective of resource based HRM, competitive advantage is derived not from the formal organization and

shaping of work *per se*, but the constituent workforce via both functional flexibility and commitment to organizational business plans and goals (Beardwell, 2001).

It is argued in some literature that the model of operational efficiency can be viewed as a composite of three, now relatively well embedded spheres of the production process: production management, work organization and employee relations.

According to Bélanger et al., (2002) the first dimension, production management, is concerned with aspects of productive flexibility and process standardization. A key facet here is quality management, which characteristically involves the use of statistical tools to analyze variance from tolerance margins at each stage of the production process, often subsumed within a wider TQM format. A quite distinct second dimension relates to work organization. Here, it is argued, there has been a trend towards production activities based on knowledge, cognition and abstract labour. The prerequisite of this aspect of the model is team work, the medium whereby tacit knowledge shared amongst the work group is developed into explicit knowledge. This practice of sharing skills across traditional demarcations 'is thus, a fundamental feature of the efficiency model' (Bélanger et al., (2002). The third sphere, 'employment relations', very much underpins the coherence of the former two components given the requirement for a committed, rather than merely compliant workforce. Two significant features emerge. Firstly, Bélanger et al., (2002) states that there is a desire to align and support task flexibility via terms and conditions of employment. This is typically sought by making pay contingent on group performance (Appelbaum, 2002.). Secondly, HRM professionals are charged with the pursuit of social adhesion and commitment to the new production format and wider organizational goals. This involves 'efforts to fashion employment conditions and the modes of regulation of those conditions in such a way as to elicit the tacit skills of the workers and tie them more closely to the goals of the firm' (Bélanger et al., 2002). In other words, the central task becomes the inculcation of a unitary

organizational culture, or in Guest's (2002) terms, the creation of a social system in support of the technical system.

2.3.1 Porter's Win – Win Hypothesis related to firm's environmental management

Firms are responding to demands from various stakeholders by increasing their environmental investments (Galdeano-Go´mez, 2008). Two approaches explain the relationship between the application of environmental practices and profit. The first perspective, known as the Porter's win-win hypothesis, argues that firms can obtain competitive advantage through further investment in environmental technology, thus increase profits (Porter and van der Linde, 1995; Hart, 1997). Pollution prevention can allow firms to save control costs, reduce input and energy consumption, and also reuse materials through recycling (Hart, 1997; Shrivastava, 1995). On the other hand, the resource-based view also argues that investment in green technology may foster the development of firm's resources and capabilities which form the basis for firm's competitive advantage (Hart, 1997; Arago´n-Correa and Sharma, 2003). For instance, Sharma and Vredenburg (1998) point out that investment in proactive environmental practices (e.g. pollution prevention) actually contribute to the development of valuable capabilities such as innovation, organizational learning and stakeholder integration. As a result, firms that develop these capabilities related to environmental management are able to obtain greater financial performance (Butler et al., 2004). The argument put forward by Porter in this model only promotes the conception that improved efficiency in operations can lead to increased performance in several dimensions in an organizations' operations. A thorough reduction in operational inefficiency or waste which could also be referred to as the inefficient and unnecessary use of resources in the production and delivery of services would be rewarded with improved performance of the business. Therefore the application of any technique to improve on efficiency in an organization in the long run would yield positive returns on the business' investments.

2.4 The Patient and quality of care

The rise in the increasing consumption of goods and services and the need for service organizations to maintain customer loyalty has emerged as a critical issue in most of the healthcare literature. Quality at one end of the continuum is customer oriented. Quality experts, (Crosby, 1979; Juran, 1988) highlighted the significance of the customer as being central to designing service strategies and maintaining quality management. Peters and Waterman (1982) emphasized the need for organizations to maintain intimate relationship with customers (patients), learn their preferences and provide for every facet of their needs. This is to say it is very important for healthcare managers and providers to constantly determine the factors associated with the satisfaction of patients with the quality of care provided so as to understand what is valued by the patient, how the quality of care is interpreted by the patient and to determine where, when and how service change and improvement can be made (Zideldin, 2006). Quality of care and the closely related customer service strategies are of vital concern for healthcare organizations, because, it has been argued that organizations tend to assume the preference areas of the customer only to later establish information asymmetry between the priority areas of the customer and what the organization assume they value (Wiesniewski and Wiesniewski, 2005; Lam, 1997; Donnelly and Wisniewski, 1996).

Indeed, it is important to note that serious errors are likely to occur if an organization attempts to achieve quality without a comprehensive understanding of the requirements and expectations of customers (Zideldin, 2006). An aggrieved customer is very likely to defect easily from a provider to another as a result of the fact that he or she is not happy with how he or she is treated as well as his or her needs and expectations. As far as service to the public is concerned, the customer factor remains never-ending to the agenda of organizations, because all businesses exist for only one purpose “to serve the customer” (Boyd, 1997).

To cope effectively with customers and minimize switching cost, Walters and Jones (2001) contend that organizations must begin to identify customers' problems, their demands and priorities and to explore ways of fulfilling them.

Research has further demonstrated the need to attract and retain customers loyal to the organization. Every organization wants to create and retain a loyal customer who engages in continued profitable business with him. This idea, referred to as customer loyalty, is a measure of success of a supplier or service provider to retain a long term relationship with the customer. That is, customer loyalty is when a supplier receives the ultimate reward of his efforts in interacting with its customer. A loyal customer would voluntarily choose a particular product against another for his need. The loyalty may be product specific or it may be company specific. On the other hand he may also require different products of the same manufacture. That is to say he makes significant purchases direct from the same supplier or provider and that counts as the company specific loyalty. For instance Gagliano and Hathcote (1994) observed that companies that managed to retain just 5 percent more of their customers had an increased profit of almost 100 percent. It has been established that the dissatisfied customer is likely to tell an average of 12 people about his/her unfortunate experiences (Sherman and Sherman, 1999) with each of the 12 in turn informing on average five other people. Thus, by inference, every dissatisfied customer tells an average of 72 people of their negative experience. In this context, quality of care that reflects patients' expectations is vital because non-quality can lead to patients switching providers and this can be detrimental to the hospital's competitive position.

2.5 Service Quality

For there to be successful customer care, service delivery and quality commands some significant power and influence to tell whether customers are being actually cared for by all quality standards. The attempt to define quality meets many and various opinions as the term is rather unclear and subjective. In fact, quality is similar to beauty which is in the eyes of a spectator. For Deming (1987), quality comprises lack of defect or reduction of variations. Juran (1999) defines quality as a product or service potential to be utilized. Crosby, (1979) stands at the aspects that quality is adaptation to demands.

There is agreement in literature that perceived service quality is multidimensional in nature. For instance Gronross, (1984) stated that there were two quality dimensions: functional and technical quality. Technical quality is determined by an answer to the question "what does a consumer get?" For example, if a consumer saves in a bank, the consumer gets interests; if a consumer uses bus, the consumer gets to a specific destination; if a consumer goes to a restaurant, the consumer has delicious lunch. Therefore, it is very important that technical quality is offered to consumers. Functional quality on the other hand is the way consumers get the service. For example, in the case of a bank, it is the matter of staff politeness, trustworthiness and other similar attributes. In case of a bus transport it is the matter of a bus tidiness, comfort, how timely the bus reaches its destination, or if the bus crew are /is polite etc. In the case of a restaurant, a consumer would also access how polite the waiters and waitresses are, how clean and tidy the restaurant is, as well as waiting time among others. However, technical quality strategy is reliable only where companies are capable to develop such technical solutions not easily achievable by competition.

The service quality dimensions displayed in Table 1 below, are adopted from Parasuraman et al, (1985),

Table 1: Dimensions of Service Quality

SERVICE QUALITY DIMENSIONS	CRITERIA
Reliability	It means that the firm performs the service right at the first time. It also means that the firm honors its promises.
Responsiveness	It concerns the willingness or readiness of the employees to provide service
Competence	It means that the possession of the required skills and knowledge to perform the service.
Access	It involves the approachability and ease of contact.
Courtesy	It involves the politeness, respect, consideration, and friendliness of contact personnel (including receptionists, telephone operators, etc.
Communication	It means keeping customers informed in the language they can understand and listening to them
Credibility	It involves the trustworthiness, believability, and honesty
Security	It is the freedom from any danger, risk or doubt.
Understanding/knowing	It involves making the effort to understand the customers' needs.
Tangibles	It includes the physical evidence of the services.

Source: Parasuraman et al, (1985) P. 47

Over the past few decades, a number of researchers have researched the attributes of the service, which contribute most significantly to relevant quality assessments (Gronroos, 1984; Parasuraman et al., 1985). Based on the dimensions of the service quality listed in Table 1

above, Parasuraman et al., (1985) developed a model for the determination of perceived service quality, which indicated that perceived service quality was the consumer's comparison between the expected service and the perceived service.

In healthcare literature, Bakar et al. (2008) also offered a two-way approach to understanding the dimensions of service quality in healthcare. This is also similar to the argument extended by Gronroos (1984). They distinguished between clinical quality and service quality. The former refers to activities of the healthcare process such as surgical skill, sufficient drugs, logistics and other factors that translate into better outcome. The latter on the other hand denote the multifactorial indicators of patients' experiences such as hospital comfort, support from providers, waiting time, appointment and visits and the physical environment of the facility.

Within these two standpoints, arguments emerge that functional quality largely explains patients' experiences given the fact that technical quality goes beyond patients' judgment of its core areas (Asubonteng et al., 1996). The inherent complexity in critically assessing technical quality and the general lack of technical knowledge by most clients seeking healthcare means that evaluation of service quality has mostly been based on attributes such as empathy, reliability, and responsiveness (see, Babakus and Mangold, 1992; Wiesniewski and Wiesniewski, 2005). It is these attributes that provide feedback and information on patient levels of satisfaction with quality and which are used to improve service delivery (Devebakan, 2005).

A modified version of service quality determinants was proposed by Parasuraman et al. (1985) whose study culminated in SERVQUAL has since exercised enduring influence on contemporary writers of service quality. According to these authors the dimensions of perceived service quality are: reliability, responsiveness, competence, access, courtesy, security, tangibles, communication and understanding/knowing the customer. These

determinants were later scaled-down to five (responsiveness, assurance, empathy, tangibles and reliability) to reflect customers' concern on service quality. Notwithstanding the controversy surrounding the reliability of SERVQUAL (Teas, 1994; Newman, 2001), the application of SERVQUAL with or without modification is evident in studies on healthcare (Rose et al., 2004). For instance, Tucker and Adams (2001) incorporated two more variables (caring and outcome); Hasin et al. (2001) although maintaining the five, modified it as communication, responsiveness, courtesy, cost and cleanliness. Gross and Nirel (1998) categorized them into four: accessibility, structure, atmosphere and interpersonal. Duggirala et al. (2008) considered seven components: infrastructure, personnel quality (doctor's care, nursing care, paramedical and support staff quality, quality of accommodation), processes of clinical care, administrative procedures, safety indicators, overall experience of medical care received and social responsibility. The assumption underlying the differences in the application of SERVQUAL is that, there is no off-the-shelf solution as to how to implement quality as a routine function in healthcare establishments. In other words, though the importance of quality may be universal, its design and implementation reflects each organization's or a country's particular way of organizing healthcare as well as the beliefs and values of both the users and the providers of health services (Sila and Ebrahimpour, 2002). Thus, based on a comprehensive review of the literature and taking into consideration the social and cultural orientation in which this study is been conducted, the study identifies patients' viewpoints on quality to encompass communication, patient-provider relationship, the hospital environment and waiting time.

2.6 Six Sigma model

Sigma is a character of the Greek alphabet, which is used in mathematical statistics to represent the standard deviation (Van den Heuvel, et al. 2005). The standard deviation indicates how closely all the various samples are clustered around the mean in a set of points (Antony, 2006). Six Sigma from a business perspective is described as a process that allows companies to drastically focus on continuous elimination of defects and breakthrough improvements in everyday business activities to increase customer satisfaction (Andersson et al., 2006). A defect is an imperfection that can cause a product or service not to conform to a standard inspection unit or satisfy the customers (Snee, 2004).

The Six Sigma model was developed at Motorola in 1987. In the mid-1990s, General Electric started implementing Six Sigma. The GE 1997 Annual Report states that Six Sigma delivered more than US$300 million to its operating income (van den Heuvel, 2005). Subsequently, many companies, such as American Express, Boeing, Citibank, Ford, and 3M, have followed General Electric (Breyfogle, 2003). More recently, applications of Six Sigma have also been suggested in healthcare (Barry *et al.*, 2002; Stahl *et al.*, 2003).

Organizations that invest in the implementation of Six Sigma improve on their quality. Six Sigma defined by statisticians, describes the standard deviation of a variable. The amount of sigma indicates the number of defects that are likely to occur in a production process (Van den Heuvel, et al., 2005). At three sigma level, about 6.7% defective rate is expected whereas at Six Sigma process level, 3.4 defective parts per million is expected.

A business objective to achieve Six Sigma level of process performance symbolizes the business' pursuit of high efficiency (Van den Heuvel, et al., 2005). Defectives from a business process result in extra cost to the business. Six Sigma intends to eliminate this kind of cost by improving on efficiency in the business (Bisgaard and Freiesleben, 2000). In order to measure the performance of a given process, a Six Sigma process ensures a clear definition

and implementation of relevant measures and metrics (Van den Heuvel, et al., 2005). A five phase cycle is used in the Six Sigma methodology to improve a process or tackle a performance problem. These are; Define (D), Measure (M), Analyze (A), Improve (I) and Control (C). These phases consist of 12 steps that guide a project leader in the execution of a quality improvement project (Harry, 1997). In addition to the stepwise processes, the Six Sigma contains an organizational structure. Each improvement process or performance problem to be tackled is considered a project. Project leaders, also known as Black Belts or Green Belts, are trained in project management, problem solving methodology, and statistical methods. The stepwise strategy that Black Belts and Green Belts follow enables them to make a proper problem definition and a data based diagnosis before undertaking attempts at solving the problem (Van den Heuvel, et al., 2005). Tools used in Six Sigma include Quality Function Deployment (QFD) and Pareto analysis check sheets, Cause and Effect diagram, link customer demands to product features and establish the relative importance of various problems (Van den Heuvel, et al., 2005).

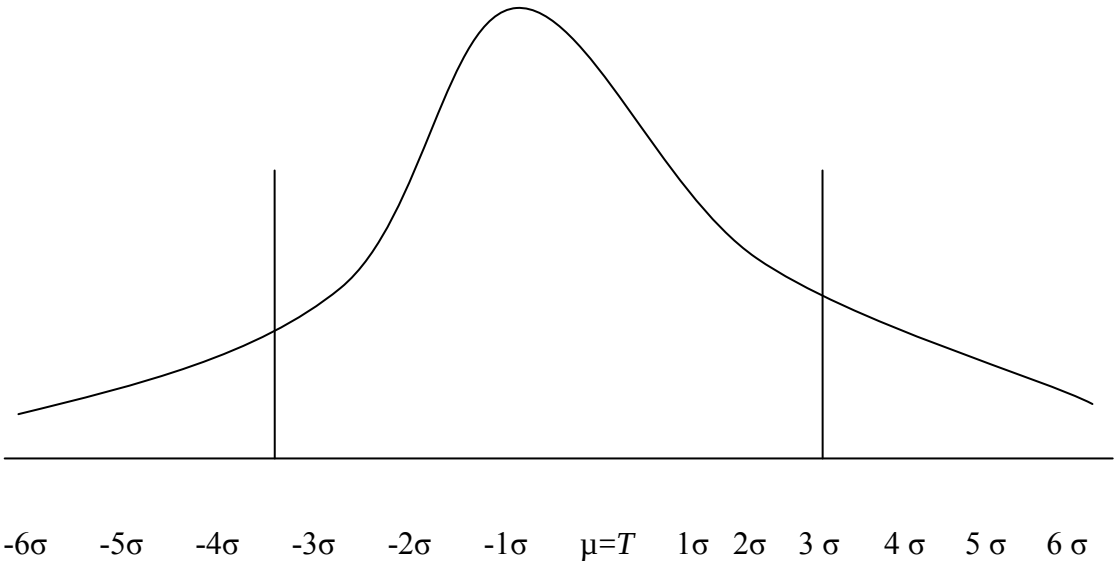
Managers or the so-called Champions review the progress of a project and ensure that the Black Belts and Green Belts focus on the interests of the organization. Experts on the Six Sigma methodology are called Master Black Belts and they are responsible for managing the Six Sigma organization (Van den Heuvel, et al., 2005). Through this structure, Six Sigma is able to combine the available knowledge from the various functions in an organization to achieve the best possible process improvements (Jensen, 1998). The focus of Six Sigma on data and the statistical verification of conclusions have proven to be a good counterbalance to the often more subjective and intuitive way of working in healthcare (Van den Heuvel, et al., 2005).

Products with many components typically have a higher tendency of failure or defects; hence can easily deviate from specification limits. The main rationale of this programme is to help

reduce variability or possibly eliminate variability totally in products quality characteristics. In other words it can be said that, the programme aims at eventually removing defects completely in products (Van den Heuvel, et al. 2005).

Before the adoption of the Six Sigma model, the three sigma standard deviation was the initial practice. The Three Sigma also sought the reduction of variability in products, but not to the extent as the Six Sigma model proposes. For instance, the Six Sigma model seeks to achieve a maximum of about 3 to 4 defective parts per million in production processes, while the three sigma model talks about 2700 defective parts per million (Van den Heuvel, et al. 2005). The figure below illustrates the above assertion.

Figure 1.1 Six Sigma and Three sigma distinguished on a normal distribution curve



Source: Montgomery, Statistical Quality Control. Pg 28

Table 1 Sigma levels and estimated parts defective.

Specification Limit	Percent inside Specification	Part per Million Defective
±1 sigma	68.27	317,300
±2 sigma	95.45	45, 000
±3 sigma	99.75	2,700
±4 sigma	99.9937	63
±5 sigma	99.999943	0.57
±6 sigma	99.9999998	0.002

From the normal distribution curve above, any point beyond or outside specification limits, that is, both the Upper Specification Limit (USL) and the Lower Specification Limit (LSL) are assumed to be out of range or not within specification. Assessing the interpretation from the figures above, the three sigma model proposes a 99.73% inside specification indicating a 2,700 defective parts per million. This condition may sound pretty good some years back, but in modern times as these, where products and services produced are more complex and have more components parts, the possibility of attaining a higher probability of conformity will be low using the three sigma model.

It can thus be said about the above assertion that, three sigma applications currently would mean giving room for more defectives in a production process. This is not acceptable in current Total Quality Management practices.

The Six Sigma model which is a build up on the three sigma model gives a higher probability of conformity to specification. A Six Sigma level in basic terms means fitting six standard deviations between a mean and the closest specification limit. If this is done successfully it would mean the standard deviations would be much smaller than they would be if it were on three standard deviations. Under the Six Sigma model, the variability or variation in the

process is very less. Therefore under this model, the probability that any specific unit of product is nondefective is 0.9999998 (99.99%) or 0.002 defective parts per million (Van den Heuvel, et al., 2005). This is by far a more appropriate condition for quality compared to the case of the three sigma model.

Healthcare needs are very dynamic; they vary from one client to another. The dynamism in the demand for this service makes its provision or delivery more complex. It is appropriate to say that, to ensure utmost quality in such services, no other model can ensure such high degree of quality than the Six Sigma model. This informs the researcher's choice of the Six Sigma model over the three sigma model for this study.

2.6.1 Six Sigma tools and techniques

There is a myriad of tools and techniques available for application within the DMAIC process. In literature the tools are mainly regarded as items necessary to carry out specific activities in a process, some examples include Pareto charts, cause and effect diagram, control charts. The techniques are the systematic procedures used to accomplish complex and systematic task or problems examples include Plan-do-check-act (PDCA) cycle, Gantt chart, flow diagrams etc. Six Sigma tools are used in the techniques to accomplish tasks systematically. Different approaches are available for Six Sigma project selection, but they are essentially top to down. Eckes, (2001) advocates that projects should be selected by a group of senior managers or that project selection should be done by a council of senior managers. This approach is in order to ensure that projects are not only of financial benefit, but also are aligned as much as possible with corporate goals.

An indicative list of Six Sigma tools and techniques are provided in Table 2 below. Not all tools and techniques have been listed in the Table.

Table 2 Six Sigma tools and techniques

Six Sigma Techniques	Six Sigma Tools
Affinity diagram	Affinity Diagram
Benchmarking	Cause and Effect Diagram
Brainstorming	Control charts
Business case	Pareto chart
Charter	Planning tools (Gantt charts)
Consensus	Poka Yoke
CTQ (Critical-to quality) tree	Prioritization matrix
Data Collection Formats	Process capability
Data collection Plans	Process Sigma
DOE (Design of Experiments)	Quality control process chart
Flow Diagrams	Regression
Gage repeatability & reproduceability	Rolled throughout yield
Hypothesis test	Sampling
Kaizen	Scatter plots
Kano Model	SIPOC diagram
Plan-Do-Check-Act (PDCA) cycle	Standardization
Stratification	Time series plots (run charts)
Stratified frequency lots	VOC (voice of the customer

Source: (RATH & Strong Management Consultants RSMC 2000)

2.6.2 Six Sigma experience in Healthcare

Six Sigma came slowly to healthcare and initially was met with some scepticism (Loay, 2003). This hesitancy came from differences between processes driven by humans and automated or engineered processes. For instance in manufacturing, it is quite possible to eliminate cost of human variability through automation, creating precise measurement of assignable causes of variation. In healthcare, the delivery of care to patients is by far a human process, and the causes of variability are often more difficult to quantify. Notwithstanding the above argument Six Sigma principles can be applied in healthcare organizations to improve their financial and operational performance. Six Sigma identifies and aligns improvement initiatives with strategic objectives and business goals and looks at key processes across the entire system (Loay, 2003). Chan (2004) added that, Six Sigma offers a new structured approach to the improvement of a complicated process in healthcare.

The Commonwealth Health Corporation according to Thomerson, (2001) was among the first healthcare organizations to fully implement Six Sigma. The Commonwealth Health Corporation implemented the Six Sigma and realised some significant gains in terms of throughput of 33% in the radiology while costs per radiology procedure decreased by 21.5% (Lazarus and Stamps, 2002b). At the beginning of 2002, Commonwealth had invested about US$900,000 in Six Sigma, which led to savings in excess of US$2.5 million (Lazarus and Stamps 2002b). Lazarus and Stamps (2002b) further indicated that the Mount Carmel Health System in Columbus reported a financial return of US$3.1 million with expectations for these financial returns to grow rapidly as more Six Sigma projects are completed. Other significant gains from Six Sigma implementation identified by Lazarus and Stamps, (2002a) were the Charleston Area Medical Centre in West Virginia which achieved US$841,000 in savings on supply chain management by using Six Sigma, and the Thibodaux Regional Medical Centre in Louisiana who have implemented the Six Sigma in areas as accounts receivable days,

medication management, patient safety, employee satisfaction, hospital acquired infections, and medical management, reported a saving more than US$475,000 per year (Stock, 2002).

2.6.3 Six Sigma Application in Healthcare

The DMAIC (Define, Measure, Analyze, Improve and Control) or Six Sigma approach integrates quite easily into service lines or processes of businesses that can furnish measurable data (van den Heuvel *et al.,* 2007). Stahl et al., (2003) suggest four general groups of metrics or response variables in healthcare that may define a delivery system's performance. These are:

1. *Service level.* The service level metrics according to Stahl et al., (2003) are those metrics that measure the ability of a system to meet the expectations of patients, referring physicians and other stakeholders, critical to quality parameters (CTQs). Each set of metrics has specific parameters.
2. *Service cost.* Service cost metrics measure or indicates the cost of a service measured against a performance that meets the expectations of patients. Some of the service cost indicators identified include cost per unit of service, labour productivity and other factors associated with the cost of providing service.
3. *Clinical excellence.* Indicators here according to Stahl et al., (2003) relate to particular treatment pathway or clinical procedures, such as compliance with guidelines for prescription of aspirin to myocardial infarction patients or reduction of rates of infection contracted in a hospital or other health-care facility. This in other words is described as clinical accuracy.
4. *Customer satisfaction.* Customer satisfaction here refers to patients' perception of the value of hospital services. That is whether the services meet or surpass patients' expected or specified satisfaction goals. Indicators here may be segmented into

specific groups such as clinical services, cost of services, staff and physician quality (Stahl et al., 2003).

2.6.4 Success factors for Six Sigma

There is a variety of important success factors for Six Sigma programmes. These success factors range from generic issues to specific issues. A couple of these include the following;

- Senior management commitment (Breyfogle, 2003)
- A good cultural fit (Harry and Schroeder, 2000)
- Good training in the use of Six Sigma tools (Harry and Schroeder, 2000)
- And strictly following the DMAIC methodology (Pande *et al.* 2000).

Six Sigma project must be strongly linked to organizational strategy and as well focus much on the end user that is the customer (Banuelas and Antony, 2002). It is also suggested that Six Sigma must begin and end with the customer.

According to Harry and Schroeder (2000), Six Sigma in most cases is designed to generate immediate improvements in profit margins. Poirier (2000) estimated that between 65% and 85% of a firm's total costs can be related directly to efficiency in operations. This in natural sense warrants the application of cost reduction strategies such as Six Sigma in firms. Healthcare delivery institutions as hospitals also need this cost reduction strategy to improve their operations as well as administrative processes (Van den Heuvel, et al., 2005).

However, the application of the Six Sigma in healthcare delivery cycles has been relatively small (Van den Heuvel, et al., 2005). Trent (2001) cited in Van den Heuvel, et al., (2005) noted that original equipment manufacturers are spreading Six Sigma through their operations by offering training to employees. George (2002), Montgomery (2001) and Basu (2001) all advocate the integration of lean principles and tools with Six Sigma in an organization's operations. Avery (2001), Moore (2002) and Baljko (2002) discuss companies' use of Six Sigma with their employees.

2.7 Identification of research gap

Based on the literature review, some gaps in the literature have been revealed. The literature review revealed that there have been relatively few studies conducted on the assessment of operational efficiency in hospitals in developing countries. Ghana as a developing country is not an exception in this case. In the specific case of Ghana, studies conducted in this field have been dramatically minimal. At least in part, the lack of appropriate data is a major cause of the limited number of studies conducted in this area in most developing countries (Hossein, 2007).

As far as this research is concerned, none of the articles or studies reviewed in this area in the Ghanaian case, has categorically suggested a specific solution to deal with the root cause of these operational inefficiencies in the Ghanaian healthcare delivery system. Some studies reviewed in this literature suggested some remedial measures that can be adopted as ad hoc solutions to correct the inefficiencies in the short run. This current study seeks to suggest a long term corrective measure that is continuous in nature to help continually tackle the operational inefficiencies in the health delivery system. The second gap identified from the reviewed literature was that, the dominant methodology used in conducting these studies in the developed economies, was the Data Envelopment Analysis (DEA). This technique is a non-parametric method in operations research and economics used for the estimation of production frontiers (wikipidea.com). In other words it is used to empirically measure productive efficiency of decision making units. This study intends to fill this methodological gap, of using another methodology in assessing the efficiency of decision making units in these selected hospitals. The major significant difference between the proposed methodology and previously implemented ones is the fact that our methodology is focused on continuous improvement. Then finally, the study seeks to project or recommend the Six Sigma Model, a

Total Quality Management technique, to improve on the operational efficiency in the healthcare delivery system in Ghana.

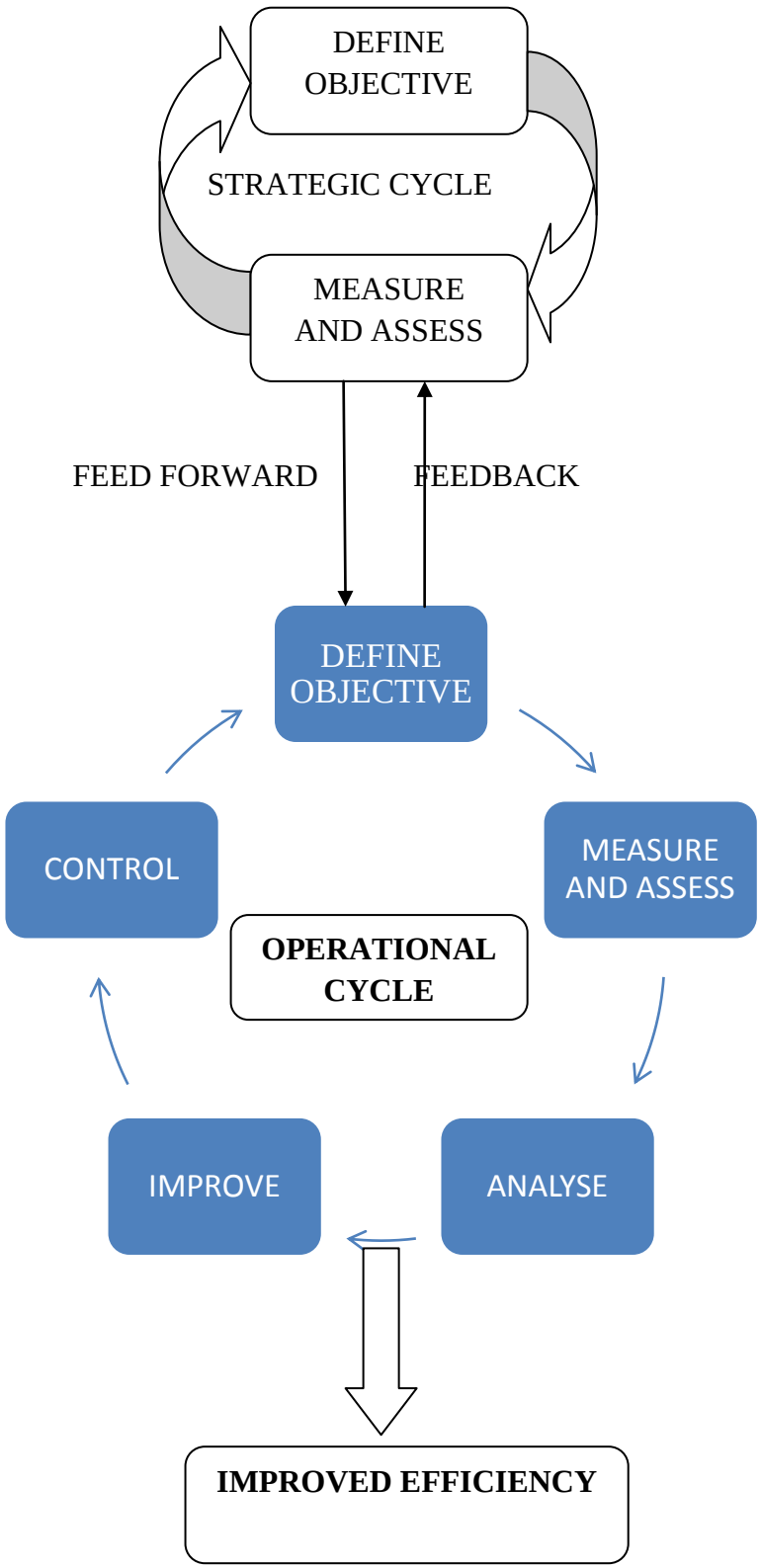
2.8 Developing the conceptual framework

The Six Sigma Conceptual Improvement model is developed from the DMAIC methodology to address the issues of operational inefficiency raised in the previous section of this study and it is solely based on the DMAIC methodology. Adopted from the supply chain conceptual improvement literature, it addresses the following points,

- The need to link improvement activities strongly to organizational strategy.
- The need to integrate improvement actions across the entire organization
- The need to focus on the end customer.
- The need to develop effective performance measurement systems for health service providers.

The conceptual model is shown in figure two below.

Figure 2: Conceptual model for improving operational efficiency



Source: Trent, (2001) Applying TQM to SCM

The model in Figure 2 above constitutes eight distinct steps to improved operational efficiency:

- Define objectives.
- Measure and assess
- Feedback/Feed forward
- Define objective
- Measure and Assess
- Analyze
- Improve
- Control

This is a similar model to the normal DMAIC methodology in Lean Six Sigma projects; the only addition to this already known methodology is the strategic phase and the link feedback and feed forward loops. These eight steps as suggested are organized in two paired cycles or phases, the strategic cycle and the operational cycle. This is in agreement with the results of the *Aviation Week & Space Technologies* survey by Velocci, (2002), which indicated that Six Sigma project objectives need to be tied strongly to the main organizational objectives to ensure success.

In the model, the strategic cycle ensures that the organizational strategies are developed into useful objectives and converted into a set of measures for activities or operations that are consistent with and aligned to the key areas of the organization. The organization's performance measured against these objectives is the key determinant for the operational-level improvement projects and activities.

Projects that are seen as having maximum strategic impact on key goals and areas of poor performance will be defined largely by a standard Six Sigma process. Once a stage/phase is

completed, feedback is given to top management at the strategic cycle. Hence the feedback is sent back to the strategic cycle at the completion of every phase of the cycle.

2.8.1 The strategic cycle

The strategic cycle in Figure2 above, consists of persons only in top management as well as the project champion; generic strategic decisions concerning improving efficiency are formulated here. In other words, this is where management at the strategic level identifies a problem that is peculiar to the efficient operation of the organization and also aligns with the organizational goals and objectives. The final decision taken at this level, that is, at the strategic phase is then forwarded to the various heads at the departmental or operational phase.

From the diagram the strategic cycle involves two main processes. These are "define objectives" and "measure and assess".

At the first process, that is, defining objectives, management seeks to set the context and objectives for the improvement project. In other words, this is where management team identifies a specific improvement project to be undertaken in the organization. Under this process objectives defined here are quite generic in nature as the scope of improvement identified here may be quite broad.

The second process at the strategic cycle involves measuring and making some assessments on the choice of improvement project identified or defined. Here management determines the baseline performance and capability of the process or system it intends to improve. Meaning that management at this stage sets standards against which performance will be measured to help assess whether the project was successful or not.

The completion of the measure and assess process completes the decision making process at the strategic level for a particular project. Having completed these two processes the final decision is forwarded to the next phase of the model, the operational cycle.

2.8.2 The operational cycle

The operational phase or cycle in the figure shows the full complements of the lean Six Sigma processes. Here the Define, Measure, Analyze, Improve and Control (DMAIC) process is fully applied to identify and correct the operational problem. This phase can best be described as the implementation phase in the model. The decision made by management is forwarded to the departmental heads (project black belts), supervisors as well as all trained staff or participants of the project, thus, these people make up the operational phase in the model. Therefore the lean Six Sigma approach is applied to identify specific areas where the problem or issue can be corrected till the entire issue of efficiency is improved.

Efficiency improvement activities must take place in the context of the complex organizational relationships that exist within the organization. This situation is recognized to be disorganized and pluralistic, unlike the relatively simple and aligned nature of internal processes. There has been a significant amount of research conducted into issues surrounding collaboration in operational efficiency (e.g. Sabath and Fontanella, 2002; Velocci, 2002). Based on the research in this area, it is possible to recommend some activities at the front end of an improvement project that will help to engender success. These are:

• Ensure understanding or a high degree of cohesion between all parties involved in the project activities. This helps to avoid petty misunderstandings and issues that can stall the progress of the project.

• Establish agreed principles and practice for resource input and gain sharing.

• On the basis of the above and expected benefits, establish collective involvement of all involved parties and agree on a scope for the project.

• Select a team from the interested organizations.

This is referred to as “set-up collaboration” in the “define” stage. In the “measure”, “analyze”, “improve” and “control”, standard Six Sigma approaches would be used but

supplemented by appropriate techniques or tools and an operational scorecard linking the performance on key measurable components back to performance on the higher level measurements.

After a successful completion of each stage, a critical assessment is conducted at the toll gate to ensure established objectives for each stage have been achieved before the next stage can begin. Activities of the toll gates complete each process. This serves as a check on project progress and also ensures that management is updated on every stage in the life span of a project. This indicates the backward movement from the operational cycle to the strategic cycle, for decision makers at this level to continually assess and evaluate the progress and outcomes of the project against established standards set.

2.8.3 Benefits of the model

The likely benefits of this efficiency improvement system are:

• A strong linkage to strategic objectives for efficiency in operations would ensure that improvement activities will focus on the most important areas and will not be *ad hoc* in nature.

• Collaboration issues are actively addressed at the start of the process so that they do not become problems later.

• The combination of waste reduction and variation reduction tools during the project allows for the complementary benefits of taking out non-value-added activities and reducing variation in the remaining "core" activities.

• Feedback from the operational level to the strategic level allows for refinement of the focus for improvement for future projects.

• The systematic approach should deliver robust solutions to inefficiencies in healthcare delivery issues.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In the first chapter of this research, we presented a formal statement of the research objectives. This chapter describes the methods to be used or to be adopted in the thesis to lmeet these objectives. An outline of the methods will be described in this section to serve as signposts to where the details on the methods can be found. This chapter has sections that describe the choice of site or the geographical area where the study was conducted, sample and sampling methods, research approach, data collection tools used to generate information for this study as well as the data analysis. It also describes the approach adopted to enhance data quality, that is, methods implemented to ensure validity and reliability. It concludes by highlighting the challenges encountered in the study as well as pertinent ethical issues in conducting research.

3.1.1 Choice of site and Justification

The choice of site for this research was guided by the fact that, these hospitals, thus, the Tetteh Quarshie Hospital, Dodowa Government Hospital and the Winneba Government Hospital are quite distinct in their geographical locations. They serve as the major formal healthcare provision centers in the communities they are located. They have also been in existence for some significant number of years. This is to say that these hospitals have operated over the years in the country to an adaptation to their environment and developed the skills necessary to ensure their successes. It can justifiably be said that, these hospitals' values and methods of operations developed over the years simultaneously with that of their environments. These hospitals are therefore suited for a study of this nature.

3.2 Research Design

The research design talks about the methodology employed in obtaining information about the level of operational efficiency in the selected hospitals to facilitate quality healthcare delivery. A cross sectional survey was used in conducting the study. This constituted a sample of the hospital workers as well as patients or clients of the selected hospitals. A survey questionnaire was designed and distributed to target respondents who were selected using the purposive sampling technique. Targeted respondents or research population were patients and workers of the Dodowa Government Hospital, Tetteh Quarshie Hospital and the Winneba Government Hospital. The population of staff consisted of those workers at the administrative units as well as the healthcare delivery units, whereas the patient population encompassed both Out-patients and In-patients. From these four sets of population, some staff and patients were selected using a purposive sampling technique. These selected staff and patients formed the sampled units used for the study. The purposive sampling technique was adopted because of the diverse nature of the populations and only some elements of the group can produce the kind of information needed. For instance, considering the patient population, they would include aged, adults and children, out-patients and in-patients, first time visitors, casual visitors and regular visitors etc. These different groups of subjects described, vary in many ways and as well will have varied opinions on the subject of this research. Coupled with this fact, subjects needed for this study as sample units needed to meet some sampling criteria and so not all subjects in the population would be qualified for selection for the study.

In order for the research to produce a realistic outcome, the collation of data has to be distributed over a large population. Thus, survey questionnaires were designed to apply to a heterogeneous population, where the targeted population encompassed a broad spectrum of respondents ranging from different gender, age groups, marital status, educational

backgrounds, designations and professions. Questionnaires were decided upon because of the following reasons;

- They ensure a high response rate as the questionnaires were distributed to respondents to complete and were collected personally by the researcher.
- They require less time and energy to administer.
- They offer the possibility of anonymity because subjects' names are not required on the completed questionnaires
- Most of the items in the questionnaires are closed, which made it easier to compare the responses to each item.

Apart from the advantages that have been listed above, questionnaires have their weaknesses; for example, there is a question of validity and accuracy. The subjects might not reflect their true opinions but might answer what they think will please the researcher, and valuable information may be lost as answers are usually brief. Therefore in the course of administering the questionnaires, some additional probing questions will be asked by the researcher to mitigate any possible effect of this weakness of the instrument.

Owing to the fact that different levels of the society have different expectations and needs, the idea of choosing respondents from different backgrounds would most certainly generate a more reliable outcome towards identifying the quality atmosphere and operational efficiency issues in these selected hospitals in Ghana. It is expected that the respondents will be very helpful and cooperative in fulfilling their obligation of filling the questionnaires patiently and also provide their own personal opinions.

3.3 The study population and sample size

An enquiry made on the average number of staff on duty at the hospitals per shift period was found to be ranging between 40 to 60 clinical staff per period. It was appropriate that the researcher choose at least fifty percent (50%) of this average number to have a fair representative of the average number of staff. Based on this assumption, the researcher chose to sample twenty (20) staff from each hospital. For the patients on the other hand, the hospitals records suggest an average number of 117 to 138 patients could be visiting the hospitals in a day, hence a sample size of 120, would be a fair representative of this population. Thus, 40 patients are to be sampled from each hospital. This sample size is also not be too large, hence would ensure a thorough and timely data gathering exercise. Subjects who met the sampling criteria were identified at the respective hospitals in the wards and outpatient departments.

3.3.1 Sampling criteria

Subjects included in the sample were selected to meet specific criteria. The patients had to meet the following criteria to be included in the sample. The criteria stated below ensured that the researcher sampled the views of persons considered as adults who better understood and were more familiar with the conditions at the hospitals, and can express their views without any influence whatsoever. This to some extent contributes to the degree of validity of the data gathered.

These criteria include;

- should be a frequent visitor to the hospital; if on admission, should have been admitted for about a week or more
- must be mentally sound in order to consent to participation

- must be willing to participate
- must be 16 years or older
- obtain the consent of guardians/parents to participate if there will be any complications or right violation

The staff of the selected hospitals also had to meet the following criteria to be included in the sample.

- working permanently with the hospital
- must be mentally sound
- should have had formal education to secondary level or beyond
- be willing to participate

3.4 Data collection

3.4.1 Data collection instrument

To gain an in-depth understanding of responses, a quantitative approach and a little blend of qualitative approach was adopted for the data collection. Such an approach is deemed very suitable for providing a better opportunity to access the exact kind of information been sought for by the study. Questionnaires were mainly chosen as data collection instrument. Whereas some minor unstructured interviews were also used to further ascertain in-depth meaning of certain responses. It must be noted clearly that, the questionnaires were the main data collecting instrument used in this study. The minor interviews conducted were adopted to help the researcher make clearer meaning of certain responses given by subjects which the researcher needed further explanation or understanding.

A questionnaire is a printed self-report form designed to elicit information that can be

obtained through the written responses of the subjects. The information obtained through a questionnaire is similar to that obtained by an interview, but the questionnaires tend to have less depth (Green, 2002).

According to Polkinghorne (2005), "the purpose of the interview is to gain a full and detailed account from an informant of the experience under study." The questionnaire sought opinions and information on quality problems in the hospitals using service quality tools. These opinions or responses were measured using different scales ranging from two points (e.g. Gender: male or female) to six points (e.g. occupation, farmer, teacher, entrepreneur, unemployed, student etc.). Data was mainly collected with the questionnaires to evaluate patients and workers' knowledge and views on quality of care and problems as well as efficiency at these selected hospitals.

The researcher personally administered the questionnaires. Again, it must be noted that the researcher had a sound understanding of the languages spoken in the three jurisdictions under study (Winneba metropolis, and Mampong and Dodowa metropolis). Where respondents could not speak or properly articulate the English language, the questionnaires for these patients were verbally translated from English into the dominant languages spoken in these areas. The aim of the research was clearly explained to patients prior to the administration of the questionnaires. Almost all the patients selected under the sampling procedure had some debriefing from the researcher concerning what was required of them, and how they had to answer the items in the questionnaire. Critical attention was given to the danger involved in allowing patients to take the questionnaires home hence on the spot collection method was used. It must be noted that the ''on the spot collection'' method was not applicable to the staff. In the case of the staff, some staff, especially the doctors could not fill the questionnaires on the spot. They kept them and after completing them the researcher went for the answered questionnaires. In this case all completed questionnaires were collected within

three weeks.

Two sets of questionnaires were used to collect the data. One was for the patients and the other one for the workers of the selected hospitals (mostly nurses and doctors). The questionnaires consisted of both closed-ended questions and open-ended questions as these provide more diverse detail. In the open-ended questions, the subjects were required to respond in writing, whereas closed- ended questions had options which were determined by the researcher.

Open-ended questions were included because they allow subjects to respond to questions in their own words and provide more detail. On the other hand, closed-ended questions were also used because they were easier to administer and analyze. They are also more efficient in the sense that a respondent is able to complete more closed-ended items than open-ended items in given period of time (Green, 2002).

A Five-point Likert scale was used to measure the degree of agreement and /or disagreement of the respondents on the statement provided in the questionnaire. In the Likert scale, the response is given numerical values which range from 0.00 to 5.50 so that all the numerical values could be calculated from all the responses. The given equivalent weights for the answers were:

Range	Interpretation
0.00 – 1.49	Strongly disagree
1.50 – 2.49	Disagree
2.50 – 3.49	Neutral
3.50 – 4.49	Agree
4.50 – 5.50	Strongly agree

3.4.2 Pretesting the questionnaire

A pre-test refers to a trial administration of an instrument to identify potential flaws. When a questionnaire is used as a data gathering instrument, it is necessary to determine whether questions and directions are clear to subjects and whether they understand what is required from them.

The researcher pre-tested the questionnaire on a total of twelve respondents meeting the set criteria at the Winneba municipal or government hospital. This consisted of six patients and six workers. All of them answered the questions. No question was entirely changed except for some minor rephrasing, following the pre-test.

3.4.3 Data collection Procedure

Questionnaires were personally distributed by the researcher to the patients and the workers at these selected hospitals to complete. The researcher found some patients in the wards where they were admitted and some health workers were found there during visiting times. Some of the patients were also found in the out-patient department together with the workers, and others at the hospitals' refectory.

The researcher helped some patients to complete their questionnaire as they could not read and make accurate meaning of the items in the questionnaire. The data was gathered or collected over a period of two months.

3.4.4 Data Analysis

The data collected were quantitative in nature. The Statistical Package for the Social Sciences (SPSS) was used in the statistical analysis for this study. The SPSS is one of the mainly and widely available and powerful statistical software packages that has an extensive range of statistical practices, which also permits a researcher to sum up information (e.g. calculate standard deviations and means), identify major differences between groups if any (e.g.,

ANOVA & t-tests), examine and or observe relationships among variables (e.g. multiple regression & correlation and graph output (e.g. line graphs, bar charts, pie chart, etc.).

Using quantitative analysis, the survey data were analyzed mainly using Common Factor Analysis and some descriptive statistics, formed around a number of propositions that the study identified. For the descriptive statistics, frequencies, percentages, mean and standard deviations are calculated. This analytic process was mainly used to describe the demographics of the sampled units.

Percentages were used to determine the magnitude of the responses to the questionnaire whereas the mean also was used to distinguish the peak of the responses of different groups of items in the questionnaire.

The data analysis technique adopted for analyzing and interpreting the data gathered was the Data Reduction Analysis also known as Factor Analysis. Factor analysis was chosen for this study because it helps to group a lot of data into smaller sets or factors/latent constructs. The aim of this study is to identify and analyze the causes of inefficiencies or quality problems present in the hospitals and improve or correct these problems with the Six Sigma model being proposed in this study.

From literature several problems have been reported as causes of inefficiency in the operations of hospitals. Hence the Exploratory Factor Analysis conducted in this study is to reduce these numerous problems into fewer groups for a better understanding and analysis of the relationships that exist between them, if any. The quality problems identified in this research were sought using eleven Service Quality (SERVQUAL) characteristics/dimensions (i.e. Responsiveness, Assurance, Reliability, Courtesy, Empathy, Communication, Equipments and Logistics, Timeliness, Understanding the patient, Tangibility and Cleanliness) that are related to the hospital case. Each of the eleven service quality

(SERVQUAL) dimension had questions that were related to patients' experiences of the hospitals services. Data collected as the quality problems were the opinions patients shared. Factor analysis adopted for this study will help to reduce these problems in a much smaller number of concepts or dimensions than the original individual variables. In that, when interpreted helps to view the variables not for what they represent individually, but for what they represent collectively in expressing a concept.

3.5 Reliability and Validity

3.5.1 Reliability

Reliability according to Green (2002) refers to the degree of consistency with which an instrument measures the attribute it is designed to measure. The two sets of questionnaires which were answered by both groups, that is, the patients and the hospital staff, revealed consistency in responses. Reliability can be ensured by minimizing sources of measurement error like data collector bias. Data collector bias was minimized by the researcher being the only one to administer the questionnaire, and standardizing conditions such as exhibiting similar personal attributes to all respondents, e.g., friendliness and support. The physical and psychological environment where the data was collected was made comfortable by ensuring privacy, confidentiality and general physical comfort.

Quantitatively, the Cronbach's alpha coefficient also known as the coefficient of reliability was used to ensure reliability of the variables adopted from literature and used for the analysis. The Cronbach's alpha coefficient tests for internal consistency and reliability for any scale or subscales used in a data analysis. That is, how closely related the variables are as a group.

The Cronbach's alpha test technique requires only a single test administration to provide a unique estimate of the reliability for the set of given variables.

In addition to the Cronbach's test of reliability and internal consistency among the identified variables the adequacy of the sample size were also tested and ensured using the Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) test respectively.

The Bartlett's Test for Sphericity tests the null hypothesis that the original correlation matrix is an identity matrix. Meaning that all diagonal elements are 1 and all of the off-diagonal elements are 0. Thus in simple terms, for factor analysis to work, we need some relationships between the variables and if the rotated matrix (R-matrix) were an identity matrix then all correlation coefficients would be zero. This test generally assesses the overall significance (i.e. significance value less than 0.05) of all correlations within a correlation matrix.

Also a more discriminating index of factor analyzability is the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO). The KMO measures the sampling adequacy, in that acceptable variables should have correlations or loadings greater than 0.5 for a good factor analysis. The KMO statistic varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlation, indicating diffusion in the pattern of correlations; hence factor analysis is not likely to be appropriate. On the other hand a value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors. This test recommends accepting values greater than 0.5 as acceptable, the higher the value of this tests the better. In summary the Bartlett's test of sphericity and the Kaiser- Meyer-Olkin measure of sampling adequacy are both significant tests that can be used to determine the factorability of the matrix as a whole.

3.5.2 Validity

The validity of an instrument is the degree to which an instrument measures what it is intended to measure (Gatewood and Field, 2000). Content validity refers to the extent to

which an instrument represents the factors under study. To achieve content validity, the researcher ensured that the subjects were given a fair understanding of the concept of operational efficiency and as well the questionnaires included a variety of questions that tested subject's knowledge or understanding of operational efficiency.

All the patients used in the study completed the questionnaires in the presence of the researcher. This was done to prevent them from giving questionnaires to other people to complete on their behalf. Also the fear of patients not returning to the hospital was another reason why the researcher ensured patients completed the questionnaires in his presence. Furthermore due to the relatively high illiteracy rate among the patients, the researcher had to ensure patients clearly understood the questions to give relevant answers.

As a result of the pretesting done before the main data collection exercise, more questions were added to ensure higher representativeness. Rephrasing of some questions was also done to clarify the questions and more appropriate alternative response choices were added to the closed-ended questions to provide for meaningful data analysis.

External validity was ensured. According to Gatewood and Field, (2000), external validity refers to the extent to which study findings can be generalized beyond the sample used. To ensure external validity the researcher chose a fair sample size for the study. In that, considering the number of patients and staff at the hospitals used in this study, the researcher chose a sample size that fairly represents at least half of the population. Coupled with this, majority of the subjects approached to participate in the study completed the questionnaires. About 92% of the subjects who were approached for the data collection participated; this suggests a very low dropout rate. Generalizing the findings to all members of the population is therefore justified.

3.6 Ethical considerations

The conducting of research requires not only expertise and diligence, but also honesty and integrity. This is done to recognize and protect the rights of human subjects. To render the study ethical, the rights to self-determination, anonymity, confidentiality and informed consent were observed.

Written permission to conduct the study was obtained from the University of Ghana graduate school and sent to the hospital administrators of the various hospitals used for the study. Verbal permission was also obtained from the nurses in charge of the various wards and units at the hospitals, where the data was collected.

Subjects' consent was obtained before they completed the questionnaires. Green (2002) defined informed consent as the prospective subject's agreement to participate voluntarily in a study, which is reached after assimilation of essential information about the study. The subjects were informed of their rights to voluntarily consent or decline to participate, and to withdraw participation at any time without penalty. Subjects were informed about the purpose of the study, the procedures that would be used to collect the data, and were assured that there were no potential risks or costs involved.

Anonymity and confidentiality were maintained throughout the study. Anonymity in this case according to Creswell, (1994) is when subjects cannot be linked, even by the researcher, with his or her individual responses. In this study anonymity was ensured by not disclosing the patient's name on the questionnaire and research reports and detaching the written consent from the questionnaire.

When subjects were promised confidentiality, it means that information they will provide will not be publicly reported in a way which identifies them (Creswell, 1994). In this study, confidentiality was maintained by keeping the collected data confidential and not revealing the subjects' identity when reporting or publishing the research work. No identifying

information was entered onto the questionnaires, and questionnaires were only numbered after data was collected.

Scientific honesty is regarded as a very important ethical responsibility when conducting research. Dishonest conduct includes manipulation of research design and methods, and retention or manipulation of data (Creswell, 1994). The researcher tried to avoid any form of dishonesty by recording truthfully the answers of those subjects who could not write nor read. Manipulation of data could not be done as an independent statistician entered the data from the questionnaire into the Statistical Package for Social Sciences (SPSS) computer software programme.

The statistician produced the results independently of the researcher to avoid subjective collaboration. The open-ended questions which were analyzed by the researcher were also checked by the supervisor for confirmation of credibility.

3.7 The Proposed Improvement Methodology

The Six Sigma or DMAIC model being recommended or proposed in this study is used to improve on the quality problems or the causes of the operational inefficiencies identified in this study. The Six Sigma methodology was chosen because it is driven by the customer and thus aims to achieve maximum customer satisfaction and minimizing the defects. It targets the customer's delight and new innovative ways to exceed the customer's expectations. The aim of this study is to help remove the inefficiencies in the healthcare delivery system to better improve on the quality of healthcare, thus to achieve maximum patient satisfaction. Furthermore, the Six Sigma is a prospective methodology as compared to other quality programs as it focuses on prevention of the inefficiencies rather than fixing them. This is the ideology of this study. The idea is to treat the causes of inefficiencies as a continuous phenomenon that will be dealt with continuously until they are totally removed and the quality of health is significantly improved and sustained. The study mainly seeks to

recommend a model that can help eliminate the quality problems and inefficiencies experienced in the healthcare delivery system to improve on the quality of healthcare and operational performance of the hospitals, hence the Six Sigma model.

A stepwise application of the model is clearly demonstrated in Chapter Six of the study. In the application, an identified quality problem faced by the hospitals in this study is used in the demonstration to make the understanding more practical.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Results obtained from Patients

4.1.1 Demographics of respondents

The first part of the questionnaire was designed to gather information about respondents' characteristics. A total of 180 copies of the questionnaires were administered during the data collection process. Out of these 180 copies of the questionnaires, 120 copies were administered to patients at the selected hospitals and 60 copies questionnaires were also administered to the hospital staff. From the 120 copies of the questionnaires administered to the patients at the three hospitals, 103 copies were completed and returned that is (85.8 percent).

From the patient respondents sampled, 43.7 percent of the respondents were males and 56.3 percent were females.

The majority of respondents were found to be within the 31-45 age groups while the minority or least of the respondents was from the group above 60 years of age. A reason for the relatively younger age distribution for the patients was mainly due to the fact that majority of the patients used for the survey were found at the Outpatient units/ departments (OPD) and these OPD's are mostly occupied by relatively younger respondents (not pediatrics or children) while the wards also had most of the relatively elderly persons. This to some extent can be said to have resulted in the responses coming from respondents who were much younger and have varying demands and expectations from the hospitals. Unlike the aged who mostly may not mind so much about the quality of service or care issues experienced in these institutions, (since they mostly have either their wards or some relative(s) supplementing care not given by hospital staff), the younger respondents are relatively more peculiar and concerned about quality of service rendered them. In the opinion of the researchers, this age

group distribution best suits this research work. Ethnicity wise, the respondents were relatively distributed fairly. With respects to the educational attainments of patients, majority (56 percent) have had formal education up to secondary school level as well as (23.3 percent) had also attained Tertiary education. This correlates with the fact that the researchers sought respondents with a relatively good educational background, to ensure respondents understood the items in the questionnaire and gave appropriate responses. Most, (56.6 percent) of the patients who responded to the questionnaire were patients who visited these hospitals frequently, in other words these hospitals would be their first point of call should the need arise, whereas 77.7 percent were outpatients and visited the hospital because of proximity reasons. Data on the occupations of the respondents was very varied and cuts across a very wide range of occupations. All the same majority of them (patients) were self employed precisely involved in trading activities. These trading activities were mostly fishing, sale of food staff and other petty trading activities. Respondents involved in fishing activities were mainly those from Winneba hospital while majority of those trading in foodstuff were from the Tetteh Quarshie Hospital and partly the Dodowa Government Hospital. A summary of the demographic data collected is displayed in Table 4.1 below.

Table 4.1 Summary of respondent's characteristics

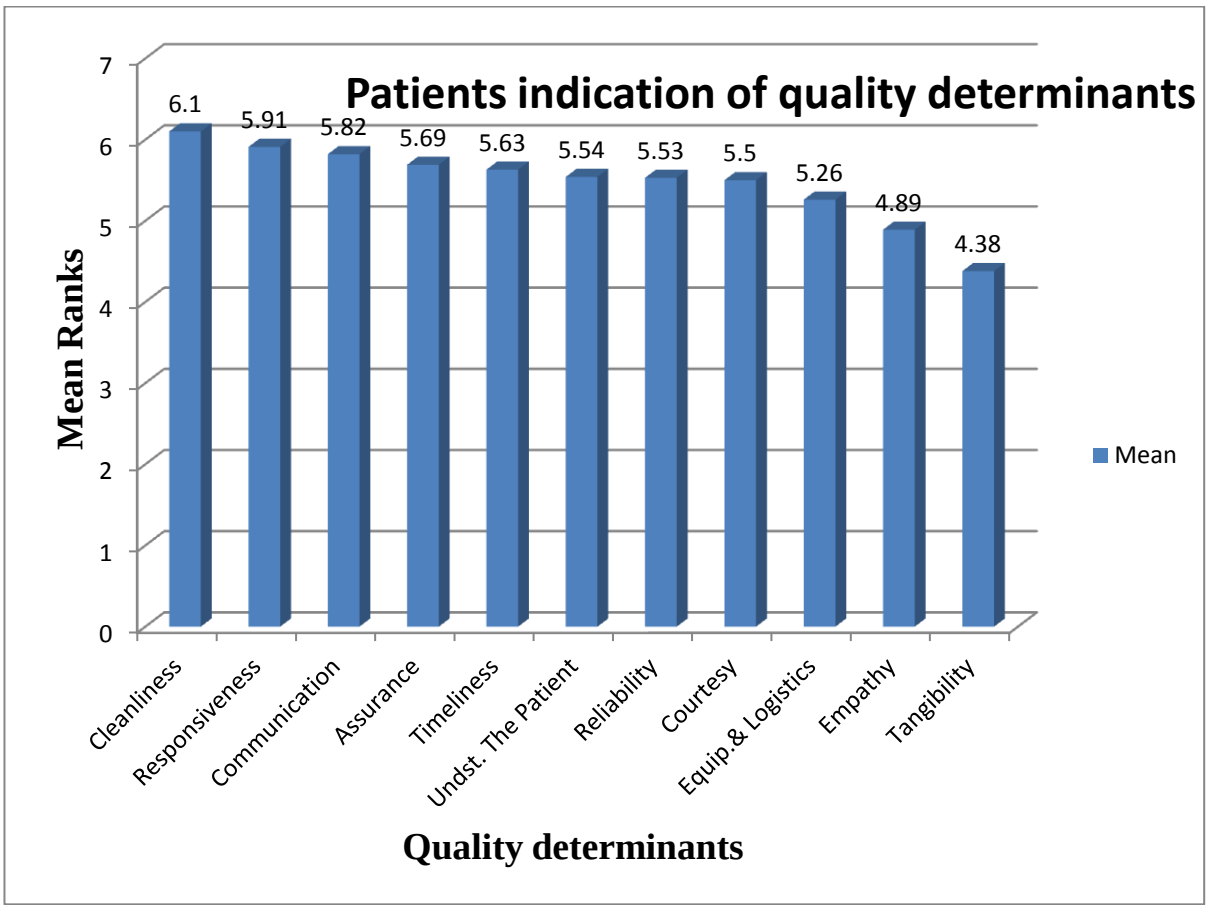
Demographic	Percent
Gender of respondents	
Male	43.7
Female	56.3
Age range of respondents	
16- 30 years	29.1
31- 45years	40.8
46- 59years	16.5
60 years and above	13.6
Educational level of respondents	
Basic/Primary level	14.6
Secondary Level	44.7
Tertiary Level	30.1
Vocational Education	10.6
Type/Class of Patient	
Outpatient	
In patient	77.7
	22.3

Source: Field of study, 2013.

4.1.2 Determinants of Service Quality

The respondents were to indicate how important they considered some selected determinants of service quality in the case of the hospital. Eleven service quality determinants that is, Responsiveness, Reliability, Assurance, Timeliness, Communication, Cleanliness, Courtesy, Empathy, Tangibility, Equipments and Logistics, Understanding the patient, were all adopted from literature to identify the quality problems associated with services rendered to patients in the selected hospitals used for this study. Respondents indicated the determinants or quality characteristic they considered most important and least important. From the questionnaire a seven point Likert scale (Very low, Somewhat low, Low Indifferent, High, Somewhat high and Very high) was used to aid respondents to indicate their preferences.

Figure 4.1 Descriptive Statistics



Source: Field of study, 2013.

Data gathered on respondents' perception of the determinants according to how important they considered them is displayed in Figure 4.1 above. There were 103 responses to this item in the questionnaire. Cleanliness was highly considered as most important by the respondents. Respondents can be said to be giving a lot of credence to how clean the hospitals environments are. Responsiveness was the second most considered, thus how staff at the hospitals responded to the patient's needs and conditions. Communication was also indicated as very important to the respondents or patients. Communication in this sense can also be described as the flow of information in the hospitals, how well issues or conditions were explained to patients as well as the ease with which patients could access information. Empathy and Tangibility were the least indicated among the quality determinants. In other

words respondents were suggesting that the physical outlook of the hospitals actually did not matter so much to them so far as they were attended to as expected. But this is not to say that, respondents would not pay any attention to the tangibility determinant or how the hospital environment looked. Because some respondents actually did give very high indication for this determinant

Table 4.2 below, shows the complete breakdown of respondent's indications of the eleven service quality determinants adopted for this study.

From the table, the frequencies of each response are those figures quoted in brackets while the percentages are the decimals not in brackets.

Table 4.2 Descriptive statistics of customer indications

	Cleanli.	Respons.	Commu.	Assura.	Undstn.	Reliab.	Timeli.	Courts.	Equip.	Empath.	Tangib.
Very low	(10) 9.7	(3) 2.9	(0) 0.0	(0) 0.0	0.0	(0) 0.0	(0)0.0	(0) 0.0	(0) 0.0	(2) 1.9	(0) 0.0
Somewhat low	(0) 0.0	(0) 0.0	(20) 19.4	(15) 14.6	(0) 0.0	(0) 0.0	(0) 0.0	(12) 11.7	(2) 1.9	(30) 29.1	(3) 2.9
Low	(3) 2.9	(2) 1.9	(0) 0.0	(8) 7.8	(0) 0.0	(0) 0.0	(2) 1.9	(0) 0.0	(16) 15.5	(6) 5.8	(5) 4.9
Indifferent	(3) 2.9	(32) 31.1	(5) 4.9	(0) 0	(10) 9.7	(11) 10.7	(11) 10.8	(8) 7.7	(7) 6.8	(13) 12.6	(6) 5.8
High	(27) 26.2	(42) 41.1	(25) 24.3	(25) 24.2	(33) 32.0	(20) 19.4	(16) 15.5	(36) 35.0	(23) 22.3	(24) 23.3	(12) 11.7
Somewhat high	(32) 31.1	(0) 0.0	(38) 36.8	37 (35.9)	(45) 43.7	(41) 39.8	(40) 38.8	(23) 22.3	(35) 34.1	(26) 25.2	(47) 45.6
Very high	(28) 27.2	(24) 23.0	(15) 14.6	(18) 17.5	(15) 14.6	(31) 30.1	(34) 33.0	(24) 23.3	(20) 19.4	(2) 1.9	(30) 29.1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

4.1.3 Tests for Reliability of Quality Determinants

In order to ensure internal consistency and reliability, the researchers conducted the Cronbach's reliability test for these eleven variables. Below are the results obtained from the reliability test.

Table 4.3(a) Item-Total Statistics

Quality determinants	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Responsiveness	.763	.434	.831
Assurance	.685	.644	.808
Reliability	.503	.462	.828
Courtesy	.460	.439	.824
Tangibility	.603	.636	.814
Empathy	.604	.671	.812
Communication	.693	.722	.805
Understanding the Patient	.625	.780	.811
Equipment and Logistics	.607	.537	.833
Timeliness	.417	.378	.843
Cleanliness	.698	.645	.807

Source: Field of data, 2013.

Table 4.3(a) contains four different columns these are labeled ''Quality determinants'', ''Corrected item – Total Correlation'', ''Squared Multiple Correlation'' and the ''Cronbach's Alpha if Item Deleted'' respectively. The first column that is ''Quality determinants'', displays the list of the quality characteristics/determinants used for the analysis. The second column thus labeled ''Corrected item – Total Correlation'' gives the correlation between an item, that is a quality determinant and the sum score of the other quality determinants. For instance the correlation between cleanliness and the sum score of the other ten quality determinants is 0.698. What this means is that there is a strong correlation between the score

of cleanliness and the combined score of the other ten quality determinants. This becomes a way of assessing how well a determinant is internally consistent with the composite score from all the other determinants that remain. If the correlation between an item (quality determinant) and the sum score of the others is weak, the item with such weak correlation should be deleted. De Vaus, (2006) suggests that any correlation less than 0.30 is considered weak for item analysis. From the table above, all the correlation values under the ‘’Corrected item – Total Correlation’’ column are acceptable; this is to say that all the variables establish relatively good correlations among each other and good for this analysis.

The third column labeled ‘’Squared Multiple Correlation Coefficient’’, measures how much of the variability in the responses to one item is predicted from the other items. The predicted Squared Multiple Correlation Coefficient is obtained by regressing the identified individual item on all the remaining items. For instance in Table 4.3(a), taking a determinant as Responsiveness, the predicted Squared Multiple Regression Correlation is 0.434. This is the predicted squared multiple regression coefficient when responsiveness is regressed on the other ten determinants. This value, 0.434 provides a sense of the level of quality of the prediction of the determinant ‘responsiveness’.

The most important column in this table is the ‘’Alpha if Item Deleted’’ column. This column represents the scale’s Cronbach’s alpha reliability coefficients for internal consistency if the individual item is removed from the scale. This is to say that, if that item is deleted it would either increase or decrease the overall Cronbach’s alpha coefficient. This is assessed by comparing these individual alpha values to the overall Cronbach’s alpha coefficient. Where the alpha value is greater than the overall alpha coefficient, it means that if that item is deleted, and the test is redone, it will cause the overall Cronbach’s alpha coefficient to increase, giving the scale of items a higher reliability or a higher level of internal consistency. The opposite also holds in this instance, in that where the alpha value is also less than the overall alpha coefficient, if that item is deleted, the overall Cronbach’s

alpha coefficient will also reduce. From the values in Table 4.3 (a) above, all the determinants had values that are very high and also very close to Cronbach's Alpha of 0.833 (see Table 4.3(b)); in that no item had an alpha value that is greater or lesser than the overall Cronbach's alpha coefficient indicating that deleting any item will not have any effect of great magnitude on the overall Cronbach's alpha coefficient, therefore all the items will be maintained.

Table 4.3 (b) Summary of Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.833	.851	11

Source: Field of study, 2013.

The summary reliability statistics as displayed in Table 4.3(b) above shows the summary statistics of the 11 items comprising the scale. The Cronbach's alpha is the average value of the reliability coefficients that would be obtained for all possible combinations of items when split into two half-test. The closer the coefficient is to 1.0 the greater the internal consistency of the item in the scale. From the summary statistics above, the alpha coefficient is 0.833, which is very high and close to 1.0. This is a clear indication that, there is a high level of internal consistency existing between these variables or determinants adopted for this study.

4.1.4 Factor Analyzing Data from Patients

The adopted service quality determinants were used as the basis for the factor analysis (Principal Component Analysis). In order to guarantee the convergent and discriminant validity, the low loading items or those items that had low correlations less than 0.5 (<0.5) were excluded from subsequent data analysis, while the latent constructs (factors) with good or high correlations were those considered as common constructs/ factors that were eligible for the analysis. The result of this analysis is to reduce the several quality problems identified to a few factors or groupings for easy and better understanding. In ensuring further reliability and goodness of fit of this model, the researcher conducted the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) test and the Bartlett's test of sphericity. Results of these tests are displayed in Table 4.4 below.

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) test conducted showed a value of 0.791, and the Bartlett's test of sphericity was 46.060, with a *p* value of 0.00.

Table 4.4 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.791
Bartlett's Test of Sphericity	Approx. Chi-Square	46.060E3
	df	946
	Sig.	.000

The Bartlett's Test for Sphericity, tests whether the correlation matrix is an identity matrix, which would indicate that the factor model is inappropriate. The correlation matrix in this case refers to a square matrix showing the correlations between all pairs of the data set, in that, it shows the individual correlation between each of the variables. In any square matrix, if the correlation between a variable and itself is one on the leading diagonal and all other entries on the off-diagonals are zeros, it forms an identity matrix. A correlation matrix is not

an identity matrix if not all off diagonal elements are zeros. A situation where the correlations on the off-diagonals are all zeros means that there is absolutely no correlation between the variables in the matrix, hence the variables would not be appropriate for the analysis. What the Bartlett's test ensures is that, the correlation matrix, is not an identity matrix. It is also used as a measure of sampling adequacy. The Bartlett's test conducted for this study is significant, meaning that the hypothesis that the inter correlation between the variables is an identity matrix is rejected. This is to say that, from the perspective of this value or this test, factor analysis is feasible. Considering a more discriminating index of factor analyzability is the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO). The KMO measures the sampling adequacy, in that; acceptable variables should have correlations or loadings greater than 0.5 for a good factor analysis. This means that if any pair of variables has a correlation value less than 0.50, it should be dropped from the analysis. The meaning of this KMO value of 0.791 from this test is that, majority of the variables used in this study have correlation values higher than the 0.50 threshold. In other words 79.1 percent of the variables used in this analysis have correlation coefficients or values greater than 0.50. The off-diagonal elements should all be high (closer to one) in a good model. This will imply that the variables establish strong correlations among themselves. The result of the KMO thus also supports the factor analysis. The significance of this test is to help prove that the sample being used for this analysis is adequate enough or the correlations between the items are strong enough to allow for factor analysis. These tests together provide a good standard which have been passed for factor analysis to proceed. In other words these two tests indicate the suitability of the data for factor analysis. Another means of assessing how well this model is doing can be obtained from the communalities.

Table 4.5 below shows the communalities of each item analyzed in the factor analysis conducted. These communalities show the proportion of each variable's variance that can be

explained by the principal components. These can also be defined as the sum of squared factor loadings.

Information displayed in Table 4.5 is in three distinct columns; these are the list of individual quality problems, the initial or default communality values and the extracted communality values. Principal Component Analysis was the extraction method used in deriving the communalities of each item. By definition the initial value of the communality in a Principal Component Analysis (PCA) is 1. From Table 4.5 below, all items under the 'initial' column had a value of 1.0 as the initial communality.

The third column, identified as the ''extraction column'' indicates the proportion of variance of each identified quality problem or item that can be explained by the principal components. Usually communality values above 0.70 give a good indication of the model being used. The variables with values or extracted communalities greater than 0.70 are well represented in the common space, while those variables with values less than 0.70 are not well represented. It is noted that, variables with high communalities are most acceptable.

Table 4.5 Communalities using Principal Component Analysis.

Quality Problems	Initial	Extraction
1. Quick response to problems	1.000	.787
2. Staff willing to answer patients questions	1.000	.794
3. Staff never too busy for patients requests	1.000	.695
4. Waiting time adequate	1.000	.737
5. Staff behaviour instills confidence	1.000	.854
6. High professionalism	1.000	.804
7. Staff friendly and courteous	1.000	.803
8. Patient treated with dignity and respect	1.000	.681
9. Clear explanations on medical conditions	1.000	.780
10. Staff assistance and cooperation assured	1.000	.695
11. Delivered promises	1.000	.712
12.Error free clinical processes	1.000	.748
13.Same level of service	1.000	.732
14.Fast information retrieval	1.000	.702
15. Physicians available always	1.000	.725
16. Refrain from acting busy	1.000	.809
17.Consideration toward patients property	1.000	.752
18.Staff polite always	1.000	.821
19.Corrections done politely	1.000	.864
20. Avoid confrontations	1.000	.795
21.Feedback to patients	1.000	.815
22.Understanding patients specific needs	1.000	.787
23.Staff go the extra mile to help	1.000	.718
24.Special assistance given to some patients	1.000	.655
25.Emotional support given by staff	1.000	.690
26.Staff listen and demonstrate concern	1.000	.669
27.Clear response to query	1.000	.717
28.Patients alerted on change in schedules	1.000	.793
29.Adequate communication signs	1.000	.764
30.Effective information centre	1.000	.845
31.Easy to understanding written documents	1.000	.787
32.Available modern equipments	1.000	.834
33.Easy access to equipments	1.000	.768
34.Functioning equipments	1.000	.871
35.Hospital hardly runs out of supplies	1.000	.701
36.Equipments are accessible	1.000	.806
37.Staff recognize regular customers	1.000	.805
38.Flexible hospital regulations	1.000	.818
39.Respect for patient preference	1.000	.823
40.Staff-patient ratio adequate	1.000	.725
41.Conscious efforts are made during peak	1.000	.704

Quality Problems	Initial	Extraction
periods		
42.Staff are punctual	1.000	.903
43.Average time with physician is adequate	1.000	.831
44.Explanations are given for delays	1.000	.750
Total Communalities		**33.896**

Extraction Method: Principal Component Analysis

From the values displayed in Table 4.5 above, with the exception of six items, all the extracted communalities are greater than 0.70. This means that majority of the variables used for this analysis are well represented in the common space. Mostly those variables with values that are close to 1.00 are those looked out for. Therefore, from the communalities displayed in Table 4.5 above, it can be said that the model adequately explains most of the variations for the variables as most of the values are greater than 0.70. But it must be said that, the model does better for some variables than it does for others. Consider ‘’special assistance given to some patients’’ with communality of 0.655 and ‘’staff are punctual’’ also with a communality of 0.903. The interpretation is that the model explains the variation better for the item captioned ‘’staff are punctual’’ than it does for ‘’ special assistance given to some patients’’. But on the whole the model well explains the variations of majority of the variables; hence it is good enough to produce significant results for this analysis.

Furthermore, a cumulative summation of all the communality values in the table would give us the total communality value which is the percentage of variation explained by the model. In the case of this study, the total communality value is 33.869. This can also be looked at as an overall assessment of the performance of the model. However, this percentage (33.869 %) in most cases is almost the same as the proportion of variation explained by the first three Eigen values of the extracted groups of variables (factors); in our case these are the quality problems identified.

The individual communalities extracted, tells how well the model is working for the individual variables and the total communality tells or gives an overall assessment of performance.

4.1.5 Factor Extraction

The information in Table 4.6 below shows the extracted variables from the factor analysis; these are shown as the cumulative percentage of variance of the extracted variables. The Eigen values associated with these factors are also shown in the table. From the table, there are four main sections labeled as ‘’Components’’, ‘’Initial Eigen values’’ ‘’Extraction Sums of Squared Loadings’’ and ‘’Rotation Sums of Squared Loadings’’. The first consisting of one column, identified as ‘’Component’’ shows the numbering of the individual quality problems identified for the analysis. This column contains numbers from 1 to 48 representing a specific quality problem identified. It should be noted that, the numbering (1 – 48) representing identified quality problems in this column are not consistent with the order in which the identified problems are listed in the communality table i.e. Table 4.5.

The next main section, thus ‘’Initial Eigenvalues’’ has three columns under it. These are the ‘Total’ column, ‘Percentage of variance’ column and the ‘cumulative percent’ column. The first column labeled as ‘Total’ shows the Eigen values of each component. The Eigen values are explained as the variances of the principal components analysis on the correlation matrix.

The first component from the table accounts for most of the variance and hence has the highest Eigen value of 7.361. The next component, that is component 2, also accounts for the second highest variance (4.797), likewise the third component, and so on. Hence each successive component accounts for less and less of the variance.

The second column under the ‘Initial Eigenvalues’ section is labeled as the percentage of variance. This column shows the percent of variance accounted for by each principal component/factor.

For this data set, the variables are assumed to be standardized, which means that each variable has a variance of 1, and the total variance is equal to the total number of variables used in the analysis.

The last column in this section is the ‘’cumulative percentage’’ column which contains the cumulative percentage of the variance accounted for by the current and all preceding principal components. For instance, in the case of the results displayed in Table 4.6, the third row shows a value of 31.896, this means that the first three components together account for 31.896% of the total variance.

The next major section in this table is the ‘Extraction sums of squared loadings’ column. Under this section there are also three columns, these are also labeled ‘Total’, ‘Percentage of variance’ and ‘Cumulative percent’. Under the first column, that is, ‘Total’ the model extracts the total Eigenvalues of factors with Eigen values greater than 2, and leaves or rejects those factors with Eigen values less than 2. Therefore it is seen from this column that, there are only eight factors, meaning that, 8 factors were extracted. Again the respective ‘percentage of variance’ explained by each of the eight factors are listed or shown in the percent of variance column. Furthermore the cumulative percents of these eight factors extracted are also shown in the ‘’cumulative percent’’ column.

The fourth and final section in Table 4.6 below, is ‘’Rotation Sums of Squared Loadings’’. This section generally shows the Eigenvalues, variance explained and cumulative percents after rotation of the factors has been performed to improve on the groups of problems or factors. The rotation changes the Eigenvalues for each of the extracted factors. That is, after rotation each of the extracted factors accounts for a different percentage of variance explained. This means that, the percentage of variance for each of the extracted factors becomes different from those shown in the ‘’Initial Eigen values’’ and ‘’Extraction Sums of Squared Loadings’’ sections, but when summed to become the total variance explained, this total is the same as that showed in the two previous sections. The first column under the

‘’Rotation Sums of Squared Loadings’’ is the ‘Total’ column. This column shows the Eigenvalues of the extracted factors after rotation. The second column here contains the percent of variance accounted for by each factor after the rotation while the cumulative percent is shown in the third column.

The extraction method adopted for this analysis was the Principal Component Analysis (PCA).

Table 4.6 Total Variance Explained and Eigen values

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	7.361	15.335	15.335	7.361	15.335	15.335	4.657	9.702	9.702
2	4.797	9.994	25.329	4.797	9.994	25.329	4.448	9.267	18.969
3	3.152	6.567	31.896	3.152	6.567	31.896	3.769	7.851	26.820
4	3.014	6.279	38.175	3.014	6.279	38.175	3.605	7.511	34.332
5	2.943	6.131	44.306	2.943	6.131	44.306	3.078	6.413	40.745
6	2.622	5.463	49.769	2.622	5.463	49.769	3.025	6.302	47.047
7	2.357	4.910	54.680	2.357	4.910	54.680	2.994	6.237	53.284
8	2.276	4.741	59.421	2.276	4.741	59.421	2.946	6.137	59.421
9	1.603	3.340	62.761						
10	1.440	3.000	65.761						
11	1.412	2.941	68.702						
12	1.284	2.676	71.378						
13	1.207	2.514	73.892						
14	1.148	2.391	76.283						
15	1.000	2.084	78.367						
16	.847	1.765	80.132						
17	.828	1.725	81.132						
18	.778	1.621	83.479						
19	.713	1.485	84.964						
20	.677	1.411	86.375						
21	.606	1.262	87.637						
22	.581	1.210	88.847						
23	.559	1.165	90.012						
24	.493	1.028	91.040						
25	.456	.949	91.990						
26	.445	.927	92.917						
27	.404	.841	93.758						
28	.351	.731	94.489						
29	.325	.677	95.166						
30	.289	.602	95.768						
31	.261	.544	96.312						
32	.240	.500	96.812						
33	.203	.424	97.236						
34	.182	.380	97.617						
35	.164	.342	97.958						
36	.162	.338	98.296						
37	.154	.321	98.617						
38	.130	.272	98.888						
39	.111	.232	99.121						
40	.093	.194	99.315						
41	.088	.183	99.498						
42	.066	.137	99.634						

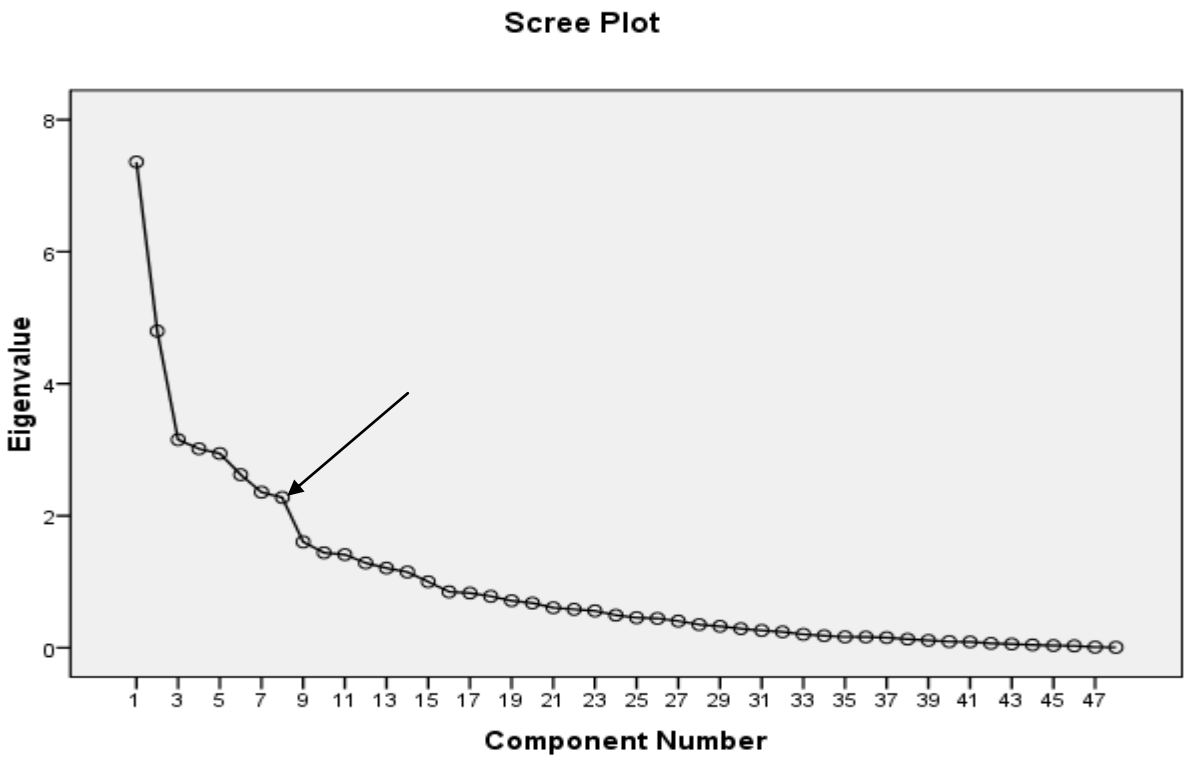
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
43	.057	.119	99.753						
44	.043	.089	99.842						
45	.033	.069	99.911						
46	.029	.060	99.970						
47	.009	.018	99.989						
48	.005	.011	100.000						

Principal Component Analysis

4.1.6 Scree Plot

The Scree plot is a graph of the Eigen values against all the factors. This graph is usually useful for determining how many factors to retain. On the graph, the point of critical importance is where the curve or the graph starts to flatten. Where the curve begins to flatten shows the end of the factors that have been retained.

Figure 4.2 Scree Plot



In the Scree plot in Figure 4.2 above, the arrow indicates a point of inflexion on the curve. It can be seen from the plot that the Eigenvalues of the first two components are very distinct above. From the third component on it is seen that the curve is becoming gentler in slope, meaning that each successive component is accounting for smaller and smaller amounts of the total variance. After the eighth component, the curve is more flat and components beyond this point are very close to each other. All of these components were those found not to have met the Eigen value greater than 2 criterion. That is to say that they all have Eigen values less than 2.

The essence of this graph or what is of importance from the Scree plot is to graphically represent those extracted components or those principal components whose Eigen values are greater than 2. At this point these eight components/factors cannot be identified. They will be explicitly identified in the next subsection below.

4.1.7 Factor Rotation

Table 4.7 below named the rotated component matrix displays the variables loaded on the extracted factors. The idea of rotation is to reduce the number of factors on which the variables under investigation have high loadings. The factor rotation does nothing to the variables or it does not change the loadings of the extracted variables in anyway, but rather reduces the table into a simpler one for easier interpretation and analysis.

The rotated component matrix shows the factor loadings or the component loadings of the extracted factors. This is the central output for the factor analysis. The factor loadings, or the component loadings in the Principal Component Analysis (PCA), are the correlation coefficients between the variables and the factors. The factor loadings are the basis for imputing a label to the different factors. Loadings above 0.50 are usually accepted and those below 0.50 are low and unacceptable. The higher the absolute value of loading, the more the factor contributes to the variable. All variables that failed to appear in the rotated component matrix or table were suppressed and this actually makes the reading of the table easier. That is to say, they were those variables that had loadings less than 0.50.

For the factor rotation conducted in this analysis, the Varimax method of rotation with the Kaiser Normalization was used. These methods of rotation were chosen because first they are the most popular and most widely used rotation method in factor analysis and they also encourage the detection of factors each of which is related to few variables. They discourage the detection of factors influencing all variables. In other words the Varimax rotation method actually cleans up the factors and makes larger loadings larger and smaller loadings smaller. Six iterations were conducted by the system (SPSS) to be able to conduct the rotation.

Table 4.7 Rotated Component Matrix

Quality problems	Components/Factors							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Staff willing to answer patients question	.847							
Consideration toward patients property	.738							
Staff go the extra mile to help	.717							
Quick response to problems	.708							
Same level of service	.613							
conscious efforts are made during peak periods	.553							
		.714						
Staff behaviour instills confidence		.690						
Special assistance given to some patients		.652						
Timeliness		.568						
Respect for patient preference		.536						
Staff recognize regular customers		.514						
Cleanliness			.716					
			.658					
High professionalism			.613					
Staff friendly and courteous			.578					
Avoid confrontations								
Corrections done politely				.708				
				.681				
Easy access to equipments				.626				
Equipment and Logistics				.578				
Available modern equipments								
Functioning equipments								
Effective information centre								
Staff polite always					.796			
Adequate communication signs					.586	.800		
Feedback to patients					.571	.683		
					.720	.589		
Average time with physician is adequate						.526		
Waiting time is adequate							.724	
Staff are punctual							.590	
Delivered promises							.580	
							.521	
Error free clinical processes							.520	
Staff listen and demonstrate concern								.688
Refrain from acting busy								.598
Emotional support given by staff								
Easy to understand written documents								
Staff-patient ratio adequate								
Understanding the Patient								

Extraction method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization

a. Rotation converged in 9 iterations

Looking at Table 4.7 above, that is the rotated component matrix, the first factor has high loadings from six quality predictors from the patients' perspective: (staff willing to answer patient's questions, consideration toward patient's property, staff going the extra mile to help, quick response to problems, same level of service; conscious efforts are made during peak period). Because these six service quality predictors are loaded on the same factor, there is the justification for combining these items in a scale which the researcher calls ''problems grouped as factor one''. Similarly, six other predictors (staff behaviour instills confidence, special assistance given to some patients, timeliness, cleanliness, staff recognize regular customers, and respect for patient preference) were also highly loaded onto factor two. For the third extracted factor, four predictors (high professionalism, staff friendly and courteous, avoid confrontations, corrections done politely) were loaded onto it. Four predictors (easy access to equipments, Equipment and Logistics, functioning equipments, available modern equipments) were also loaded onto the fourth factor. Four, four, five and two predictors were loaded onto the fifth, sixth, seventh and eighth factors respectively. Principal Component analysis, the most and widely used method of extraction in factor analysis was used in extracting and grouping the above variables, whereas the Varimax method of rotation was also the rotation technique adopted. The entire solution was arrived at in 9 iterations. It must be noted that, naming the factors is a matter of subjectivity and the researcher's discretion could be used in such a case. The eight latent constructs are regrouped under the main quality predictors (Management quality, Staff quality, and Clinical quality) by the researchers in the discussion of the results.

4.2 RESULTS OBTAINED FROM STAFF

4.2.1 Demographics of respondents

This section shows the results of data gathered on the demographics of the staff from the selected hospitals. 'Staff' is used to categorize all of the selected workers of the hospitals used for this study. Sixty (60) copies of the questionnaires were administered to the staff in total, 56 (93.3 percent) were completed and found useful for this study. From the data collected on the sampled staff population the male respondents were the minority (26.7 percent) and the remaining (73.3 percent), obviously the majority, constituted the female respondents. With regards to the age distributions, majority of the respondents were those within the 36 – 45 age groups while the lowest were from the 18 – 25 age groups. From the staff sampled for the study, 73.2 percent were nurses in the wards and OPD units, 14.3 percent were found to be from the administrative/records units while the remaining 12.5 percent were medical personnel (Doctors). Out of the nurses who responded to the questionnaire, majority (43.3 percent) of them were stationed at the male and female inpatients section. These two wards were considered as one unit and considered as staff from the inpatients ward. Twenty one percent (21.0%) were also stationed in the maternity wards while 8.9 percent were at the out patients unit.

Data gathered on the educational qualification of the staff especially the nurses suggested that majority i.e. (55.1 percent) of the staff respondents held diploma in nursing and (36.6 percent) had Bachelor's Degree in nursing. 8.3 percent of the doctors stated PHD as their educational qualification.

Table 4.8 below shows a summary of the demographic data gathered on the respondents.

Table 4.8 Summary of respondent's characteristics

Demographic	Percent
Gender of respondents	
Male	26.7
Female	73.3
Age range of respondents	
18 – 25 years	8.3
26 – 35 years	46.7
36 – 45 years	30.0
46 years and above	15.0
Educational level of respondents	
Diploma in nursing	55.1
Bachelors Degree	36.6
Masters/PHD	8.3
Category of staff	
Nurses	73.2
Doctors	12.5
Administrative staff	14.3

Source: Field of study, 2013.

4.2.1 Communalities Explained

Questionnaires administered to staff were also used to identify some quality problems in the hospitals from the perspective of the staff of the hospitals. These questions were grouped under three main constructs identified from literature. These were Management quality, Staff quality and Clinical quality. Respondents stated their opinions by agreeing or disagreeing to the items stated in the questionnaire under each of these three identified constructs. The items under each construct were supposed to be possible challenges or problems affecting the quality of service rendered to patients in these hospitals. These questions or predictors under each of the identified constructs formed the basis of the Common Factor Analysis adopted for analyzing the responses gathered on each item.

The first analysis conducted was to identify the amount of variance explained for each item by the model. This analysis also further tests the appropriateness of the variables for factor

analysis, coupled with the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and the Bartlett's test of sphericity tests that have already been conducted for all of these variables at the beginning of the analysis. The communalities explained by the model for each item is derived in this analysis. These are shown in Table 4.9 below. Table 4.9 below displays the communalities or variations of each item explained by the model. The table as seen is divided into three main columns. The first column identified as 'quality problems' contains all the predictors or quality challenges suggested in the questionnaire. The second column has the initial communalities of all the items, and these initial communalities are all 1.00. The third column in this table is the extraction column. This column shows the extracted communalities of each item. These extracted communalities for each item represent the amount of variance explained by the model for each item.

Table 4.9 Communalities

Quality Problems	Initial	Extraction
1. Inadequate financing	1.000	.816
2. Poor staffing	1.000	.979
3. General inadequacy of logistics and infrastructure	1.000	.872
4. Low job satisfaction	1.000	.827
5. Illiteracy among patients	1.000	.894
6. Poor management and supervision	1.000	.822
7. Inadequacy or lack of internal controls	1.000	.917
8. General lack of inadequate time management at the hospital	1.000	.972
9. Ensuring clinical quality is treated as a core issue in the hospital's vision	1.000	.875
10. Occurrence of clinical errors is low	1.000	.949
11. Internal control measures are actively in place to ensure clinical quality	1.000	.980
12. clinical procedures are clearly stated around for staff to serve as reminders	1.000	.963
13. structures are in place to reproach staff that make frequent clinical errors	1.00	.931
14. Hospital has functioning HR unit that recruits its personnel	1.000	.956
15. Staff always meet patient's expected waiting time expectations	1.000	.942
16. There is effective communication management and all other departments at the hospital.	1.000	.818
17. Management system adopted is liberal and all inclusive	1.000	.905
18. There is rapid response to problems and needs of departments at all times	1.000	.974
19. The average clinical error rate at the hospital is adequate	1.000	.961
20. Staff always meet patient's expected waiting time expectations	1.000	.949
21. Patients always leave the hospital satisfied	1.000	.907
22. Staff are always on time to work	1.000	.983
23. staff are knowledgeable of their job description	1.000	.969
Total Communalities		**21.161**

Extraction Method: Principal Component Analysis.

From the table above it can be seen that the corresponding Extracted communalities for the common factor analysis are all very high. The model significantly explains the variance of all the variables used for this analysis. Again those items with extracted communalities closer to 1.00 are those significant to this analysis. From the table all the extracted values are very significant as the communalities extracted ranged from 0.816 to 0.983. It can thus be said that the model explains all variables very well. This gives a good indication that the factor analysis is appropriate for this analysis.

4.2.2 Factor Extraction

Factor extraction in the analysis helps to reduce the factors into a relatively fewer number, thus selects those factors that meet the Kaiser Normalization rule, of keeping factors with Eigen values greater than two. Results of this process are shown in the table below.

Table 4.10 below shows the extraction of variables from the factor analysis; these are shown as the cumulative percentage of variance of the extracted variables. Eigen values associated with these factors are also shown in the table. There are four major sections labeled as ‘’component’’, ‘’Initial Eigen value’’, ‘‘Extraction Sums of Squared Loadings” and ‘‘Rotation Sums of Squared Loadings”. Each of these four major sections has columns with some labels. Each of these columns is explained as follows. The first major section labeled ‘’component’’, shows the list of individual quality problems used in this analysis.

The first column under the ‘’Initial Eigen value’’ column is labeled ‘’Total’’. This column displays the Eigen values of each component. It also shows the components that had Eigen values greater than two (> 2) as specified in the model. The second column under the ‘’Initial Eigen value’’ is labeled Percentage (%) of variance.

This column shows the percentage of variance accounted for by each component in the model, while the third column, thus the cumulative percent (%), only shows the cumulative percentage of the variance accounted for by the current and all preceding principal components.

‘’Extraction of sums of squared loadings’’ – this section shows only the extracted components with Eigen values greater than 2, and leaves or rejects those factors with Eigen values less than 2. In this peculiar case only four factors were extracted from the lot of twenty three (23) components. The Eigen values associated with these four extracted components are again displayed and their respective percentage variance explained under the Total and % of variance columns respectively. The final column is the Rotation sums of squared loading. The values in this panel of table show the distribution of the variance of those extracted components after the Varimax rotation. The Varimax rotation tries to maximize the variance of each of the factors, so that the total of variance accounted for is redistributed over the four extracted factors or components. The extraction method adopted for this analysis was the Principal Component Analysis.

Table 4.10 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.635	20.152	20.152	4.635	20.152	20.152	4.347	18.901	18.901
2	4.133	17.970	38.123	4.133	17.970	38.123	4.143	18.013	36.915
3	3.477	15.119	53.241	3.477	15.119	53.241	3.691	16.049	52.964
4	2.731	11.873	65.115	2.731	11.873	65.115	2.795	12.151	65.115
5	1.958	8.513	73.628						
6	1.552	6.746	80.374						
7	1.476	6.419	86.793						
8	1.182	5.138	91.931						
9	.611	2.655	94.585						
10	.579	2.519	97.104						
11	.333	1.446	98.550						
12	.241	1.049	99.599						
13	.092	.401	100.000						
14	5.327E-16	2.316E-15	100.000						
15	3.810E-16	1.656E-15	100.000						
16	2.048E-16	8.906E-16	100.000						
17	1.521E-16	6.615E-16	100.000						
18	8.554E-17	3.719E-16	100.000						
19	-1.724E-17	-7.495E-17	100.000						
20	-2.025E-16	-8.805E-16	100.000						
21	-2.441E-16	-1.061E-15	100.000						
22	-3.086E-16	-1.342E-15	100.000						
23	-4.353E-16	-1.893E-15	100.000						

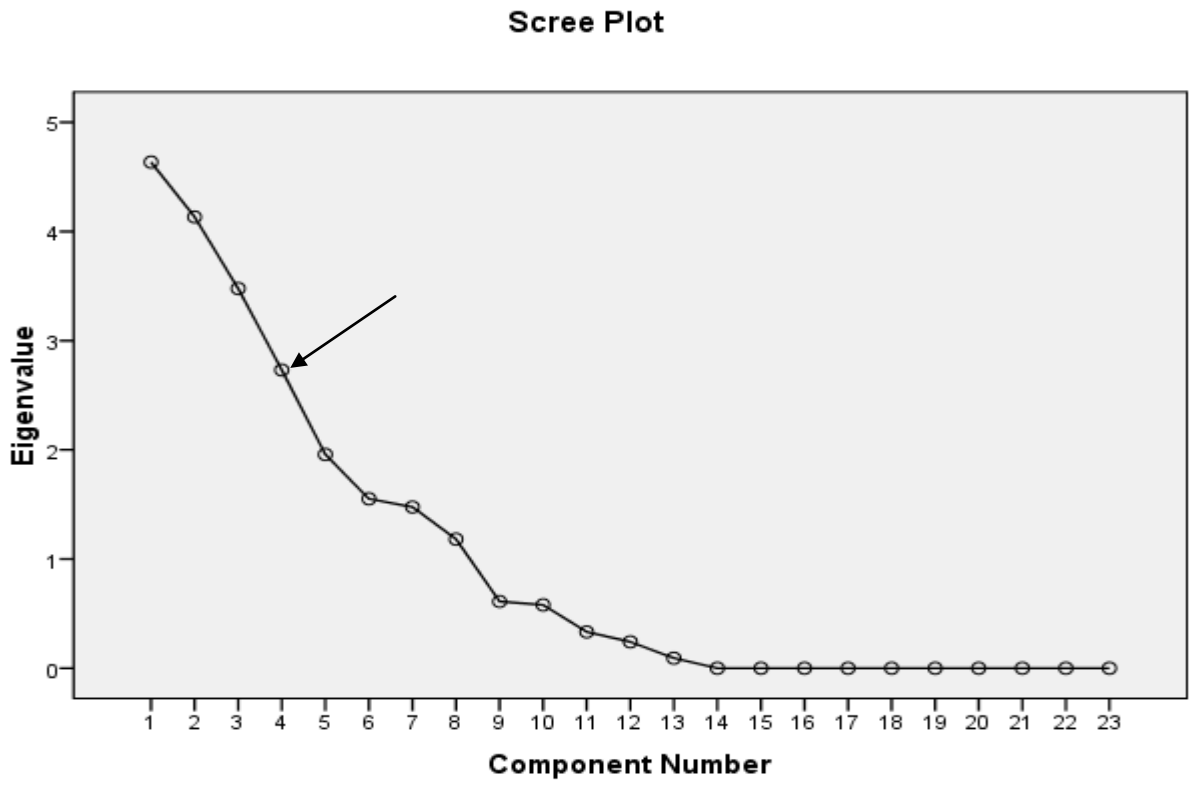
Extraction Method: Principal Component Analysis.

From the table above, the four factors extracted explain a total of 65.11% of the variance of all the factors. This percentage of variance explained by the model is thus, significantly high. This result from this analysis can also be considered as a very good indication that, the model suits the variables for the factor analysis.

4.2.3 Scree Plot

The Scree plot in Figure 4.3 graphs the Eigen values against the component number. On the graph, the values of the components with Eigen values greater than two are all seen clearly. The point of critical importance in the graph is where the arrow indicates the last extracted factor.

Figure 4.3 Scree Plot



After the fourth component it is seen that the points are becoming quite closer and the curve also becoming gentler in slope, meaning that each successive component is accounting for lesser and lesser amounts of the total variance. Beyond this point the curve is more flat and components beyond this point are relatively close to each other. All of these components were those found not to have met the Eigen value greater than 2 criterion. That is, they all had Eigen values less than 2.

The essence of this graph is to graphically show those extracted components or those principal components whose Eigen values are greater than 2.

4.2.4 Factor Rotation

The rotated component matrix or Table 4.11 shows the factor loadings or the component loadings of the extracted factors. This is the central output for the factor analysis. The factor loadings in the Principal Component Analysis (PCA), are the correlation coefficients between the variables and the factors. The factor loadings are the basis for inputting a label to the different factors. The loadings above 0.50 are usually acceptable. The higher the absolute value of loading, the more the factor contributes to the variable. All variables that failed to appear in the rotated component matrix or Table 4.11 were those variables that had loadings less than 0.50.

The Varimax method of rotation with the Kaiser Normalization was used. These methods of rotation were chosen because first they are the most popular and most widely used rotation method in factor analysis and it also encourages the detection of factors each of which is related to few variables, while it discourages the detection of factors influencing all variables. In other words the Varimax rotation method actually cleans up the factors and makes larger loadings larger and smaller loadings smaller. And also 21 iterations were conducted by the system (SPSS) to be able to conduct the rotation.

Table 4.11 Rotated Component Matrix

Quality problems	Components			
	1	2	3	4
Clinical procedures are clearly stated around for staff to serve as reminders.	.884			
Staff are given all necessary information needed to ensure patients leave the hospital satisfied	.832			
Staffs are made known of their specific duties or job description.	.507			
The average clinical error rate at the hospital is adequate		.883		
Occurrence of clinical errors is low		.728		
Ensuring clinical quality is treated as a core issue in the hospital's vision		.686		
Low job satisfaction		.671		
Internal control measures are actively in place to ensure clinical quality			.832	
Inadequacy or lack of internal controls			.753	
A system ensures staff is always on time to work or is at post.			.553	
There is rapid response to problems and needs of departments at all times				.801
Management involvement and level of supervision				.716
Management system adopted is liberal and all inclusive				.651

Extraction Method: Principal Component Analysis
Rotation Method: Varimax and Kaiser Normalization

From Table 4.11 (rotated component matrix) above there are a total of five columns, the first labeled items, contains the individual items loaded for the analysis. The other four columns are the columns for each extracted factor. In these four columns the factor loadings or correlations of each item as loaded onto the extracted factor is displayed Factor 1 from the table had three items highly loaded onto it. These are “clinical procedures are clearly stated around for staff to serve as reminders”, “staff are equipped with all necessary information

needed to ensure patients leave the hospital satisfied", "staff are made known of their specific duties or job description". These three items grouped under factor 1 are all potential causes of inefficiency in the operations of the hospitals. For instance where clinical procedures are clearly displayed around for staff to go by, it can help reduce clinical errors which results into improved quality of healthcare delivered. 'Patients leaving the hospital always satisfied', helps instills confidence in the hospital staff, therefore boosting their morale to do more.

The second factor has four items or problems loaded unto it, these are "average clinical error rate at the hospital is adequate", "Occurrence of clinical errors is low", "ensuring clinical quality is treated as a core issue in the hospitals' vision", and "Low job satisfaction". The third extracted factor has three factors "Internal control measures are actively in place to ensure clinical quality", "Inadequacy or lack of internal controls'' "a system ensures that staff is always on time to work and at post" highly loaded onto it. The fourth and final extracted factor has three factors "there is rapid response to problems and needs of departments at all times", "management involvement and high supervision", and "management system adopted is liberal and all inclusive" highly loaded onto it.

The loadings or correlations as shown in the table above are all above the 0.50 threshold specified in the analysis. Once again the Varimax with Kaiser Normalization was the rotation technique adopted for the rotated component matrix, while there were 21 iterations conducted to arrive at this rotation. This could also mean 21 algorithms were executed to estimate this solution.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 Quality determinants as considered most and least by patients

The appropriate management of healthcare services through the efficient delivery of care to the satisfaction of patients is the aim of most healthcare delivery organizations (Duggirala et al., 2008). To this end, this study examined issues or problems contributing to the low levels of efficiency in Ghanaian government hospitals. There are numerous problems existing in the Ghanaian healthcare delivery system (Researchandmarkets.com, 2008). This study adopted eleven service quality characteristics as the basis for identifying the quality problems present in the hospitals. The first section of the questionnaire asked the respondents to indicate the quality determinants they considered most important when assessing quality of service in the hospitals. Cleanliness, Responsiveness and Communication emerged as the highest or most considered quality determinants. This finding is well supported in academic and practitioner circles. For example, studies conducted by Hardy et al., (1996), Hair, (1998), and Taylor, (1994), found that cleanliness and responsiveness in hospitals emerge as strong factors considered by patients as a determinant of quality healthcare delivery. This by implication is to say that, patients see the hospitals as healing institutions. A very tidy environment is necessary not only as a primary measure to control disease outbreak but also to provide them some form of psychological relieve to their condition. Hence patients expect a clean hospital environment. Patients also expect staff to be willing to help clients and also render prompt services. Norazah et al., (2009), similarly came out with some findings that stressed on the importance attached to cleanliness and communication by patients in Malaysian hospitals. This is consistent with findings in this study, as cleanliness as well as communication both emerged as highly considered quality determinants from this study. The implication of this finding in a general sense is that, if patients consider these three quality determinants i.e.

cleanliness, responsiveness and communication as very important to their perception of what quality healthcare is, then problems emanating from these three quality characteristics are what patients would be looking out for to assess the quality in the services/ healthcare rendered them in these hospitals. For instance, when a patient is admitted in the hospital, the implication is that the ailment is serious. The admitted patient would thus expect the service provider to render optimal care and attentiveness to alleviate his/her suffering. In a situation as this, a patient who highly considers responsiveness or communication as a quality determinant will expect hospital staff to be willing to help at all times and also render prompt services or better still will demand adequate information/communication on his/her medical condition and recuperation. Healthcare services short of this would be perceived as poor service quality by this patient. These patients' choices clearly show that cleanliness, responsiveness and communication are the three most critical quality dimensions of hospital services. This conclusion is consistent with findings by Cheng and Tang, (2000) who researched on patient's expectations and satisfaction in Singapore hospitals, where they found that patients highly considered responsiveness and communication as very critical to their satisfaction with healthcare services at hospitals in Singapore.

Aside these three highly considered quality determinants (i.e. cleanliness, responsiveness and communication) assurance and timeliness were also relatively considered high by the patients. They were the fourth and fifth considered determinants by the patients and had mean ranks of 5.69 and 5.63 respectively.

In line with the objectives of the study, the second part of the questionnaire used for the data collection sought to identify and define the quality problems present in the healthcare delivery system of Ghana. The data collected in this section is on identifying the various quality problems or the potential causes of inefficiencies in the healthcare services delivered at the hospitals.

The findings suggest that the most prevalent problems causing poor quality of healthcare are centered on the service quality determinants in the hospital case. Patient's perceptions were sought on forty eight individual problems initially identified. Using factor analysis, these forty eight were reduced to eight main categories of problems. The researchers were able to identify these eight categories of problems as 'Staff responsiveness', 'Helpfulness of staff', 'Staff attitude', 'Hospital logistics and equipments', 'Communication in the hospitals', 'Promptness of services', 'Clinical accuracy' and, 'Staffing'. This identification is done by the researcher based on the kind of problems found in each group.

Staff responsiveness, the first category of problems identified in this study, is composed of six individual problems (Staff willing to answer patients questions, Consideration toward patient's property, Staff go the extra mile to help, Quick response to problems, Same level of service, Conscious efforts are made during peak periods). Staff willingness to answer patients' questions emerged as the problem with the highest factor loading/correlation i.e. 0.847 among the group of problems loaded onto this category. Patients in this regard suggest that staff exhibit some significant degree of unresponsiveness in the hospitals. In that, patient's expectations with regards to staff responsiveness are not met.

The responsive nature of a provider significantly contributes to customers' perception of service quality or to the satisfaction a customer would have from an experienced service. A number of quality studies in healthcare have suggested the critical essence of the behavioral factor of employees (Cheng and Tang, 2000; Datuk et.al, 2011). This is to say that responsiveness contributes significantly to customers perception of quality and as well influences the customers' decision of remaining loyal to the service provider or not. If staff in an organization is perceived as not being responsiveness, customer's perception of the quality of services would also be very low, thus perceiving the organization's services as that of poor quality. This is a clear case of some Ghanaian hospitals, as patients used in this study suggest

that staff in these hospitals are not responsive. A critical assertion of the other problems found in this group, are similar to this problem of unresponsiveness in these hospitals. For instance critically assessing problems as ‘staff willingness to answer patients questions’, ‘staff willing to go the extra mile to help patient’, ‘quick response to patients need’ can all be likened to the idea of responsiveness in these hospitals.

Helpfulness of staff was the second factor identified in this study. This factor had seven quality problems highly loaded onto it. Most significant of these is the problem of feedback from hospital staff to patients. It was the highest (0.720) loaded item onto the staff helpfulness group. Feedback in this sense is assumed as how often and quick staff of the hospital got back to patients with relevant information required from them and management as well. Patients in this regard suggest that, getting feedback or information from the hospitals staff is not as smooth as it should be. This significantly predicts the issue of low level of professionalism exhibited by some staff at the hospitals. As a matter of fact, the lack of confidence in staff behaviour and staff willingness to offer special assistance to patients was among the problems that were also loaded onto this factor, giving a clear indication that staff are not helpful in these hospitals. Helpfulness in generic terms cuts across a broad spectrum. For instance soliciting necessary information and providing adequate feedback to a customer in any situation is a highly considered service quality predictor. Without these feedbacks, customers are left clueless as to what next to do. This assertion is similar to the case of patients in hospitals. Patients deserve to have adequate feedback on any enquiry or condition from hospital staff or management at all times. Hospitals that actively communicate with and provide timely and useful feedback are generally helpful to patients. Where patients get a lot of help or feedback, it helps them stay motivated and engaged in the minor responsibilities required of them by healthcare givers or professionals. Hence helpfulness in general in these hospitals is lacking significantly and should be improved.

The third factor identified was named 'staff attitude'. Problems as lack of high professionalism exhibited by staff, inflexible hospital regulations, staff unfriendliness and lack of courtesy, occurrence of confrontations and Staff too busy for patient's requests were the individual problems highly loaded unto this factor. Among these problems, high professionalism among staff, had the highest factor loading or correlation that is, 0.716. These problems collectively suggest patients expect staff in these hospitals to be more professional when rendering services as health professionals. There are relatively low standards of professionalism exhibited by staff in these hospitals with regards to the behaviour of staff. Lester et al., (2008) have suggested that behaviour of staff in service-oriented organizations is very important and must be incorporated as a culture in the organization. Cohen and Keren, (2008) have also argued that spontaneous and quality discretionary behaviours are essential elements in effective service delivery. Through quality professional behaviour nurses and other healthcare professionals can deliver higher levels of patient satisfaction and improve organizational efficiency (Chang and Chang, 2009; Lee et al., 2009). This is to say that, it is in the interest of Ghanaian healthcare institutions and hospitals to engage their staff, especially the nurses, in professional behaviour issues as a means of improving the quality of services. These quality problems identified under the factor 'staff attitude' exist because of the lack of professional behaviours as courtesy, attentiveness, friendliness etc. among hospital staff in these hospitals used in this study.

Five problems were highly loaded onto the fourth factor identified as 'Inadequacy of hospital logistics and equipments'. In this study the findings show that, there were problems of inadequacy of equipment and some logistics needed by healthcare providers to provide quality healthcare services to patients. As a matter of fact this problem has been the most prevalent of all the problems faced in the healthcare delivery system of Ghana. It has been seen in several reports of studies conducted in Ghana (Donkor and Samuel, 2012; Ayimbillah

et al., 2011; NHIS report; 2010, Kwakye, 2004). In the case of this study, aside the problem of general inadequacy of equipment and logistics, other significant problems were also identified under this factor some of which include the malfunctioning nature of some of the equipment available as well as the inaccessibility of the equipment by all classes of patients who visited these hospitals. Respondents' opinion on this problem is that, the relatively few types of equipment available are broken down and awaiting repairs or replacement. Where these equipment are functioning properly, some patients are unable to access them either because of financial reasons or pressure on these equipment. This analysis is consistent with similar reports by some researchers in Ghana. (Kwakye, 2004; NHIS report, 2010; etc). This therefore further confirms reports of existing studies conducted on this area in literature.

Communication in the hospital is the fifth factor identified by the researchers from the factor analysis in this study. Three problems, effective information centre, staff politeness when talking to patients and adequate communication signs are the individual problems loaded onto this category. Good medical care depends on effective communication between patients and healthcare providers. Where this condition is lacking, it could result in improper medical treatment. That is, improper communication can lead to improper diagnosis and delayed or improper medical treatment (HHS, 2001). The problem of an effective information centre and adequate communication signs are most prevalent in the hospitals used for this study. Patients suggest these hospitals lacked these communication systems that are needed to aid patients acquire the necessary information they required or facilitate healthcare delivery at the hospitals. For instance communicating with persons who are deaf or hard-of-hearing often requires interpreters or other services. These hospitals lacked functioning centres with qualified personnel needed to meet this kind of challenge. Communication in some regards also extends to the manner in which staff talk to patients at the hospitals as well as their knowledge base of what they intend communicating to the patient. The respondents in this

study suggest that staff are most often very impolite towards them. Raising their voices at patients and some impolite gestures were the most identified cases of impoliteness by some staff toward patients in these hospitals. By implication, managements of these hospitals can improve on the quality of services rendered to patients by improving on communication in the hospitals as well as engaging staff in managing their attitudes towards patients.

Furthermore ‘’promptness of hospital services’’ was the sixth latent factor from this study’s findings. This factor was composed of four problems (Average time with physician is adequate, delivered promises, staff are punctual, and waiting time is adequate). Promptness of hospital services coined from these four individual problems suggests the untimely manner in which services are rendered to patients in these hospitals. Average time spent with a physician had the highest loading of 0.800. Critically assessing these problems, they suggest time taken or spent by patients in these hospitals is not appropriate, meaning patients spend long waiting times to receive various healthcare services. Hospital managements and policy-makers should be more concerned with outpatient waiting time because it is a measure of organizational efficiency (Kujala et al. 2006; Cayirli et al. 2008; Zhu et al., 2009). Some literature on service quality indicates that waiting experiences are typically negative and have been shown to affect overall satisfaction of consumers with the service encounter (Bielen and Demoulin, 2007). The finding in this study is also consistent with findings of Donkor and Samuel, (2012) on unrealistic delays or long waiting times as a major problem and a source of dissatisfaction in many Ghanaian hospitals resulting in healthcare services not being delivered promptly.

Clinical accuracy is also identified as a major problem found existing in Ghanaian hospitals from the analysis. This was the seventh latent category defined in this study. ‘An error free clinical process’ was the problem with the highest loading (0.724) among the problems loaded onto this factor. Errors in clinical processes occur when a healthcare provider chooses

an inappropriate method of care or improperly executes an appropriate method of care. In other words these are also described as human errors in healthcare. Respondents in this study suggest there are occurrences of these human errors in these hospitals. These errors significantly affect the quality of healthcare provided in these hospitals. According to the Agency for Healthcare Research and Quality report 2002, about 7,000 people were estimated to die each year from clinical errors. The report further suggests that clinical errors affect one in 10 patients worldwide. This report confirms the fact that clinical inaccuracies or errors are highly prevalent in many hospitals worldwide, and so the Ghanaian hospital's experience is nothing different with regards to this problem. This report, thus, confirms the finding in this regard as an existing problem in Ghanaian hospitals.

The eighth and final factor identified in this study was defined as 'staff strength'. There were two problems significantly loaded onto this factor. Among the two problems, inadequate staff-patient ratio was the highest loaded problem onto this factor. A factor loading of 0.688 had this problem emerge as the problem with the highest correlation with the factor 'staff strength'. This is to say that patients suggest the number of staff available at these hospitals do not match the increasing numbers of patients as well as their demands. This finding significantly bears inference with the MOH report, (2008), in that the Ministry of Health calculates that the number of nurses (including professional nurses, community health nurses, enrolled nurses and midwives) at 16,316, a shortage of 30,999 nurses in accordance with the ''workable'' number of 47,315. Several studies have also reported the issue of inadequate numbers of medical staff in Ghana as a problem creating high inefficiency in the healthcare delivery system (Kwakye, 2004; NHIS report, 2010; Ayimbillah et al., 2011). Shortages of healthcare delivery staff results in increased workloads and pressure on staff. This significantly worsens the efficiency situation in the hospitals as well as the quality of care to be given to patients. The findings of this current study further confirm the reports of these

other studies conducted on causes of poor quality of care given and efficiency in Ghanaian hospitals.

The results when considered collectively imply an important message from patients to hospital managers and other professionals. For instance improving on staff responsiveness and helpfulness, ensuring professionalism among staff, improving communication, clinical accuracy and promptness in services rendered would significantly improve on the quality of healthcare provided in these hospitals. A clearer indication of these constructs is that patients focus their expectations of quality service on the functional aspects, ``how it is done". Hence correcting inefficiencies in the healthcare delivery system would mean attaching critical attention to improving the quality of the care processes and personnel involved in these functional processes or operations of the hospitals in Ghana. This is not to say abandoning the technical aspects and concentrating on the functional activities alone would improve on the quality situation as well as efficiency in Ghanaian hospitals. But with reference to this study, the functional activities and processes in the hospitals have been found to contain majority of the prevalent quality problems. In this same vein, if majority of the quality problems impeding efficiency in most of these hospitals are to be eliminated to improve efficiency in the hospitals, then the hospital's functional processes and activities have to be critically reviewed.

5.2 Problems Identified by staff

Having sought opinions of patients on the causes of inefficiencies in healthcare services delivered in these hospitals, the researcher further sought the opinions of staff on the causes of poor efficiency in services of the hospitals.

Table 4.11 in the previous chapter, (pp. 91) displays the rotated component matrix, the final output from the factor analysis conducted.

Thirteen individual problems were identified from the opinions of the staff as the main causes poor quality which could lead to inefficiency in the hospitals. Factor analyzing these identified problems revealed four latent constructs or factors that better depict the causes of inefficiencies in the operations of the hospitals. These four factors were renamed considering the patterns discovered in the groups they belonged. The first factor was named "Information flow", factor two was called "Clinical errors", factors three and four were called "Inte rnal controls" and "Management proactivity" respectively.

The first factor extracted in the analysis, had three problems loaded onto it. This factor contains problems that mainly revolve around communication i.e. how well specific duties as well as job descriptions of hospital staff was outlined and made available to them, as well as the availability of documents that serve as quick reminders to staff to aid them in ensuring accuracy in services they rendered etc. "Clinical procedures being clearly stated around to serve as reminders for staff" and ''Staff are given all necessary information needed to ensure care given to patients leaves them satisfied'' had the highest correlations or factor loadings (0.884 and 0.832) respectively. This is to say that, documents or information that could easily serve as reminders or provide staff with directions as to how to go about procedures and some processes were not always available. In some cases specific job descriptions are not available to staff, their duties and roles are rather stated in a generic style. The unavailability of such information contributes to sluggishness and basic human errors that occur in the hospitals. Adequate provision of these medical or clinical information contributes significantly to staff efficiency and quality of clinical services provided in these hospitals. These factors strengthen (information flow) notion of inadequate flow of information in these hospitals. Staff in this case, suggest that, the dissemination of information in general in these hospitals is not adequate as it ought to be. The importance of the adequate flow of information in organizations has been reported in many studies Norazah et al., (2009). Lack of this

necessary conditions significantly affect the efficiency in operations of the organization, hence the case of these hospitals used in this study.

The second latent factor was coined around problems relating to clinical errors in the hospitals. Four individual problems were loaded highly onto this factor. These are, ‘’Average clinical error rate at the hospital is adequate’’, ‘’Occurrence of clinical errors is low’’, ‘’Ensuring clinical quality is treated as a core issue in the hospital's vision’’ and ‘’Low job satisfaction’’. Ensuring the non-occurrence of these clinical errors is likely to improve on the quality of healthcare delivered in the hospitals. The issue of low job satisfaction contributes significantly to this problem. Staff suggested to be enduring deplorable work conditions that are constant distracters to their operations. For instance working for several months without payment makes delivery of their services very difficult.

The third factor was named ‘’Internal controls’’. Strict adherence to work procedure and medical processes is key to the successful provision of quality healthcare in these hospitals. Hence management is to ensure staff complies with accepted or appropriate procedure to meet established standards in healthcare delivery in these hospitals. Staffs opinions from this study suggest that control mechanisms present at the hospitals are inadequate. In other instances, they suggest that, these internal control measures are in existence but strict adherence to is lacking. This confirms the issue of inadequacy of the internal control measures. For instance, majority of staff are not aware of laid down internal procedures of dealing with, or reproaching staff who frequently commit clinical errors. In most instances they are rather covered up by fellow staff. It is thus, clear from this finding that internal controls in these hospitals are not adequate.

Management proactivity was the fourth factor identified in this study. With regards to this category, ‘’rapid response to problems and needs of departments at all times’’ was the major

problem loaded onto this factor. Staff in this case suggests that efforts by management to tackle problems faced in the hospitals were inadequate and thus caused a number of problems that affected their efficiency. It must be noted that the hospitals are government hospitals and as such management face some significant bureaucracies in their attempt to undertake some steps to tackle problems facing the hospitals. Considering taking initiatives and acting promptly staff was of the opinion that management was not doing much in that aspect. Furthermore Management involvement and level of supervision also emerged as a problem that affected the efficiency of some staff in the hospitals. Staff again suggest that the number of health personnel at the hospitals providing care to patients is inadequate, hence the issue of inefficiency in the hospitals' operations.

5.3 Assessing challenges faced in improving and controlling the quality problems Identified.

The avowed objective of the hospitals in Ghana is to ensure quality in healthcare delivered to their clients in an efficient manner. The success of this objective requires continuous improvement in efficiency and control of challenges that impede or potentially can disrupt the achievement of this objective. With regards to findings from this study four challenges are mainly faced by management as regards the improvement of efficiency in the hospitals. These are, the challenge of inadequate health infrastructure, the capacity of human resources, facilities to cope with the increasing quality demands and illiteracy among patients. Opinions were sought from persons mostly in management or leadership positions about peculiar challenges faced in improving or correcting the problems identified as affecting the quality of services or efficiency of staff in the hospitals; results gathered were grouped under the four major themes mentioned above. In this study, it is observed that these four challenges are the major challenges that impact negatively on the ability of the hospitals to improve on their efficiency hence the poor quality healthcare delivered to patients most often. Health

infrastructure mainly constitutes problems of inadequacy of space at the hospitals, mostly in the wards and the Outpatient departments. This condition or challenge is most severe in the case of the wards, unlike the outpatient units where patients are made to sit outside or hang around and check in from time to time. Respondents here suggest that the challenge of limited working space in the wards and maternity units compounded the issue of improving efficiency in their operations. Instances where patients are admitted in hospital lobbies and rooms where clinical equipments are to be kept affect their operations significantly. This situation is most prevalent at the maternity units. Expectant mothers due for labour outnumber the ward's capacity hence the overflows are admitted on the corridors of the wards. In extreme situations some other rooms as the stores or equipments rooms are converted temporarily into ad hoc wards just to contain the situation. This affects movement of equipments and personnel in general, thus inhibiting the efficient delivery of healthcare services. The results confirm the issue of worsening healthcare delivery situation upon the introduction of the National Health Insurance Scheme (NHIS report, 2010); more especially the increased facility attendance not matching increased infrastructure. Another challenge identified in this study that is also consistent with some other studies conducted in Ghana was capacity of human resource. Poor 'staff–patient' ratio has been identified as a challenge in the Ghanaian healthcare delivery industry (Ayimbillah et. al., 2011). In this study we addressed it as the capacity of the human resource. Responses from the staff again suggested that the number of patients hospital staff attends to during a working session is far beyond their capacity and this significantly affects their efficiency. Coupled with this is some challenge of low job satisfaction. If job satisfaction is low and staff are expected to cope with the extra workload in these hospitals, their efficiency would definitely be impeded. For instance at the Out patients units, there was not a specific number of patients a staff was supposed to attend to in a day, but staff suggested they could attend to an average of 120

patients in a day. This is stressful and results in their sluggish attitudes towards their work, hence affecting their efficiency. Some doctors who were used in this study as well supported this claim, and suggested their case was rather overwhelming. The workload at the hospitals significantly outmatched the capabilities or capacities of the human resource; hence this significantly affected the efficiency of the staff and the hospital as a whole.

Findings from the study also revealed that inadequate facilities needed to cope with increasing quality demands of patients was also a prevalent challenge in the hospitals used in this study. As a result of recent activities in the Ghanaian healthcare industry, for instance the introduction of the National Health Insurance Scheme (NHIS), there has been a tremendous increase in demand for healthcare as well as facility attendance countrywide. This has significantly increased the quality problems already existing in the system. Moreover facilities such as specialist centres, equipments and certain drugs are not always readily available, thus stifling the work of the service providers in the industry. Coupled with this challenge is the issue of illiteracy on the part of patients. Responses collected from staff on this challenge suggest that, only a few of the patients who visit these hospitals most often are literates, thus, majority are illiterates and are indigenes of the communities in which the hospitals are located. Illiteracy among patients according to the staff posed challenges with getting patients particulars for documentation, difficulty with administering certain treatments and medications, and most persistent and worse of all, was the issue of dealing with unnecessary patients interference with clinical procedures at the hospitals. For instance, some patients make entry into some restricted room areas in the hospitals as a result of the fact that they cannot read or understand some inscriptions or do not understand why they must not come in especially when a person of theirs is in there. These petty but frequent situations interfere with clinical processes as they occur.

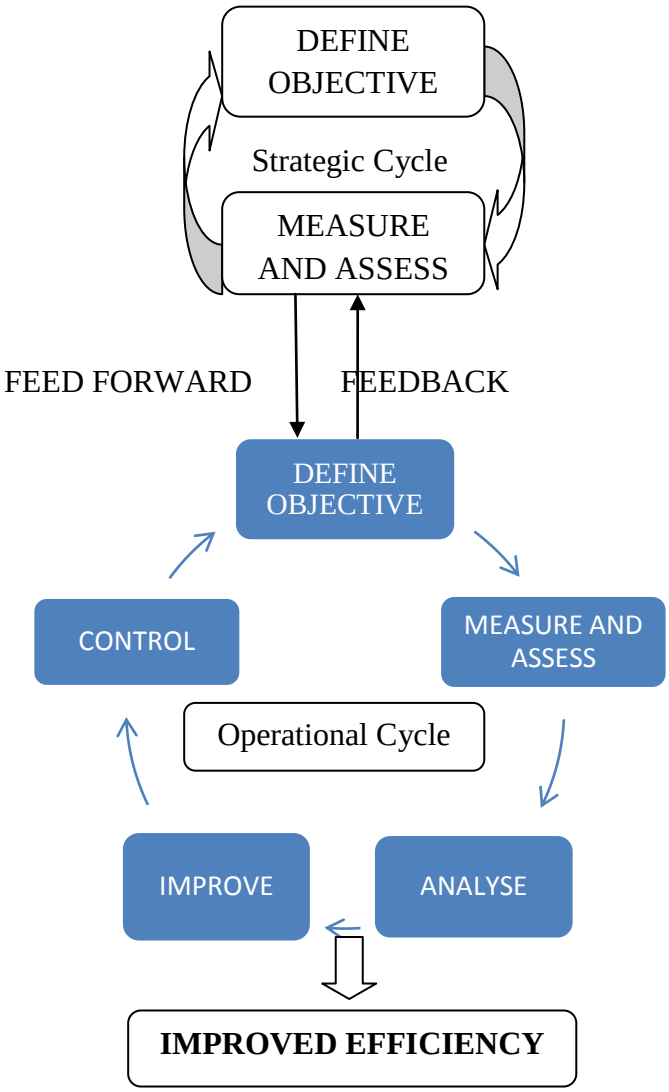
All these challenges emanating from patient illiteracy one way or the other contribute to extra workload and stress on staff of the hospitals there by affecting efficiency as well.

CHAPTER SIX

6.0 A Review of the Model

The model adopted in this study is a similar model to the normal DMAIC methodology in Lean Six Sigma projects. The only addition to this already known methodology is the strategic phase, the feedback and feed forward loops. There are seven interconnected steps in this model, and it is organised in two–paired cycles or phases; thus, the strategic cycle and the operational cycle. The core objective of this model is to ensure Six Sigma improvement decisions are strongly tied to management goals or are strictly in line with top management goals and objectives for the organization.

Figure 6.1: Efficiency Improvement Model



6.1 Application of the Six Sigma Process Improvement DMAIC Cycle

This section describes a step by step application of the proposed model in improving efficiency in the hospitals. Each step has been carefully explained with relevant activities that need to be undertaken for the success of the model. 'Crowding', an operational problem identified from the findings is also used as an example to better explain the application of the model.

6.2 Success Factors for Six Sigma

For the hospital to successfully implement the Six Sigma technique and improve on its efficiency, it must ensure certain structures and conditions are adequately in place.

First and most important is management's support to the process (Breyfogle, 2003). The decision for new ways and improved modern methods of giving care is only an aspect of management's commitment to the process. This is because quite often implementing Six Sigma processes comes with huge capital and other resource needs. Management's unflinching support in terms of providing all needed help from start to end of the process is very key to the success of the Six Sigma methodology at the hospital.

Coupled with this, adequate training in the use of Six Sigma tools and education is also very essential to the success of the technique. This is because staff may have problems applying the tools and techniques if they are new to these techniques and tools. In some cases affected staff may have problems of accepting the changes and improvements the technique brings and may take actions or attitudes that can jeopardize the project. Therefore adequate education and training for staff is needed to enlighten them on their needed support for successful implementation of the Six Sigma methodology.

It must also be said that, a strict adherence to the Six Sigma steps or processes is also critical to the success of the process (Pande *et al.*, 2000). All activities involved in the Six Sigma

methodology should be carefully executed and steps strictly adhered to ensure a successful completion.

6.3 The Strategic Cycle

The first cycle which is the strategic cycle involves two processes, which are 'Define objective' and 'Measure and Assess'. This cycle depicts top management's activities in the model to ensure that the quality improvement process is well aligned with top management and general organizational objectives.

6.3.1 Define Objectives

The management at this stage should clearly define the overall objectives for seeking to improve on the crowding situation at the hospital. Managements' objectives should involve ensuring privacy for hospitalized patients, well ventilated wards and a free flow of clinical activities in the wards. The achievement of these objectives will lead to an improved overcrowding in the wards.

6.3.2 Measure and Assess

Management here should measure and assess the conditions in the wards to know whether its objectives are being achieved or not. This gives a clearer picture of the problem they should improve. The measurement and assessment by management is done mainly through observations of activities in the respective wards or by studying performance reports and other documents on activities going on in the wards. A successful completion of this process should convince management that there is indeed a problem and this marks the end of the strategic cycle. Implementation of the next stage of the model then begins. In that, the decision by management on what problem or process that needs improvement is forwarded through the feed forward loop to the operational cycle where a solution to the improvement of the problem is sought.

6.4 The Operational Cycle

The operational cycle contains five steps. At this stage the selection of the project team is carefully done. This is a major activity that precedes the five steps involved in the operational cycle. The activities here are those undertaken by the project team.

6.4.1 Define

The define step in the operational cycle involves the definition of the problem of crowding by the project team. This step confirms there is crowding as identified by management as the exact or main cause of hospitals' inability to achieve management's objectives. Therefore the project team conducts preliminary assessments of the problem of crowding in the wards. The team then prepares the project charter. This document contains the scope of the project, problem statement, the overall objectives, and the project objective and resources and personnel requirements for the project.

In our crowding illustration, the problem statement is; crowding rate has exceeded the acceptable crowding rate in the hospital's wards. The overall objective is to have well ventilated and uncongested wards.

The project objective is to reduce crowding in the wards to at most 12.5%. The project is to be undertaken only in the wards at the hospital.

6.4.2 Measure

The project team here conducts a survey on staff and patients opinions on the signs and causes of crowding in the hospitals' wards. Congested wards, difficulty in the flow of clinical activities as well as intrusion on patients' privacy are signs of crowding in the wards. The causes include, frequent re-admissions, number of available wards, number of nurses in the wards, and type of patients (needing admission or not) reporting at the hospital. Well structured questionnaires and or interviews are used to collect both variable and attribute data on these causes and signs at this stage.

6.4.3 Analyze

In this stage we do a critical analysis of the data/information gathered from the measure step. This analysis will help to isolate the top causes of crowding in the hospitals' wards as well as the symptoms. With this type of causes it is appropriate to use a check sheet. From the check sheet we construct a histogram or a Pareto chart which clearly displays the top causes and symptoms identified.

Unplanned re-admission is identified as a top cause of crowding in the hospitals' wards. Using a cause and effect diagram it is found that, Doctors and Nurses are often too busy and do not make any follow-up with patients' post hospitalization treatments and system constraints encountered by nurses are the two top causes of re-admissions which causes crowding in the hospitals' wards.

6.4.4 Improve

At this step the project team identifies and implements the possible remedies to the top causes of crowding. Identifying the remedies is done through brainstorming. Consideration is given to the human resource and other resources available for the project to ensure feasible outcomes.

Staff and other personnel are led to appreciate the benefits to be gained from implementing this process improvement activity. For this purpose, the project team conducts training and education for staff or personnel to be involved in the implementation and as well sensitize other staff to lend their support to this activity when needed.

With regards to our illustration some remedies to implement are, nurse interventions with emphasis on education and counseling to increase compliance. Telephone reminders are scheduled daily to remind patients to take their medications at appropriate times. A 24-hour post-hospitalization call centre should be established as a remedy to the problem of re-

admission. The project team trains personnel knowledgeable about a range of medical issues to take phone calls from patients who reach the call centre for enquiries.

6.4.5 Control

The last step of the operational cycle is the control step. This is where continuous efforts are made to sustain the improvements made in the processes or problem identified to ensure lasting results. Management and staff must exercise high levels of responsibility at this stage to ensure lasting gains from improving on the problem of crowding at the hospital. The project team at this stage prepares a control plan that allows everyone to be involved in the continuous sustenance of the project. Periodic audits and error-proofing exercises are scheduled by the project team to ensure everyone follows the required procedures in their daily operations. The completion of this step also indicates the end of the operational cycle. Feedback is sent to top management on the successful implementation of the improvement process through the feedback loop.

The model above if adopted and implemented gradually, is likely to improve on the efficiency in the operations of hospitals as well as improve on the quality of care administered in the long run.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS OF FINDINGS

7.1 Summary of Findings

The research adopted a quantitative approach to analyze the phenomenon under study. Survey questionnaires were used as the main data collection tool. The survey was conducted in three different hospitals, i.e. the Winneba Municipal Hospital, Dodowa Government hospital and the Mampong (Tetteh Quarshie) Government Hospital using some staff and patients of these hospitals. A total of 180 respondents (40 patients and 20 staff from each hospital) were sampled for the study. Data collected was analyzed using some descriptive statistics and factor analysis, to help reduce the numerous problems identified to fewer constructs/groups for better understanding.

In this study, the researchers have demonstrated how the Six Sigma DMAIC process can be used to improve on efficiency in some hospital operations in Ghana. Furthermore, eleven Service Quality (SERVQUAL) determinants/characteristics in the hospital case were used to identify the service characteristics that are considered most important by patients and the areas in which the hospitals' quality problems emanated mostly from. In this way, Ghanaian hospitals can improve on the quality of health services rendered to patients and efficiency of the hospitals.

Analysis of the findings were that cleanliness, responsiveness and communication are the most critical of the service quality determinants or characteristics that influence patient's perception of what quality of service is in the hospitals.

Drawing inference from the discussion, patients consider a clean hospital environment, adequate communication between patients and the care providers as well as responsive staff as the quality characteristics that define their perception of quality service in healthcare. Hospital services lacking these characteristics are perceived as poor quality by patients in this

regard. It is important to state that majority of the poor quality problems faced by patients are from the functional aspects or processes of the hospitals' operations. Staff attitude and responsiveness as well as communication in the hospitals contribute most of the poor quality problems that affect efficiency in these hospitals. Inadequacies of healthcare professionals as well as lack of needed equipment and infrastructure also contribute significantly to the causes of poor quality of healthcare in the industry. But it must be noted that with regards to this study they must not be construed as the main causes of poor quality of healthcare delivered in these hospitals as in the case of many studies conducted in hospitals in developing country case like Ghana.

According to reports of some studies reviewed in the literature that also formed the premise for this study (Ayimbillah et al., 2011; NHIS report, 2010; Kwakye, 2004), numerous quality problems exist which affect the efficiency of the hospitals. The survey results confirmed the existence of these problems, as patients identified forty three (43) individual problems whereas staff also suggested twenty three (23) problems which can be categorized into management quality, staff quality and clinical quality dimensions. Using Factor analysis those problems, identified by patients, were reduced into eight groups/factors whereas those problems suggested by staff were also reduced into four groups/factors.

7.2 Conclusions

Eliminating poor quality healthcare and improving efficiency in the system, is one of the biggest and most debated issues in developing countries and even in some developed countries too. Governments in these countries over the years have spent millions of dollars adopting techniques and necessary technology to improve on the efficiency and quality of healthcare provided in their healthcare delivery systems.

Therefore, a close examination of the problems affecting efficiency and effectiveness of the Ghanaian healthcare delivery system will be prudent. In this analysis, problems causing poor quality and affecting the efficiency of the healthcare system are investigated using eleven service quality characteristics/determinants. In the factor analysis eight and four latent constructs/groups were identified from the patients and staff opinions of quality problems respectively. From the patients perspective, 'responsiveness on the part of hospital staff', 'helpfulness of staff', 'staff attitude', 'hospital logistics and equipments', 'communication in the hospitals', 'Promptness or timeliness of hospital services', 'clinical accuracy' and, 'poor staffing' were the eight groupings of the quality problems identified, whereas the staff opinions of quality problems were grouped into 'information flow', 'internal controls', 'financing' and 'staffing'. These problems are the major groups of quality problems contributing to the poor quality healthcare as well as efficiency in the hospitals used in this study.

Cleanliness, Responsiveness and Communication are quality characteristics that are highly rated by many patients. These quality characteristics from this study contribute significantly to patients' perception of what quality of healthcare is.

7.3 Recommendations and Managerial Implications

The main recommendation of this study is the recognition for the need of integrating the Six Sigma quality improvement process/activities gradually into the care delivery processes of the hospitals. In that, the Six Sigma (DMAIC) process has tools and techniques, which can be used to identify causes of inefficiencies the healthcare delivery processes. For instance a tool like the cause and effect diagram when applied appropriately can be used to identify the causes of inefficiencies in a continuous manner. This will help the hospitals in the continuous quality improvement journey. The Six Sigma (DMAIC) process pays off because of the development of a cost reduction, mistake-free and customer oriented processes it proposes (Buck and Charles, 1998). Integrating the Six Sigma tools in the hospitals' operational processes generally enables hospital staff to increase their hospital's efficiency in the long run. In that, where inefficiencies are identified in a process, the model gives specific means by which that process can be done more efficiently. It is therefore strongly recommended that the Six Sigma model proposed in this study should be integrated into the hospitals' healthcare delivery processes gradually to help improve on the inefficiencies in the system and as well solve the quality problems identified in this study.

Furthermore based on these findings, functional activities at the hospitals should be re-evaluated in the light of patients' expectations. According to the findings of this study patients critically consider cleanliness, responsiveness and communication as activities that need re-evaluation. This is to say these quality characteristics form patients' definition of quality of healthcare. It is highly recommended that the hospitals should put in measures to improve on the cleanliness of the hospital environment at all times, likewise the smooth flow of information from hospital management and staff to patients. Directional signs, procedures and processes should be made adequately available to patients at all times.

Also management of the hospitals need to establish a commonly held definition of functional quality characteristics. It will provide the hospital staff with an ultimate focus for high quality in their healthcare delivery. For instance from this study, the three main quality characteristics identified need to be seen with a common spectacle by all players in the hospitals. Through this, specific standard can be set for all to work towards the achievement of improved quality to reduce inefficiencies in the system.

7.4 Recommendations for Further Studies

In the study, the Six Sigma DMAIC process was introduced and discussed. Inference can be drawn that this model's techniques will discourage medical errors and poor quality of care in the Ghanaian healthcare system. Implementing all the proposed tools will likely reduce the current poor quality conditions and significantly improve efficiency to perhaps Six Sigma levels. However, it is not certain that all the proposed tools in this model can be implemented in the Ghanaian healthcare case. This is because, even though results from implementing Six Sigma tools can be impressive, they are expensive (Carrigan and Kujawa, 2006). It will be imperative to investigate the readiness and willingness of healthcare managers and professionals to adopt and commit scarce resources to implement all the Six Sigma quality improvement processes and tools in Ghanaian hospitals.

Furthermore the analysis presented in this paper can be improved in several ways by conducting more substantial research. The feasibility of the Six Sigma model in Ghanaian hospitals could be better verified by carrying out an action or a practical research to test the model and its processes and tools on pilot bases.

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APPENDIX

RESEARCH QUESTIONNAIRES

UNIVERSITY OF GHANA BUSINESS SCHOOL

M.Phil Operations

This questionnaire is intended to identify and define the quality problems in the healthcare delivery system in Ghana. Please note that this survey is **solely** for academic purposes, therefore your anonymity and confidentiality is highly assured.

Questionnaire for patients

SECTION A: Socio-Demographic Profile of Respondents

1) Gender of respondent

A. Male [ ] **B.** Female [ ]

2) Age range of respondent

A. 16-30yrs [ ] **B**. 31-45 yrs [ ] **C.** 46-59yrs [ ] **D.** 60yrs and above [ ]

3) Educational level of Respondent

A. Basic/primary level [ ] **B**. Secondary level [ ] **C.** Tertiary level [ ]

D. other (specify) .....

4) Type/class of patient

A. Outpatient [ ] **B.** In patient [ ]

5) Why do you choose this hospital to any other hospital in this district?

A. Proximity [ ] **B**. Quality of service [ ] **C.** Reputation [ ]

D. Acceptance of NHIS here [ ]

E. Other (please specify)
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IDENTIFYING QUALITY PROBLEMS USING DETERMINANTS OF SERVICE QUALITY

Indicate the following on a scale of 1 to 5, which you consider most and least when looking at quality of service delivered you

- **5 Very high (**If determinant contributes highest to service quality)
- **4 High** (If determinant contributes
- **3 Indifferent** (Cannot tell whether determinant contributes to service quality or not)
- **2 Low** (Determinant does not contribute significantly to service quality to you)
- **1 Very low** (Determinant contributes nothing to service quality to you)

Please tick the appropriate dimension for each determinant in the boxes to your right

Determinant of service quality	Rate between 1 to 5				
	1	**2**	**3**	**4**	**5**
1. Responsiveness					
2. Assurance					
3. Reliability					
4. Courtesy					
5. Tangibility					
6. Empathy					
7. Communication					
8. Understanding the customer					
9. Equipment and Logistics					
10. Timeliness					
11. Cleanliness					

Measuring the quality problems in the health delivery system

Please indicate how you feel about these services by expressing your level of agreement or disagreement to the statements below.

Responsiveness

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
12. When there is a problem, staff are quick in their response.					
13. Staff are always willing to answer patients' questions.					
14. Staff are never too busy to respond to your request					
15. Time spent waiting before been attended to is adequate					
16. Behaviour of the staff instills confidence in you					
17.Staff always exhibit high professionalism at all times					

Assurance

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
18. Staff are friendly and courteous at all times					
19. Patients are treated with so much dignity and respect					
20. Customers are given clear explanations of medical conditions					
21. Patients are always assured staff assistance and cooperation.					

Reliability

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
22. Hospital services are always rendered as promised					
23. Error free clinical processes in most cases at the hospital.					
24. Patients are given same level of service at all times in the day					
25. Fast retrieval of patient's medical information at all times.					
26. Physicians are available at all times and willing to see patients.					

Courtesy

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
27. Staff refrain from acting busy and rude when patients ask questions.					
28. Staff show consideration towards the property and values of patients.					
29. Staff are always polite towards patients no matter the situation.					
30. Staff always corrects patients in a polite manner or tonation.					
31. Staff always avoid petty confrontations or arguments with patients (Tolerant).					

Empathy

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
32. Staff obtains feedback and keep patients informed.					
33. Staff understands patient's specific needs					
34. Staff goes out of their line of duty to render some assistance.					
35. Staff shows emotional support mostly when seeing to patients.					
36. Some patients are given assistance when in critical conditions even when it's not yet their time to be seen					

Communication

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
37. During contact at service points, staff listen and demonstrate understanding and concern.					
38. Staff are able to respond clearly to a particular query by patients.					
39. Staff alert patients if a scheduled appointment may be changed					
40. There are adequate communication signs directing patients at the hospital.					
41. There is an effective information centre at the hospital that facilitates easy flow of information					
42. It is easy to understand written materials.					

Equipments and logistics

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
43. There is availability of modern equipment.					
44. Patients can easily access these equipments.					
45. Equipments are functioning properly					
46. The hospital hardly runs out of supplies.					
47. Equipments are accessible to all classes of patients when necessary.					

Understanding the customer

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
48. Staff recognize regular patients and address them by name.					
49. Hospital regulations are flexible enough to accommodate patients' schedules.					
50. Staff show respect for patients' preference.					

Timeliness

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
51. Patient – staff ratio is adequate					
52. Conscious efforts are always made during peak periods or times to reduce pressure.					
53. Staff are punctual and time conscious.					
54. Average time spent seeing a physician is adequate.					
55. Patients are given explanations for causes of delays.					

56. Please state any problem you also encounter whenever you visit this hospital

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RESEARCH QUESTIONNAIRES

UNIVERSITY OF GHANA BUSINESS SCHOOL

This questionnaire is intended to identify and define the quality problems in the healthcare delivery system in Ghana. Please note that this survey is solely for academic purposes, therefore your anonymity and confidentiality is highly assured.

Questionnaire for staff

SECTION A: Socio-Demographic Profile of Respondents

1) Gender of respondent

A. Male [ ] **B.** Female [ ]

2) Age range of respondent

A. 18 – 25 [ ] **B**. 26 – 35 yrs [ ] **C.** 36 – 45 yrs [ ] **D.** 46 yrs and above [ ]

3) Educational qualification

A. Diploma [ ] **B**. First degree [ ] **C.** Masters/ PHD [ ]

D. other (specify) .....

4) How long have you been working here?

A. Less than a year [ ] **B**. 2 – 5 yrs [ ] **C.** 5 – 15 yrs [ ] **D.** 16 yrs and above [ ]

5) Which category of staff are you

A. Administrative staff [ ] **B.** Nurse [ ] **C.** Physician [ ]

6) Which department do you belong to?

A. OPD [ ] **B**. Theatre/ Surgery [ ] **C.** Records [ ] **D.** Ward [ ]

E. Other (please specify)
.....

ASSESSING CHALLENGES FACED IN IMPROVING AND CONTROLLING THE QUALITY PROBLEMS IDENTIFIED

The statements in the table below have been seen as challenges faced by care givers in most hospitals. Indicate the extent with which you agree or disagree with each statement.

Q7 **Tick your appropriate response in the boxes below**

STATEMENT	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Inadequate financing					
2. Poor staffing					
3. General inadequacy of logistics and infrastructure					
4. Low job satisfaction					
5. Illiteracy among patients					
6. Poor management and supervision					
7. Inadequacy or Lack of internal controls					
8. General lack of adequate time management at the hospital					

Q8. Please suggest any specific challenge faced in doing your duty as a hospital staff.

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MEASURING THE FACTORS OF QUALITY

The statements in Tables (9-11) below seek information on the extent to which the hospital tries to ensure utmost quality and reduce poor quality services rendered to patients. This is assessed through clinical quality, management quality and staff quality. Please state whether you agree or disagree with the statements, by ticking the appropriate response.

Clinical quality/ adherence to technical guidelines

Q9 **Tick your appropriate response in the boxes below**

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Ensuring clinical quality is treated as a core issue in the hospitals' vision					
2. Clinical errors occur quite frequently e.g. 3-4 times daily					
3. Internal control measures are actively in place to ensure clinical quality					
4. Clinical procedures are clearly stated everywhere for staff to serve as a reminder					
5. Structures are in place to reproach staff that make frequent clinical errors.					

Management quality

Q10. **Tick your appropriate response in the boxes below**

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Hospital has a functioning HR unit that recruits its personnel.					
2. Hospital has a functional medical records system					
3. There is effective communication between management and all other departments at the hospital					
4. Management system adopted is liberal and all inclusive					
5. There is rapid response to problems and needs of departments at all times.					

Staff quality

Q11. **Tick your appropriate response in the boxes below**

STATEMENT	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The average clinical error rate at the hospital is adequate.					
2. Staff always meet patients' expected waiting time expectations.					
3. Patients always leave the hospital satisfied.					
4. Staff are always on time to work					
5. Staff are always knowledgeable of their job description					