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IMPLEMENTATION OF TOTAL QUALITY MANAGEMENT SYSTEMS IN THE ROAD SECTOR OF THE GHANAIAN CONSTRUCTION INDUSTRY

BY

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DECLARATION

I hereby declare that this submission is my own work towards the award of an MSc and that to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of this University or other, except where due acknowledgement has been made in the text.

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ABSTRACT

Total Quality Management (TQM) has been recognized as a successful management philosophy in the manufacturing and service industries. TQM can equally be embraced in the Ghanaian road construction industry to help raise quality and productivity in the road construction sector. The construction sector plays an important role in the infrastructural development of every country. Some of the major problems to implementing TQM in the Ghanaian construction industry were found to be lack of expertise, commitment and reliability by entire work force as well as government inability to be consistent in policy formulation and the logistics needed for implementation of TQM system. The study was aimed at evaluating the TQM implementation in the road construction industry in Ghana. In achieving this aim, the following specific objectives were set to identify the key components, the extent and challenges of TQM implementation in the Ghanaian road sector. The study indicated that, TQM is dependent on the translation, integration and institutionalization of TQM management behavior into the routine practices of construction industry. TQM also entails complete overhaul of the organizational culture and management approach as opposed to the old strategy of top management issuing orders to subordinates. With regards to the extent, most organizations had no formal program for the implementation of TQM. Lack of education in TQM was the major challenge in road construction industry. The study adopted a structured questionnaire survey targeting forty (40) road contractors with Ministry of Roads and Highways classification category A1B1and A2B2 operating within Ashanti Region of Ghana. It is recommended that, extensive awareness and training programs be initiated to improve the client's and contractors' understanding and approach towards total quality management system and hence increase their willingness to implement TQM, which would in turn improve coordination, teamwork and increase productivity in the construction industry.

Keywords: Total Quality Management, Road construction, Implementation

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ABBREVIATION

TQM   Total Quality Management

QMS   Quality Management Systems

QA   Quality Assurance

QS   Quality System

MORH   Ministry of Roads And Highways

SPC   Statistical Process Control

COQ   Cost of Quality

DMAIC   Define, Measure, Analysis, Improve And Control

SMEs   Small and Medium –Size Enterprises

ISO   International standard organization

PDCA   Plan, Do. Check and Act

TQ   Total Quality

QM   Quality Management

RII   Relative Importance Index

CHAPTER ONE

INTRODUCTION

1.1   The Background of the Study

Total Quality Management (TQM) is a management philosophy which focuses on the work process and people, with the major concern for satisfying customers and improving the organizational performance and productivity. It involves the proper coordination of work processes which allows for continuous improvement in all business units with the aim of meeting or surpassing customer's expectations. It emphasizes on totality of implementing of quality in all facets of an organization with the aim of reducing waste, poor quality work and rework to reduce cost and increase efficiency in the problem of quality management and its associated costs been of great concern to most industries since the early 1960s. As a result, some large construction contractors have pursued and implemented innovative quality management techniques such as quality assurance (QA) and total quality management (TQM).In effect quality has been one of the private sector's main preoccupations for a long time. In the late 1980s and early 1990s, the definition of quality shifted its emphasis to a broader sense; quality is now defined and driven by customer demand and satisfaction (Deming, 1986). Since the 2000s, quality has often been referred to as the "Lean Six Sigma" process improvement management (Thomsett, 2005). Recently, another name is the "New Gold Standard" which has been mostly used and applicable in the service and hospitality industry (**Michelli, 2008).** However, whatever the names that have been used by any specific industry, they all refer to quality as continuous improvement processes with a focus on the customer.

In recent years, the Quality System (QS) program appears to continue to maintain its strong presence in several public organizations of modern times (Van Seaton, 2010).

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TQM is applicable to any organization regardless of size, even though the public sector organization is fast adopting the ideology in order to make them effective in meeting public demands.

However, the adoption of the ideology by most organizations has been hampered due to their non-compliance with the procedures and principles of TQM implementation by (Kanji & Wong, 1998). While some organizations, run TQM like a program which they expect to function and perform the magic all by itself, others have used a half-hearted approach to it, by using some bits and pieces of the principles. This has accounted for the failure of most organizations in meeting their expected target from implementing this ideology. There is a need to continue to buttress the benefits that accrue to organizations from the implementation of TQM, especially in developing economies, such as Ghana where the adoption of these principles seem far-fetched to organizations.

The Ghanaian road construction industry gives us a true picture of the little-approaches of organizations in their quest to make profit at the expense of quality. With the spate of changes going on in the country due to government reforms, the nature of competition seem to be changing from what it used to be. According to Ofori,(1993) the influx of foreign and local investors into different sectors of the economy has given rise to intense competition, thus the need for organizations to look internally into their operational procedures and change strategically to meet up with the challenges. This research aims to find out the quality level of local contractors and the problems with the implementation of TQM and also will assess the effect of TQM implementation on the Ghanaians constructions industry. Recently, an empirical case study suggests that TQM is indeed a successful experience in state and local governments due to the fact that it is guided by a leadership commitment and a

common organizational vision which "results in significant quantifiable benefits" (Kluse, 2009). The use of a strategic approach to implement quality management by construction industry will therefore improve their competitiveness.

A recent study suggests that the United States (U.S) Air Force, an early proponent of the TQM era since the early 1990"s, embraced a new "partial quality" endeavor because the "total quality" of the past has been a failure, as they seem to be successful with this new endeavor to avoid the mistakes of the past (Rinehart, 2006). Similarly, the U.S. Navy recently embarked on a new continuous improvement effort due to failed initial TQM efforts in the early 1990"s because senior leaders did not "get on board." They are "more serious this time" (Symonds, 2009). Since management acknowledges that there is a problem, it can take the second step to develop a clear understanding of underlying principles and elements of TQM such as training, team work, supplier involvement, customer services and its implementation which can be considered as the primary quality management tool.

1.2. STATEMENT OF THE PROBLEM

Even though Total Quality Management is widely acclaimed by most organizations all over the world, its implementation in most cases has been a problem in major Ghanaian road contractors due to circumstances which many in both industry and academia have not fully investigated by Bryde and Robinson (2005). According to Kpamma (2009) clients of the construction industry of Ghana continue to lament the low standard of total quality management system delivered to them by contractors. To Kwakye (2006) defective construction products begin from the drawing board. It is in this direction that the adoption of TQM in the road construction sector is timely. Arditi and Gunaydin (1997) noted that the attainment of quality in the construction industry has been abstract over the years in spite of great expenditures of time, money

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and resources expended on them. Over the years, Ghana is no exception as far as achievement of acceptable levels of total quality management which is concerned in the construction industry.

According to Menon, (1992), the problem of TQM implementation abounds and includes failure to inform everyone in the organization regarding the direction in which the TQM system is heading. Similarly, Dam (2010) found that lack of adequate training contributes to failure of TQM implementation in construction of roads. The inability to control suppliers also contributes to TQM implementation failures (Dam, 2010).

In a study conducted, about 60% to 70% of senior management claimed they do not recognize the impact of TQM on their companies' ability to compete in the market. On a more serious note regarding the implementation of TQM, Beer and Eisenstat (2003) postulated that the failures of TQM implementation are strongly hinged on failures to implement and not TQM theory and method. Similarly, Zbaracki (1998) clearly noted that lack of feedback is attributable to sloppy TQM implementation.

Not much study has been conducted into the reasons for the low levels of TQM implementation in the road sector of the Ghanaian construction industry. It is in the light of this that this study was undertaken to explore the extent contractors in the Ghanaian road sector implement TQM programmes and the challenges Ghanaian contractors face in their bid to implement TQM programmes.

1.3 Research Questions

This dissertation intends to answer the following questions:

1. What challenges confront the implementation of TQM in the road construction sector?

2. What are the key components of TQM implementation in road construction in Ghana?

3. To What extent has TQM been implemented in the Ghanaian road construction sector?

1.4 Aim of the Study

The aim of this study was to evaluate the TQM implementation in the road construction industry in Ghana.

1.5 Objectives of the Study

To achieve the aim of the study the following objectives were set

- To identify the key components of TQM impacts of the road construction sector;
- To identify the extent of TQM impacts of the Ghanaian roads sector; and
- To identify challenges in TQM implementation in the Ghanaian road sector.

1.6 Scope of the works

Geographically, this study was limited to registered road construction companies operating within Ghana registered with the Ministry of Roads and Highways ,The ministry has the categories of contractors A, B and C which has four financial sub-classification within the categories class 1,2,3,and 4 which set a limitation for contractors in respect of the project they can undertake. Class 1 has the height resource base, decreasing through Classes 2 and 3, with the class 4 having the least resource base (MORH 2014). This study was limit to the Ashanti region companies. However it is hoped that the data obtained from the study will give a true reflection of the assessment of the challenges contractors face in implementation TQM in Ghana. This regions were chosen because of proximity and the high number of contractors

within the regions of Ghana. In terms of construction, and its proximity to the research has made data accessibility to be easy. The study covered contractors who are registered under ministry of Highways with the category of A1 to A2, B1 to B2, for road works, drainage structures, civil engineering contractors respectfully operating in the Kumasi regions capital.

1.7 Methodology

The study method was multiple research approach involving semi-structured interview and a questionnaire survey was adopted for the study. The method adopted in this study consisted of multiple research approach involving Semi-structured interview and a questionnaire survey was adopted for the study to solicit information about challenges of implementation Total quality management practices in road construction, conducting questionnaire survey through interviews and lastly the assessment of feedback from questionnaire survey to identify the state of effectively implementing of total quality management practices in the road construction industry in Ghana.

1.8 Significance of the study

The importance of TQM in this study is very crucial to the road construction industry in Ghana. It is our hoped that, this research will help the various stakeholders in the construction industry example clients (Government/Private), as well as contractors to develop and incorporate TQM in the design and implementation in all road construction projects. It is also envisaged that with the exposition of this study, the construction industry will experience improved productivity profit as well as quality of construction works. The results of this study are very crucial for the government since it is the biggest client in road construction projects. Lastly, the findings of this research will serve as a contribution to knowledge to the various sectors of the

construction industry, in the academia and will spur others on to engage in research on effectively implementation of TQM in the construction industry in Ghana.

1.9   Structure Report of the Study

This study was divided into five main chapters. The first chapter consisted of the general introduction; which constituted the background to the study, statement of the problem , aims and objectives of the research, the scope of the study, research methodology, the significance and limitations of the research. The introduction formed chapter one of this dissertation, chapter two involved a detailed literature review of this area of the study. An in- depth discussion of the research methodology consisted of data collection, sampling of respondents, questionnaire design, and administration of questionnaires were treated in chapter three. Chapter four involved evaluation and analysis of data collected and this will be concluded by the fifth chapter comprised of the recommendations, conclusions, contribution to knowledge and areas that need further research. The conceptual model in figure 1 below demonstrates the key elements in the structure of the study.

CHAPTER ONE	→	**GENERAL INTRODUCTION** Background to the study, Problem Statement; Research questions; Aims; Objectives; Significance
CHAPTER TWO	→	**LITERATURE REVIEW** Concept of TQM; History of TQM; TQM philosophy; Drivers of TQM; Barriers to TQM implementation; TQM in road construction.
CHAPTER THREE	→	**RESEARCH METHODOLOGY** Research philosophy; Research approach; Sampling frame; sampling; instrument design and administration.
CHAPTER FOUR	→	**ANALYSIS AND DISCUSSION OF RESULTS**
CHAPTER FIVE	→	**CONCLUSION AND RECCOMENDATION** Review of objective and findings; Directions for future research

Figure 1.1: Conceptual Model for research organization

CHAPTER TWO

LITERATURE REVIEW

2.0   Introduction

The construction industry is based on craftsmanship; hence quality control and assurance procedures applied in manufacturing industry cannot be readily applied in construction where there are higher degrees of uniqueness in each and every project (Frank and Roland, 2001). In an attempt to bridge the gap between construction and manufacturing industries, the study of total quality management becomes imperatives. Also, Ozaki (2003) noted that construction clients and customers demand for enhanced product quality and lower production cost which demands the study of total quality management system on production processes of construction products. While. Aoieong,, Tang, and Ahmed (2002) were of the opinion that from a lean production perspective, defects and rework which are consequences of poor quality are wasted .Hence, studies have shown that the cost of poor quality have proved to be greater than the investment for managing quality and should therefore be eliminated. (Zairi, 2000, Tukel and Rom, 2001; Bryde, 2003).

2.1   Definition of Quality

The simple definition of quality is meeting the customer requirements, Moreover, and aiming at increasing customers satisfaction, many organizations have focused on quality and reduced their costs to gain maximum customer satisfaction, examples of this being Toyota in Japan, Samsung in South Korea. Achieving customer satisfaction depends on not only how well and how thoroughly quality actions in the several areas of the organization work individually but also on how well and how thoroughly they work together. According to Maguad, (2006).

Quality refers to the different workmanship of various activities. According to Fukui et al, (2003), Subsequently each business or activity has a different definition of quality, for example in sales the term quality is more focused on the services which are provided to customer, while in manufacture, the term quality is more focused on the production process, and in construction, quality refers to both of services provided and outputs. The American Society for Quality Control defines quality as "the total features and characteristics of a product or service made or performed according to specification to satisfy customers at the time of purchase and during use" (Talha, 2004). The emphasis in this definition is that the quality is achieving the specification. Quality includes everything that the client anticipates and requires and is continuously changing. The definition careful the customers who guide the quality, and changeable according to customer requirements. Mukherjee (2006) indicates that quality satisfies three Fs- Fit, Form and Function. The product should also be able to fulfil the functions desired to be performed by the product.

From the definitions given, one can conclude that quality is more than a tool or issue used to gain competitive advantage for businesses because it is a matter of existence. So, most of the quality concepts which mentioned beyond are focuses on providing a product that satisfy and meet the customers" needs. Quality is therefore very necessary for the organizations' to ensure that they have conveyed their products or services according to the customer expectations and requirements. Moreover, each person has his or her own concept of quality and it is very challenging to give specific definition for quality, but there is no doubt and everyone can agree that, quality is perfection through control, accuracy, and comprehensiveness in work. Therefore, the varieties in quality definitions emphasis the Hradesky study in 1995, as he stated that there is no single definition of quality that will apply to all companies in all industries.

2.1.2 Quality Past and Present

Quality has existed from the earliest decades as behavior, so we can refer to quality as anything prepared or manufactured with a degree of "excellence" or as the worth of a product or service. For more than 25 years, there have been many changes towards improved quality. Each civilization has implemented a part of the concept of quality, but this knowledge started in the USA, and mostly in manufacturing sectors. This improvement can be seen in quality of product, leadership and management. Quality today is everyone dependably focusing on the customer requirements and is the way of increasing profits by improving products quality.

2.1.3 Quality Circle

A quality circle is a group of employees from the same work area and doing similar type of work voluntarily meet for an hour periodically either every week or periodical to identify, analyze and resolve work related problems in their own area. As stated by Zetie, (2002), quality circles are a volunteer gathering of group of employees with an interest in solving a problem of mutual concern to them. The structure of a quality circle is headed by the top management who has the responsibility to form the steering committee known as the quality council who in turn are responsible for observing all important activities in the organization.

2.1.4 Overview of Total Quality Management (TQM)

2.1.4.1 Total Quality Management (TQM)

TQM evolved in the 1980s and began to have a major impact on management and engineering approaches to long-term success through customer satisfaction. It is based on the involvement of all members of an organization in improving processes, products, service and the culture in which they work. A study by Garvin (1984)

outlined the development of TQM as the outcome of four major eras of development. He explains the evolutionary process where quality has moved from an initial stage of inspecting, sorting and correcting standards to an era of developing quality manuals and controlling process performance. The third stage regards complete manuals including areas of an organization other than production, and the use of standard areas of an organization other than production, and the use of standard techniques such as statistical process control (SPC). (Oakland & Marosszeky, 2006) define quality control as "fundamentally the activities and techniques employed to achieve and preserve the quality of a product, process, or service. It includes a monitoring activity, but is also concerned with finding and reducing causes of quality problems so that the requirements of the customer are continually met".

The ancient development of quality as a management concept demonstrates that its evolution did not occur abruptly in sudden changes in management philosophy, but gradually through stable consistent improvement. This reflects a series of management innovations that were created during the twentieth century. Therefore, the TQM movement was not formulated as a separate philosophy, but derived from previously established scientific management concepts.

2.1.4.2 Previous Research on TQM

Report by (Oakland, 1994), indicated that three important components should be considered in order to implement TQM, these are a documented quality system, teamwork and the use of improvement tools and techniques. Moreover, (Hellston & KlefsjÖ, 2000), emphasize on Oakland study. They discussed TQM as a management system consisting of the three dependent components: values, techniques, and tools. Techniques and tools support the values and together they form a whole. Moreover, they said, the implementation of TQM should begin with the identification of core

values that should characterise the organization. The next step is to distinguish techniques that are suitable and support the core values. Then, in order to support the techniques found to be suitable, tools must be identified and used in an efficient way.

From research aiming towards developing a framework for implementing TQM in the construction industry in Bahrain, Total Quality Management system has become one of the best solutions to overcome construction industry's problems, and specification could be used as a gateway to introducing TQM to the construction industry. (Al-Sehali, 2001). A study by Various construction companies are unconcerned about implementing TQM in order to reduce quality problems in their projects because it is not uncommon for them to consider TQM to be equal with quality assurance (QA) (Love, et al, 2004), .

TQM is becoming more than a way of saving a company by increasing productivity in a short term. In addition to that, TQM companies enjoy cost- efficiency, flexibility and approachability (Rao et al, 2004), A comprehensive survey was carried out aimed at determining whether the use of improvement tools in the construction industry are important aspect of continues improvement (Delgado & Aspinwall, 2005). Result showed that, in terms of use, quality, performance measure, and technology tools are common practice in the industry. Identifying the relationship between TQM and overall performance, show there is a strong and optimistic association between TQM, overall performance and customer satisfaction and suggest that an emphasis on quality would result in organization gains (Arawati, 2004). The previous studies regarding TQM considered the concept of the TQM as one of the best solutions to overcome the construction industry problems. Moreover, many studies focus on importance of the tools and techniques in implementation TQM philosophy.

2.1.5   Quality Concepts from Quality Gurus

2.1.5.1   Walter and. Shewhart

Walter and Shewhart, (1891-1967), who is regarded as the father of present quality control, identified problems which existed in production and linked them with the rejection of a product by the customer, Shewhart established the cycle for learning and improvement as the quality management concept and tool. Walter and Shewhart in the USA during the 1920s and with the Bell Laboratories paid attention to the TQM concept through statistical process control (SPC). The design of the plan-do-check-act cycle was the scientific method to improve the work process. In addition to this Shewhart"s concern was to develop a system to measure variables in production. Shewhart's emphasis on the need for statistical analysis to create an suitable understanding of work processes was clearly important for acquisitive the essence and causes of variation, both controlled and uncontrolled (Twaissi, 2008).

2.1.5.2   Deming's Philosophy

The theoretic essence of the Deming (1950), management method concerns the creation of an organizational system that fosters cooperation and learning and simplifies the implementation of process management practices. This in turn leads not only to continuous improvement of processes, products, services, but also to employee fulfilment, both of which are critical to customer satisfaction and ultimately, to firm survival (Lawrence, 2000). Deming stated "Quality should be aimed at the needs of the customer, present and future". According to Deming, the foundation of quality management is reducing the variation in products and then improving the average. Deming, (1986) proposed 14 points as the principles of TQM, Rungtusanatham, Jeffrey and Bin Wu (2003), stated that these 14 points should

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provide a cure for the "seven deadly diseases" and help organizations' to overcome the obstacles to producing and delivering high quality products and services.

2.1.5.3 Feigenbaum's Philosophy

Feigenbaum (1961) was the first who proposed the total approaches to quality issues. His philosophy was that quality is not implemented in a particular area, but must be implemented in totality for all management levels of the organization. Feigenbaum defined total quality as an effective system to ensure production and service at the most reasonable levels that allow customer satisfaction. He demanded that quality means the best for customer use and selling price, and effective quality management includes of four steps: setting quality standards; assessing conformance to these standards; acting when standards are exceeded and planning for improvements in the standards. This control process is more suitable for TQM, as it includes the improvement dimension. However, it does not incorporate the TQM culture, nor does it stress customer satisfaction and management responsibility.

2.1.5.4 Juran's Philosophy

An early doyen of quality management by Juran (1970), emphasized that the focusing on statistical process control is not enough, so his philosophy was that quality must be adopted by the top management and they responsibility of spreading the quality concepts. In addition to this, and aimed at increasing product quality, he used another principle, which focuses on customer and human resources, Juran therefore defined quality as "Fitness for purpose or use", Moreover, Juran focused on management rather than on workers because managements are responsible for most quality problems.

2.1.5.5 Crosby's Philosophy

An American consultant, Crosby (1980), defined quality as "conformance to requirement". From his definition the word "requirement" is broader than specification, and goes beyond meeting specifications. The Crosby's approach described the measurement of the Cost of Quality (COQ), which includes any costs that are attributable to achieving quality and focuses on the price of both conformance and non-conformance. Quality in Crosby's approach is conformance to requirements and quality is free.

2.1.5.6 Ishikawa's Philosophy

Ishikawa (1985) argued that quality management should extend beyond the product manufactured or service provided to post-sales service. The Japanese realized that since quality must permeate the entire company, it cannot be entrusted to just one department. Instead, it must be the centre of attention for top management (Ishikawa, 1985). He emphasized that the term quality means quality of product, service, and management- in fact the company itself. Also, he established an idea of the "internal customer", the next person in the process, and he paid attention to statistical tools, used in organizations, describing these tools as "indispensable for quality control" (Bank, 1992), and consisting of: pareto chart; cause and effect diagram (Ishikawa diagram) and scatter diagram.

2.1.5.7 Summary of the Ideas of the Gurus

Paper by Hellston and KlefsjÖ (2000). Says that, there are different opinions about TQM, and the reasons of these differences are discussed in a first reason is the gurus, who are often seen as fathers of TQM, do not, in fact like the concept. For example, Deming never did use the term TQM, and said "the trouble with TQM, is that there is no such thing, it is a buzzword". Deming said that "the term TQM implies quality as a

method but in reality it is the outcome of a method". This resistance to the term TQM from some gurus could be what made people doubtful and reduced their willingness to implement this term. The second reason is that there are many similar concepts for roughly the same idea, such as total quality control, total quality improvement, and strategic quality management. The third reason is that there are many vague images and few definitions of what TQM really is. The formulations are very clear in these definitions such as "a way to…." a "philosophy for…", "a culture of …", " approach for…".

Even here, in the above-mentioned views of the gurus, there are some differences in definitions or philosophy for TQM. Many characteristics of TQM can be distilled from the above definitions. The term "quality" for Deming means "Continuous improvement" and the target is Zero defect. Juran argues that for quality to improve, short term "sporadic" or long term "chronic" problems must be resolved, and the cost of quality includes both conformance and non-conformance. Crosby, on the other hand, believes that the cost of quality includes only the non-conformance costs, and conformance costs of prevention and appraisal are not really the cost of quality, but more the cost of doing business.

2.2 Tools and Techniques of TQM

According to Chan (2003), said ' You cannot manage what you cannot measure'. Subsequently, there is a need to create a process for measurement of quality management system performance, aiming at monitoring data on current and end user customer satisfaction for all essential processes. TQM tools are technical means used to work in the quality programs, and often include diagrams, statistical graphs, also, used to improve processes or develop products in any organization by identifying, analysing and evaluating data that is relevant to their business. Therefore by using the

tools and techniques, one can investigate problems, identify solutions and implement them in work practices, by measuring and analysing the outcome.

Ishikawa (1976), defined the seven quality control tools are usually perceived as too simplistic and not appropriate (Bamford and Greatbanks, 2005). TQM tools are practical methods, skills, means or instruments that can be applied to particular tasks. According to McQuater et al, (1995), they are used to facilitate positive change and improvement, and they distinguish between tools and techniques as follows: tools are defined as a device that have a clear role, often narrow in focus and used on its own, such as cause and effect diagrams, Pareto analysis, control chart, histogram and flowchart. A technique has a wider application, often resulting in the need for more thought, skill and training to be used effectively, such as SPC, benchmarking, quality function deployment.

Bamford and Greatbanks (2005), suggest in their paper that the following are the key for the successful implementation, use and success of applying the quality control (QC) and M7 tools and techniques: in depth knowledge of the process; formal training in problem solving techniques; suitability of tools selected for use; and application simple models at all levels in the organization to learning.Dale (2003), states that all techniques have similar importance, but that they are different and applicable in different situations. This means that each technique has unique qualities and can present the same data in different ways. Dale also strongly maintains that an effective employment and a mix of tools and techniques constitute the way to solve problems. All previous tools are only examples and there may be more. As stated by ReVelle (2003), the number of TQM tools is close to 100 and they come in different forms. In addition to this they may be described as instruments or methods used for the work in TQM programs.

2.3 TQM and Other Quality Management Tools

2.3.1   TQM and Six Sigma Concept

The Six Sigma is a procedure that blends together many of the key fundamentals of past quality initiatives while adding its own special approach to business management, and the main goal of Six Sigma is to reach 3.4 defects per million opportunities over the long term. The Six Sigma procedure focuses on customer knowledge by translating customer needs and expectations into areas for improvement. The Six Sigma is a statistical concept that measures a process in terms of defects. Achieving Six Sigma means the processes are nearly perfect. In its business use, it indicates defects in the outputs of process, and helps organization understand how far the process deviates from perfection. Six Sigma has been considered as a viewpoint that employs a well-structured continuous improvement methodology to reduce process variability and drive out waste within the business processes using statistical tools and techniques (Antony and Bañuelas, 2002). In a study carried out Banuelas and Antony (2004), one of their conclusions was that the Six Sigma has been embraced in many companies as the new business strategy. It is focused on improving processes by eliminating variation using a well-structured procedure. In a study conducted by Antony (2007), it was found out that Six Sigma will be around as long as it continues to yield quantifiable bottom-line results in organizations. Although the number of applications of Six Sigma in manufacturing companies has gone down a great deal, Six Sigma in other areas such as finance, healthcare, IT and banking has gone up knowingly in recent years.

The Six Sigma methodology consists of five phases, which are known as (DMAIC):

- **D**efine the projects, the goals, and the deliverables to customers (internal and external)

- **M**easure the current performance of the process ;

- **A**nalyses and determine the root causes of the defects;

- **I**mprove the process to eliminate defects; and

- **C**ontrol the performance of the process;

Many organizations worldwide (manufacturing companies, service-oriented companies, small and medium-sized enterprises (SMEs) have implemented Six Sigma and achieved extraordinary improvements in their market share, customer satisfaction, product reliability and service quality with impressive financial savings (Harry and Schroeder, 2000). The major alteration between Six Sigma and Total Quality Management (TQM) is that Six Sigma incorporates control phase with ongoing checks in order to ensure that once improvements are achieved, they are not a one time or temporary phenomenon, but maintained over time. According to Scarnati and Scarnati (2002), Six Sigma is an industry standard for defect free products. The Six Sigma can be used to improve an existing process to create a new product or process. The differences between TQM and Six Sigma are summarized by Pradeep and Sanchari (2007).

2.3.2   TQM and ISO 9000

The concepts of TQM and the ISO 9000 are almost new to most developing countries such as Ghana even though the ISO 9000 series of standards has become an internationally recognized means of managing organizations. Some industries in developing countries realised the benefits when some of the organizations in those countries were awarded the ISO certificate. Research conducted in Scotland (Witcher,

1993) found that the main reason enforcing and encouraging organizations to implement ISO 9000 was external pressure from customers.

Sun (1999) presents the result of a study which aims to review was the pattern of implementing TQM versus ISO 9000 at the beginning of the 1990s. It found that the implementation of ISO 9000 is not always in parallel with the implementation of TQM. In fact, countries follow different patterns of quality improvement in terms of TQM versus ISO 9000. On the other hand, the quality management system proposed by ISO 9000 is a necessary foundation for other quality methods under TQM (Sun, 1999).

ISO 9000 is made of four parts; ISO 9001 is applicable in contractual situations whereby the supplier is capable of indicating its ability in development, production, and servicing. ISO 9002 is applicable for contractual usage, and product conformance can be achieved through production and installation. ISO 9003 is applicable for quality assurance in final inspections and tests with the aim of detecting and controlling the disposition of any product nonconformity. ISO 9004 is serves as a guideline in developing and implementing a quality management system.

The main differences between ISO 9000 and TQM are summarised by Sui Pheng-Low (1998). ISO 9000 is primarily a quality management system in which the emphasis is on the writing of formal procedures and instructions to guide employees. However, construction companies are more technical systems; they are social systems, so TQM is about integrating these two systems through the adoption of managerial processes which focus on customer needs, employee needs and stakeholders' needs. Srdoc et al., (2005), stated that the ISO 9001 is a model for quality assurance in design, development, production, installation and servicing.

Different from the old standard (ISO 900, 1994) that was focused on procedures, the new ISO 9001 (ISO 9001:2000) is focused on processes. Its eight key management principles are: Customer based organization; Leadership; involvement of people; Process approach; System approach to management; Continual improvement; Factual approach to decision making; Mutually beneficial supplier relationship.

2.3.3 TQM and Quality Assurance

Defined Quality Assurance as "broadly the prevention of quality problems through planned and systematic activities (including quality documentation)by Oakland and Marosszeky (2006), these will include the establishment of a good quality management system and the assessment of its capability, the audit of the operation of the system, and the review of the system itself". The process of Quality Assurance then is an activity designed to provide evidence to confirm and associate confidence among all parties, and quality process is successfully implemented. The main interesting points in this stage are the quality in the withdrawal of defect ratio (zero defects), and the study of quality cost as an economic decision to determine the quality level. Quality Assurance has adopted three types of quality control:

Prevention control: this means following up the work implementation step by step to discover the defects before they happen, and prevent their occurrence.

Progress control: this means inspecting the product after the end of each manufacturing stage, to ensure the quality level, so as not to allow for the product to move into another stage before inspection. This helps to detect defects when they occur and immediate actions apply.

After production control: this means to ensure the quality of the product after the completion of the manufacturing and before it reaches the end user.

Nukulchai (2003), in his paper on TQM in higher education summarized some of the differences between quality assurance and TQM.

2.3.4 The Stages of the Implementation TQM Program

In the modern world today the implementation of the TQM process is one of the most complex activities that a company can undertake, because it requires cultural change for everybody. (Kanji and Asher, 1993 in Dahlgaard, Kristensen and Kanji, 2002), developed a four-stage implementation process for their TQM model. In the critical analysis stage they indicated that output will be the continuous improvement cycle, i.e. PDCA cycle. The stages are:

1- Identify and preparation

2- Management understanding and commitment to TQM

3- Scheme for improvement TQM

4- Critical analysis of TQM

At the critical analysis stage the output is Deming's cycle, i.e. plan-Do-Check- Act. However, the above four stages of implementation can be modelled according to the Deming"s PDCA cycle as follows:

Kanji and Asher, (1993) described the four stages as follow:

- Plan: identifying and assembling information about the organization in the prime areas where improvement will have most impact on the organization's performance.

- Do: Making sure that the management understands the objective and procedure of TQM and are prepared to adopt them all the time.

- Check: By a process of involvement of management and control in a proper scheme of training and communication, identifying quality issues and affecting a determination of them by management led improvement activities.

Act: starting a new initiative with new targets and taking the complete improvement process to everybody indicating supplier and customer links in the quality chain. Obtaining information about progress and consolidating success.

It was clear from the above that to achieve successful implementation of total quality program, it requires to establish an adequate plan and management commitment is essential to apply the proposed plan. Sufficient management training and communication help to identifying the critical quality issues. Everyone in the organization must link in the quality chain. The improvement in its operations and evaluations the outputs, will led to meet the needs of internal and external customers through comprehensive continuous improvement activities for the organizations as an integrated quality system.

2.5 Challenges to Total Quality Management

2.5.1 Individual Level Factors

There is indication of growing scholarly interest in examining the willingness of employees to contribute both in developmental activities (Noe and Wilkinson, 1994) and in processes of systemic level change and transformation. Literature has identified the following four variables which play a large role in influencing the readiness of knowledge workers to participate in TQM implementation: At the individual level, these include: the scope of expertise in TQM that an employee possesses (Pasmore and Fagans, 1992); the degree of individual empowerment experienced by an employee in the work setting (Sashkin and Kiser 1993); the level of employee

motivation to apply TQ tools to ongoing task challenges (Waldman, 1994) and employee fulfilment (Anderson et al., 1994).

2.5.2 Management Issues

The top management of every organization has a major role to play in achieving a successful implementation of innovative strategies (Salem et al., 2005; Hudson 2007). The success of quality management practice lies in their commitment in developing and implementing an actual plan and adequately providing the required resources and support to manage changes arising from the implementation. However, challenges identified in several studies seem to be related to management issues. A thorough review of research by (Common et al., (2000), Alarcon et al., (2002), Forbes and Ahmed (2004), Olatunji (2008) and Alinaitwe (2009)) found delay in decision making, lack of top management support and commitment, poor project definition, delay in materials delivery, lack of equipment, materials scarcity, lack of time for innovation, unsuitable organizational structure, weak administration, lack of supply chain integration, poor communication, use of substandard components, lack of steady work engagement, long implementation period, inadequate preplanning, poor procurement selection strategies, poor planning, inadequate resources, lack of client and supplier involvement, lack of customer focus and absence of long term planning are among major barriers to quality management practice. Though some appear easy to be addressed, the overcoming of these barriers is very critical to the implementation of quality management practice across organizations.

2.5.3 Financial Issues

The implementation of innovative strategies like lean construction, six sigma requires some funds. Adequate funding is needed to motivate the workers, provide relevant equipment's and employ lean specialist to guide both employers and employees in

implementing the concept. Economically related issues are among the most common challenges to quality management practice across different organizations in various countries. However, the nature of these challenges varies across countries. An analysis of studies reported by Common et al., (2000), Olatunji (2008) and Mossman (2009) identified some of these barriers to include corruption, inadequate projects' funding, inflation, implementation cost, and poor professional wages, lack of incentives and motivation, and risk aversion. Unless adequate efforts are made to overcome these barriers, several companies could be discouraged from implementing quality management practice in their organizations.

2.5.4 Educational Issues

There have been several efforts to provide awareness, guidance and knowledge relating to total quality management (TQM) practice by academics, researchers, practitioners and bodies such as Construction Excellence (CE) and British Research Establishment (BRE). However, these bodies operate in very few countries. Despite the large amount of publications made by researchers, it seems educational issues appear to be the most common barriers to quality management practice. This may be related to the fact that the concept was adopted from the manufacturing industry. Some of these challenges are identified by Common et al,(2000), Cua et al,(2001), Alarcon et al., (2002), Castka et al, (2004), Olatunji (2008), Jorgensen and Emmitt (2008), Alinaitwe (2009), Abdullah et al,(2009) and Mossman (2009) to include lack of understanding, lack of technical skills, high-level illiteracy, lack of training, lack of holistic implementation, inadequate knowledge, lack project team skills, inadequate exposure to requirements for quality implementation, lack of awareness programmes, difficulty in understanding concepts and lack of information sharing. Hence, it can be

suggested that educational barriers pose a great threat to the sustainability of lean practice.

2.5.5   Government Issues

Despite the significant economic contribution made by the construction sector in various countries, it faces numerous problems which appear to be related to government policies. Some studies reveal that certain barriers arose due to government attitudes towards the construction industry in some countries. An in depth analysis of research findings in Olatunji (2008) and Alinaitwe (2009) reveals challenges like government bureaucracy, irregularity in policies, lack of social amenities and infrastructure, materials inaccessibility and unsteady price commodities. Furthermore, some of the financial barriers like inflation, professional wages, and corruption practices could also be related to government issues.

2.5.6   Technical Issues

The implementation of quality management practice may be affected by barriers which are technical. These challenges are considered technical because they have a direct impact on applying certain total quality management principle and tools such as reliability, simplicity, flexibility and benchmarking (Koskela, 1992). Some of these were identified by Ballard and Howell (1998), Koskela (1999) and Alinaitwe (2009). As lack of buildable designs, incomplete designs, poor performance measurement strategies, lack of agreed implementation methodology, lack of prefabrication, uncertainty in supply chain, lack of design constructability, inaccurate and incomplete designs. Furthermore, (Mossman, 2009). Also identified the fragmented nature of industry as a barrier to teamwork and cooperative partnering. Though these issues relate to certain tools, they could hinder a holistic implementation of the concept. A

haphazard implementation may not yield the full benefits of quality management practice.

2.5.7   Human Attitudinal Issues

Human attitude is one of the major factors affecting the implementation of quality management practice in various construction industries. According to Howell (1999), based on studies carried out by Common et al., (2000), Cua et al., (2001), Alarcon et al., (2002), Castka et al., (2004), Forbes and Ahmed (2004), Alinaitwe (2009) and Mossman (2009), some of these factors are lack of transparency, cultural change, lack of team spirit, lack of self-criticism, lack of teamwork, lack of cooperation, poor housekeeping, poor leadership, leadership conflict, poor understanding of client's brief, misconceptions about lean practice, over enthusiasms, seen as too complex and alien, and fear of unfamiliar practices.

2.5   Characteristics of the Ghanaian Road Construction Industry

The problems facing the road construction industry in Ghana are similar to those which are commonly seen in reports on the industries in other developing countries. The problems and issues are well exemplified by those which were highlighted in a report on the roads sector of the industry. Compared with other industries, the Ghanaian road Construction industry is low-tech and labour intensive. Consequently, the long term sustainability of the industry's significant role in the socio-economic development of the country is dependent upon the development of its human capital, bearing in mind some of the human-related problems that has bedeviled the industry over the years; low productivity, low quality workmanship, low level of technical and managerial competence, and time and cost overruns (Ofori, 2001, Ahiaga-Dagbui, et al, 2011). Construction delay is also a major problem facing the Ghanaian road

construction industry. It is rampant and its economic and social impact is often discussed.

TQM in the Ghanaian road sector involves the formulation of strategies, setting goals and objectives, planning and implementing the plans; and using control systems for monitoring feedback and taking corrective actions. (Dale, et al (a) 1994) According to Juran (1988), the basic goal of total quality management in the road sector is the elimination of failure; both in the concept and in the reality of projects, services and processes.

TQM controls are operational techniques and activities that are used to fulfil quality requirement (ISO 8402, 1994). As a measure of quality, quality control however is costly when viewed in terms of tangible and intangible variable cost. Due to the problems associated with quality control in the road sector, now focus on other avenues or means through which quality could be managed effectively. Dale, Boaden and, Lascelles (1994), noted that the solving of a problem after a nonconformance issue in the road sector has been created is not an effective route towards eliminating the root cause of a problem in road sector as far as implementation of TQM is concern.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0   Introduction

The word methodology refers to the way that research should be undertaken and the activities it should cover during data collection process in terms of the disciplined collection and evaluation of specific data to help the researcher understand the targeted sample better by linking companies to their actions (system) and evaluate their performance and problems. Moreover, research methodology specifies the information required to design the procedures of data collection, manage the data collection process, analyses the results and link the findings and their implications, (Proctor 2003).

3.1   Research Design

Research design, according to Oppenheim (1992), is the "basic plan or strategy of the research, and the logic behind it" which will help the researcher to draw the research sample and categorise the sub-groups it must contain and which variables need to be measured. Therefore, the research design will identify the research philosophy, approach, purpose, logic and outcome of the research.

The research was to determine the Total quality management adoption within the road construction industry in Ghana . The design normally specifies which of the various types of research approach was adopted and how the researcher plans to implement scientific controls to enhance the interpretability of the results (Polit and Hungler, 1999).

Quantitative research allows researchers to familiarize themselves with the problem or concept to be studied. This research is based on investigation of TQM among road

construction companies in Ghana and, therefore, the researcher focused on contractors' views. In order to collect the required data, the researcher adopted face-to-face semi structured interviews and questionnaire survey which was targeted at registered road contractors with the ministry of roads and highway classification of A1 B1 and A2 B2.

3.2   Research Approach

Partington (2002) argued that the selection of the research approach relies on the research aim and objectives. However, before choosing the appropriate research design, three criteria should be taken into consideration: the nature of the research topic, time availability, and degree of risk (Creswell, 2003).

Induction and deduction are two approaches used to establish what is true or false in research and draw conclusions. Deduction is usually undertaken using a structured quantitative research method. On the other hand, induction is usually undertaken using a less structured qualitative research method. (Saunders et al., 2007).

3.3   Research Strategies

According to Saunders et al. (2007), a research strategy is a blueprint which the researcher will use to answer specific research questions, by specifying the sources the researcher will use to collect the required data and considering the constraints during data collection process such as location, time, and access to data, ethical issues and money. The focus of this research is not to what approach one strategy is attached, but whether it is the appropriate strategy to answer the research question or not.

However, since the survey strategy gives the researcher more control of the research process, the researcher took the time criteria into consideration during questionnaire

design and interview piloting. As a result, this research adopted the survey strategy for its data collection process. Moreover, the availability of data and literature on QM allows developing a theory by studying different QM frameworks.

3.4   Data Collection Methods

Saunders et al. (2007) clarify the data collection methods for any research as secondary and primary data. Due to the nature of this study, which focused on researching challenges to the implementation of QM within road construction companies in Ghana, data was collected by face-to-face semi structured interviews and questionnaire survey.

3.5   Target Population

The targeted population was limited to road contractors registered with Ministry of Roads and Highways classification A1 B1 and A2 B2 operating within the Ashanti Region of Ghana. Class A1 B1 has the highest resource base, followed by A2 B2 (MORH, 2014). The region was chosen because of proximity and the high number of contractors within the region which give a true reflection of assessment due to number of on-going projects in the region. The study covered 45 registered contractors 'with classification of A1 B1, A2 B2, in the Ashanti regional. In order to help achieve a good representative from a large population, the researcher took into consideration the factors that influence the determination of the target sample.

3.6   Sampling Procedure

Selecting the targeted sample is a fundamental element in any research; clear identification and misidentification of the targeted sample has its advantages and disadvantages. However, it is impracticable to survey the entire population to answer the research questions, which involves high cost, difficulties when gaining access for

all the targeted organisations and a very long time for data collection and analysis. A subset of the population or the 'sample' is, thus, used to gain information about the entire population (Henry, 1990). A relatively small sample if appropriately selected can be informative about the total population.

Sampling procedures informs on how the segment of the population involved in data collected was selected. The population of the research is the universe of units from which the sample is selected (Bryman, 2004). Survey research is concerned with making inferences about a population on the basis of information from a sample. The basic idea of sampling is to use appropriate techniques so that a sample can be drawn, which allows for statistical inference and generalization back to the population. On the other hand, it seems obvious that the smaller and more sizable the targeted sample is, the more likely the research was practical, cheaper and save time in terms of data collection and analysis.

To determine the appropriate sample size for the study, a sample method from the simplified formula for proportions by Yamane (1967), was used with a confidence level of 95 percent assumed to an acceptable margin of error i.e. half the width of the confidence interval.

Which is $n = \frac{n}{1+N(e)^2}$

Where:

n = the size of the sample

N = the size of working population i.e.

e = confidence interval, expressed as decimal (e.g. 0.05 = ±5%)

Calculate the Sample size $= \frac{45}{1+45(0.05)2} = 40.431$

This yielded a sample of 40 respondents (contractors).

3.7   Questionnaire Design

Oppenheim (1992) described questionnaire formulation as an integral part of the research design stage. For a quantitative study like this, one of the biggest challenges in question design is to ensure that every response can be expressed numerically, for the simple reason, statistics and econometrics perceive those variables as a stronger measure in analysis. Questions in a questionnaire could be open-ended, close-ended or a mixture of the two (Frazer and Lawley, 2000; Oppenheim, 1992), based on the expected outcome. Frazer and Lawley (2000) described four main methods of questionnaire administration: mail questionnaire; personally administered questionnaire; telephone questionnaire; and internet questionnaire.

The questionnaire adopted for the study which according to Oppenheim (1992), this method is the most commonly used method of collecting quantitative data in management surveys because it ensures a high response rate, low cost compared with other methods, minimum interviewer bias, and accurate sampling. This method is considered cheaper than other methods and requires less effort by the questioner when compared with verbal and telephone surveys. Moreover, this method involves written questions and usually standardized answers that make it simpler for respondents to follow. The main disadvantage of this method is that respondents control the time of returning their response which reflects on increasing the overall time.

3.8   Interview

Two main methods of conducting interviews: structured interviews; and qualitative research interviews which he described to comprise less structured interviews mainly unstructured or semi-structured interviews (Bryman, 2004). This is not to say that

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structured interviews are not used in qualitative research. A structured interview is an interview design used mainly in survey research where the respondent is expected to answer a standardized set of questions. Qualitative interviewing methods however are much less structured and the focus is on the interviewee's point of view than the researchers concern. This method provides the needed flexibility for other issues which could be of much interest to the research to be discussed and considered in future interviews or introduce a different point of view.

However, the mixed methods research approach allows researchers to be more integrative, flexible and holistic in their investigative techniques, as they strive to address a range of complex research questions that arise, Powell et al. (2008). Therefore, this study has combined quantitative and qualitative data techniques to gather the required data, (self-administrated and interviewer-administrated questionnaires) as the quantitative data technique and the individual face-to-face in-depth semi-structured interview as the qualitative technique. This approach was adopted to allow the interviewer to explore the views of the interviewee, allow them to explain their views on the subject matter, make recommendations and suggestions and make room for the discussion of other pertinent issues not covered in the interview guide.

3.9   Data Analysis

The completed questionnaires were edited to ensure completeness, and readability. Once the data had been checked, they were arranged in a format that enabled easy analysis. Quantifiable data from the questionnaires was coded into the software for analysis which was. Statistical Package for Social Sciences (SPSS 16.0) and Microsoft excel were then used to analysis the data because it was considered to be user-friendly. Frequency tables, percentages, bar charts and other descriptive were

used to summaries the results. Respondents are required to provide answers by ticking a number on a 5-point Likert Scale in order to make it easier for them. The five-point Likert scale scoring system mentioned earlier formed the basis of calculating the mean score for each of the factors; the relative ranking of the factors by all respondents, was then determined by comparing the individual mean score and the standard deviation for each criterion for the questions in the questionnaire.

CHAPTER FOUR

REUSLTS AND DISSUSSION

4.0   Introduction

Chapter four of this study deals with analysis and discussion of results. The initial aspect deals with demographic information of the respondents which consists of status and years of experience in the construction industry. The analysis consists of cross tabulation and ranking of identified variables or factors using relative index, which was widely used in the presentation of results. This technique allows for a good analysis of the data collected due to nature of the questionnaire and the percentage of the variables was also employed in the analysis and discussion.

The analysis as well as the discussions revolves around the first, second and third objectives of the study. That is to identify the key components for TQM implementation in the road construction industry; to identify the extent of implementation in the Ghanaian road sector and the third objective was to identify challenges in TQM implementation in the Ghanaian road sector.

4.1 Instrument Administration

A questionnaire were self-administered by the researcher by hand delivery to technical personnel such as manager directors, project manager and site engineers in the construction sector. After the administration of the questionnaires the researcher used three weeks to retrieve the questionnaires and in all forty (40) questionnaires were administered and all the (40) were retrieved giving a representing 100% response rate were retrieve.10 questionnaires were retrieved from manager directors response representing 100% ,whiles 15 questionnaires were retrieved from project managers respondent representing 100% and 15 questionnaires were retrieved from the site engineers respondent which represented 100%.

4.1   Profile of Respondents

This section tends to give a thorough understanding of the nature and background of the respondent firms. It was necessary to dig deep into the legal status and the years of operation that they have attained in the road construction. These really help in ascertaining the validity and the reliability of the information provided for the study since the respondent have more working experience in the subject study.

4.2.1   Legal Status of firms

The nature of legal organizations affects the behavior of the firm's activity. Again as a requirement for the acquisition of Government of Ghana works, firms are supposed to be legally registered. Table 4.1 presents the responses on the legal status of the respondent firms. The table shows that 14 respondents representing 35 percent are Government Ministry, 26 of the respondent firms representing 65 percent are Private Consultant. Conclusion drawn from the above show that the most dominant firm operating in the regions (Ashanti Region) are the private consultant.

Table 4.1 Demographic Information

Institution Of Work		
	Frequency	Percent
Government Ministry	14	35.0%
Private Consultant	26	65.0%
Total	40	100.0%

Source: Field Survey, 2014

Fid 4.1 above showed that, out of 35% of respondents been the employees with Government ministry and the remaining 65% were private consultants.

4.3   Work Experience of the Respondents

The experience of the construction firms is very vital in construction procurement. Before and during the construction stage, the experience of the firm will be brought to

bear in the field; therefore they will be able to give authentic information. The survey results indicates that out of the 40 respondents, 10% had been working for zero to five years, 35% from six to ten years, 35% from eleven to fifteen years, 15% from sixteen to 20 years and the remaining 5% had been working with their institution for 20 years and above. A cross tabulation of the respondent category and years of experience as shown in table 4.2.

Table 4.2 Work Experience of the respondents

Number Of Years Working With Institution		
	Frequency	Percent
0-5yrs	4	10.0
6-10yrs	14	35.0
11-15yrs	14	35.0
15-20yrs	6	15.0
20yrs And Above	2	5.0
Total	40	100.0

Source: Field Survey, 2014

Table 4.3 indicates that, 10% of the institutions had been in existence from zero to five years, 27.5% from six to ten years, 10% from eleven to fifteen years, 20% from sixteen to twenty years and 32.5% for twenty years and above. Table 4.4 shows that majority of the respondents, approximately 83% were civil engineers, with the rest being project/contract managers, materials engineering, quality managers and others. The results of the survey will be thus be titled towards the view of civil engineers.

Table 4.3 Experience of the Organization

	Frequency	Percent
0-5yrs	4	10.0%
6-10yrs	11	27.5%
11-15yrs	4	10.0%
16-20yrs	8	20.0%
20yrs And Above	13	32.5%
Total	40	100.0

Source: Field Survey, 2014

Table 4.4 Position Held

	Frequency	Percent
Project/Contract Manager	2	5.0%
Civil Engineer	33	82.5%
Materials Engineering	3	7.5%
Quality Manager	1	2.5%
Others	1	2.5%
Total	40	100.0

Source: Field Survey, 2014

4.4 Level of Quality Management in the Ghanaian Road Construction Industry

Table 4.5 below shows that on the issue of frequency of implementation of quality management systems in organization is poorly done. This is evident from the fact that 75% of respondents answered that quality management systems were sometimes implemented, 5% said they were never implemented whiles the remaining 20% were

certain of the implementation of quality management systems. The result is very alarming due to the importance attached to quality management systems.

Table 4.5 Implement Quality management system

	Frequency	Percent
Never	2	5.0%
Sometimes	30	75.0%
Often	4	10.0%
Always	4	10.0%
Total	40	100.0

Source: Field Survey, 2014

Table 4.6 Implement Company Formal Quality Management System

	Frequency	RII Percent	Ranking
Already Implemented	12	30.0%	2
In Preparation	4	10.0%	3
Not Planned	24	60.0%	1
Total	40	100.0	

Source: Field Survey, 2014

With regards to the implementation of a formal quality management system, Table 4.6 shows that, majority of the organizations forming 60% had not planned for a formal implementation of a quality management system, 30% had already implemented it and the remaining 10% had it under preparation. This again shows that quality managements systems are not given the required attention in road construction.

Table 4.7 Quality Improvement Program

	Frequency	Percent	Ranking
TotalQuality Management	1	2.5	2
ISO 9000	1	2.5	2
Quality Control/Quality Assurance	38	95.0	1
Total	40	100.0	

Source: Field Survey, 2014

Table 4.7 shows that, for the type of quality improvement programme being employed in the organization, 95% of the respondents said that their organizations had Quality Control/Quality Assurance and the remaining 5% evenly split between Total Quality Management and ISO 9000. This result indicates that the Ghanaian construction industry is slow to adopt the current quality management culture.

From table 4.8 above, 80% of respondents could not describe their quality improvement programme because they did not have any formal programme, 10% described their quality improvement programme as being periodic short-range solutions or motivational programmes while the remaining 10% of the respondents said they had a formal programme underway with widespread employee awareness. The inability of respondents to describe their quality management systems shows the low level of quality management practices among most road contractors. This goes to show why studies have indicated the poor quality workmanship of road construction works along with associated cost overruns (World Bank, 2003; Ahiaga-Dagbui, et al., 2011)

Table 4.8 Quality Improvement Program

	Frequency	Percent	Ranking
There Is No Formal Program	32	80.0	1
Periodic Short-Range Solutions Or Motivational Program	4	10.0	2
A Formal Program Is Underway With Widespread Employee Awareness	4	10.0	2
Total	40	100.0	

Source: Field Survey, 2014

Table 4.9 Quality management works in organization

	Frequency	Percent	Ranking
Very Well	1	2.5	2
To Some Extent	38	95.0	1
Cannot Say	1	2.5	2
Total	40	100.0	

Source: Field Survey, 2014

According to Table 4.9, majority of respondents forming 95% thought that quality management systems worked to some extent in their organizations while the remaining 5% either thought it worked well or that they could not say whether quality management worked at all in their organizations.

Table 4.10 after the implementation of your quality improvement programme, quality has?

	Frequency	Percent
Drastically Improved	1	2.5%
Improved	26	65.0%
Remained Same	5	12.5%
Decreased	1	2.5%
Cannot Say	6	15.0%
Not Applicable	1	2.5%
Total	**40**	**100.0**

Source: Field Survey, 2014

With regards to results after implementation of quality improvement programme, Table 4.10 shows that, 65% conceded that programme quality had improved, 2.5% said it had improved drastically, 12.5% said programme quality had remained the same, 15% could not say whether there was an improvement or not and the remaining 2.5% were indifferent to the question. This study shows the importance of quality management systems.

4.5 Identifying Challenges in Implementing Quality Management in Road Construction

Table 4.11 Management issues on challenges to Quality Management in road construction

Descriptive Statistics			
	Mean	**Standard Deviation**	**Rank**
Lack of Top Management Support and Commitment	4.68	0.829	1
Poor Project Definition	4.37	1.102	2
Lack of Equipment	4.35	1.145	3
Poor Communication	4.25	0.870	4
Poor Planning	4.20	1.181	5
Lack of Time for Innovation	4.10	1.033	6
Delay in Decision Making	4.08	1.071	7
Inadequate Resources	4.05	0.846	8
Delay in Materials	3.95	0.876	9
Inadequate Pre-Planning	3.92	1.118	10
Weak Administration	3.88	1.090	11
Absence of Long Term Planning	3.78	1.050	12
Lack of Steady Work Engagement	3.77	1.052	13
Unsuitable Organizational Structure	3.75	1.032	14
Lack of Customer Focus	3.70	1.043	15
Lack of Client and Supplier Involvement	3.69	1.045	16
Poor Procurement Selection Strategies	3.65	1.122	17
Long Implementation Period	3.62	1.055	18
Use of Sub-Standard Components	3.48	0.905	19
Grand Mean	**3.96**		

Source: Field Survey, 2014

4.4.1 Management Issues

Michael et al. (1997) opined that TQM is a generic management philosophy and a set of tools which allow an institution to pursue a definition of quality and a means for attaining quality.

In the analysis of the challenges affecting the implementation of total quality management in road construction, Table 4.11 shows that under management issues, all 40 respondents unanimously declared the significance of all 19 management issues as challenges affecting the implementation of quality management in road construction. Each factor had a mean score of not less than 3.00. The average mean obtained was 3.96, which is approximately 4.00. On the likert scale, a score of 4.00 meant that the enumerated factor was very significant in the implementation of quality management in road construction.

4.4.2 Financial Issues

Table 4.12 Financial Issues on challenges to Quality Management in road construction

Descriptive Statistics			
	Mean	**Standard Deviation**	**Rank**
Inadequate Project Fund	4.63	0.774	1
Implementation Cost	4.38	0.925	2
Poor Professional Wages	4.30	0.823	3
Lack of Incentives and Motivation	4.12	0.791	4
Inflation	4.10	0.709	5
Risk Aversion	3.43	0.846	6
Corruption	3.32	0.797	7
Grand Mean	**4.04**		

Source: Field Survey, 2014

Table 4.12 above takes into account challenges that are collectively grouped under financial issues. It can be observed that the least mean score came from corruption with a score of 3.32 and the maximum mean score came from inadequate project fund with a score of 4.63. This indicates that all seven factors under financial issues significantly affected the implementation of quality management in road construction. A grand mean of 4.04, approximately 4.00 shows that the stated financial issues serve as a huge challenge to quality management implementation in road construction.

4.4.3 Educational Issues

Table 4.13 Educational Issues

Descriptive Statistics			
	Mean	**Standard Deviation**	**Rank**
Lack of Training	4.65	1.027	1
Lack of Technical Skills	4.52	1.062	2
Lack of Understanding	4.40	1.336	3
Lack of Project Team Skills	4.42	1.035	4
Inadequate Knowledge	4.40	0.982	5
Lack of Awareness Programmes	4.32	0.971	6
High Level Illiteracy	4.30	1.436	7
Lack of Holistic Implementation	4.25	1.080	8
Inadequate Exposure To Requirements For Quality Implementation	4.15	0.802	9
Lack of Information Sharing	4.00	1.038	10
Difficulty In Understanding Concepts	3.82	0.984	11
Grand Mean	**4.29**		

Source: Field Survey, 2014

From Table 4.13, under educational issues, 11 factors were pointed out. The factor that produced the least mean score was difficulty in understanding concepts with a mean score of 3.82. The factor with the highest mean score was lack of training with a mean score of 4.65, approximately 5.00. All 11 factors produced a grand mean of 4.29, approximately 4.00. This according to the likert scale rating implied that the 11 factors posed a challenge to the implementation of quality management in road construction.

4.4.4   Government Issues

Table 4.14 Government Issues

Descriptive Statistics			
	Mean	**Standard Deviation**	**Rank**
Government Bureaucracy	4.32	0.694	1
Inconsistency in Policies	4.15	0.662	2
Materials Unavailability and Unsteady Price Commodities	4.00	0.784	3
Lack of Social Amenities and Infrastructure	3.88	0.883	4
Grand Mean	**4.09**		

Source: Field Survey, 2014

Under factors collectively defined as Government issues, Table 4.14 indicates that respondents on the average agreed that all four factors significantly affected the implementation of quality management in road construction. The least mean score was 3.88 based on the lack of social amenities and infrastructure. The highest mean score was Government bureaucracy with a mean score of 4.32. A grand mean of 4.09 under Government issues implied that all 40 respondents agreed that the four factors under Government issues significantly affected the implementation of quality management in road construction.

4.4.5   Technical Issues

Table 4.15 Technical Issues

Descriptive Statistics			
	Mean	**Standard Deviation**	**Rank**
Poor Performance	4.35	0.975	1
Lack of Agreed Implementation Methodology	4.18	0.874	2
Lack of Design Constructability	4.07	0.888	3
Lack of Buildable Designs	3.68	0.730	4
Incomplete Designs	3.67	0.764	5
Measurement Strategies	3.65	0.736	6
Uncertainty In Supply Chain	3.64	0.731	7
Inaccurate and Incomplete Designs	3.60	0.810	8
Grand Mean	**3.86**		

Source: Field Survey, 2014

According to table 4.15, 8 factors were listed under technical issues. On the whole, none of the factors had a mean score less than 3. Poor performance as a factor had a mean score 4.35 which was the highest. The factor with the least mean score was inaccurate and incomplete designs with a mean score of 3.60. Respondents yielded to the fact that technical issues were a challenge to the implementation of quality management in road construction. This can be seen from a grand mean score of 3.86, approximately 4.00.

4.4.6   Human Attitudinal Issues

Table 4.16 Human Attitudinal Issue

Descriptive Statistics			
	Mean	**Standard Deviation**	**Rank**
Lack of Teamwork	4.52	0.987	1
Lack of Cooperation	4.52	0.751	2
Lack of Transparency	4.45	0.876	3
Poor Leadership	4.35	1.075	4
Lack of Team Spirit	4.25	1.006	5
Cultural Change	4.20	0.883	6
Fear of Unfamiliar Practices	4.15	1.089	7
Leadership Conflict	4.07	1.289	8
Lack of Self-Criticism	3.80	1.018	9
Grand Mean	**4.26**		

Source: Field Survey, 2014

Table 4.16 shows the 9 factors that were grouped under human attitudinal issues as a challenge to the implementation of quality management in road construction. Lack of self-criticism produced the least mean score with a score of 3.80. The highest mean score went to both lack of team work and lack of cooperation with a score of 4.52 each. The grand mean of 4.26, approximately 4.00 indicated that human attitudinal issues were a challenge to the implementation of quality management in road construction.

4.4.7 Ranking Of Challenges In Implementing Quality Management

Table 4.17 Challenges in Implementing Quality Management

Challenge	Mean Score	Rank
Educational Issues	4.29	1
Human Attitudinal Issues	4.26	2
Government Issues	4.09	3
Financial Issues	4.04	4
Management Issues	3.96	5
Technical Issues	3.86	6
Grand Mean	**4.08**	

Source: Field Survey, 2014

Table 4.17 indicates that, the highest ranked challenge was educational issues with a mean score of 4.29 .According to Common et al., (2000), Cua et al., (2001), Alarcon et al., (2002),Castka et al., (2004), Olatunji (2008), Jorgensen and Emmitt (2008), Alinaitwe (2009), Abdullah et al., (2009) and Mossman (2009) identified educational issues as a challenges to implementation of TQM.

followed by human attitudinal issues with a mean score of 4.26 According to.Common et al., (2000), Cua et al., (2001), Alarcon et al., (2002), Castka et al., (2004), Forbes and Ahmed (2004), Alinaitwe (2009) and Mossman (2009) identified human attitudinal issues as a barrier to implementation of TQM.

Government issues followed with a mean score of 4.09. Research findings by Olatunji (2008) and Alinaitwe (2009) reveals government issues as a challenges to the implementation of TQM with financial issues being the fourth ranked with a mean score of 4.04. An analysis of studies reported by Common et al., (2000), Olatunji (2008) and Mossman (2009) identified financial issues as challenges to the implementation of TQM.

. Management issues were ranked fifth with a mean score of 3.96. Research by (Common *et al.,* (2000), Alarcon *et al.,* (2002), Forbes and Ahmed (2004), Olatunji (2008) and Alinaitwe (2009)) found management issues as a challenge to implementation of TQM and technical issues took the sixth place with a mean score of 3.86. According to Ballard and Howell (1998), Koskela (1999) and Alinaitwe (2009) identified technical issues as challenges to implementation of TQM. The grand mean of 4.08 shows that the above six challenges issues significantly affect the implementation of quality management in road construction industry of Ghana.
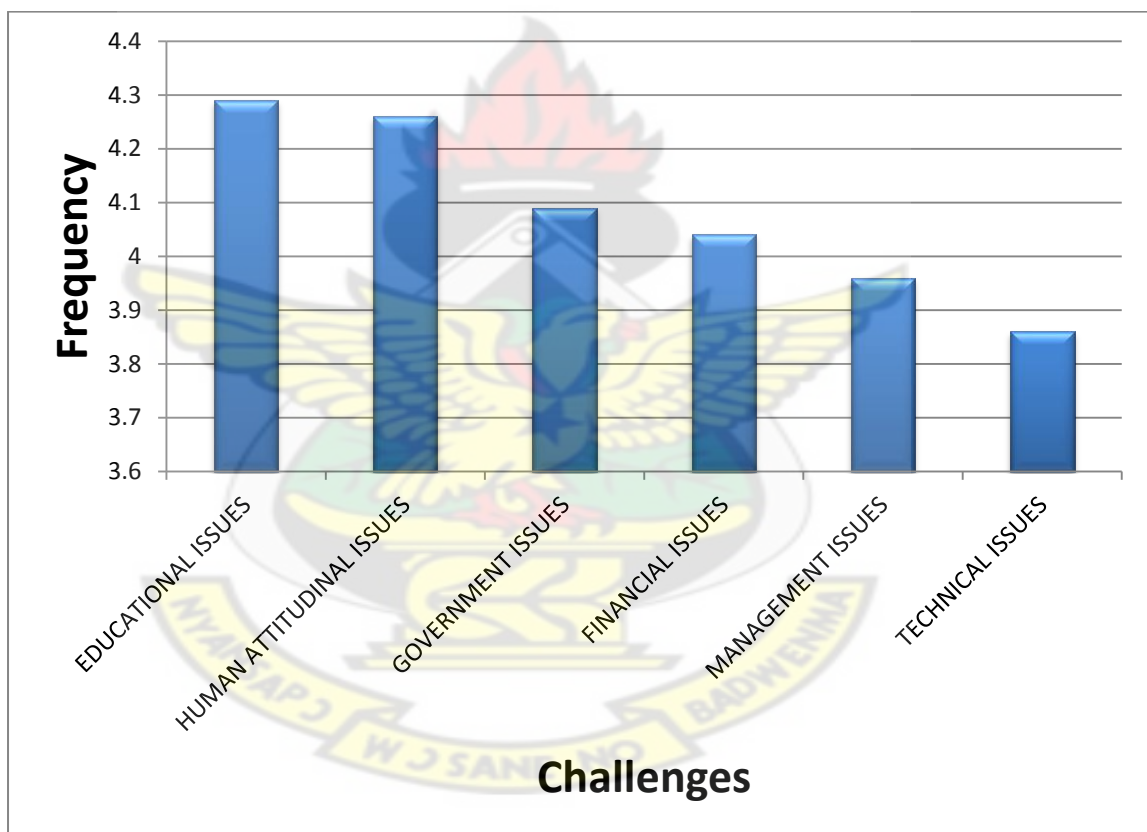

Figure 4.5 Charts for Ranking of Challenge

Source: Field Survey, 2014

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This research directed at evaluating the total quality management (TQM) implementation in the Ghanaian road construction industry. Detailed discussions of key issues, which originated from the questionnaire and semi-structured interviews of the research, are presented in this chapter. The findings from the questionnaire and interviews were discussed in relation to the objectives of the study, which is supported by the literature to enable meaningful conclusions to be drawn and appropriate recommendations made.

5.2 Review of Research Objectives

As earlier on stated, this research broadly looks at the evaluating TQM implementation in the Ghanaian road construction industry. Three main objectives were set namely; identifying the key components for Total Quality Management (TQM) implementation in the road construction industry, identifying the extent of Total Quality Management (TQM) implementation in the Ghanaian road sector and finally identifying challenges in Total Quality management (TQM) implementation in the Ghanaian road sector.

Objective 1: *To identify the key components for Total Quality Management (TQM) implementation in the road construction industry.*

In view of this, a literature review on quality concept was conducted. The main issues addressed were: Total quality management viewed as a journey rather than an end on its own. Total quality management is dependent on the translation, integration and institutionalization of total quality management behavior into the routine practices of

the construction industry. Additionally it's believed that total quality management equals quality assurance plus quality control.

Further analysis showed that, total quality management entails complete overhaul of the organizational culture and management approach as opposed to the old strategy of top management issuing orders to subordinates. Total Quality Management (TQM) also means the utilization of quality principles to particular process and management functions to ensure total customer or user satisfaction.

Objective 2: *To identify the extent of Total Quality Management (TQM) implementation in the Ghanaian road sector*.

The study showed that Total Quality Management (TQM) was of little or no importance to most of the respondents and that the level of implementation of Total Quality Management (TQM) is very low in the Ghanaian road sector. Table 4.5 and Table 4.6 show that most of the organizations gave little or no attention to Total Quality Management (TQM). Majority of the organizations had no formal program for the implementation of Total Quality Management (TQM).

Objective 3: *To identify challenges in Total Quality management (TQM) implementation in the Ghanaian road sector*.

Several challenges were identified as being challenges in Total Quality management (TQM) implementation in the Ghanaian road sector . These challenges were grouped into six categories; Management issues, Financial issues, Educational issues, Government issues, Technical issues and Human attitudinal issues. Results from Table 4.17 shows the ranking or order of significance of the above categorized challenges, taking note that Educational issues had the topmost priority with technical

issues taking the last spot, though all six challenges significantly affected Total Quality management (TQM) implementation in the Ghanaian construction industry.

5.3 Recommendations

Based on the findings of this research work on total quality management systems in the road construction industry in Ghana, the following recommendations were made;

1. There is the need for increased emphasis on educational training (formal or informal) and competence.

2. Commitment and consistency by both senior management and entire work force for successful implementation of Total Quality management (TQM) by way of employing a positive human attitude.

3. Government should be consistent in policy making regarding quality management and materials and logistics need for TQM implementation should be made available.

4. Good working practices should be promoted and standardized.

5. Management issues and financial issues should be properly addressed to help improve the implementation of quality management in the road construction industry.

5.4 Further research

Further research is recommended to explore the challenges workers face implementing TQM. Also future study could focus on the development of a TQM training module for Ghanaian Road contractors focusing on contemporary Quality Management practices and the development of a TQM manual for use by senior management for the implementation of TQM programmes.

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KNUST

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Topic

Implementation Of Total Quality Management In The Ghanaian Road Construction Industry

Introduction

The researcher is a post-graduate student at the Kwame Nkrumah University of Science and Technology studying for a Master of Science degree in Construction Management. The researcher is conducting a research into quality management in procurement of road works. The aim is to evaluate the present challenges of quality management in the road construction industry in Ghana.

This survey is an attempt to add to the continuing knowledge that will lead to better planning for project outcomes for constructing road works. With this background, kindly answer the questions in this questionnaire as accurately as you possibly can. Your response to this research will be confident and will be used exclusively for academic purposes. The questionnaire is divided into three main sections.

SECTION A: BACKGROUND INFORMATION

Please tick as appropriate

1. Please indicate institution of work

   Government Ministry ( )   Private Consultant ( )

2. How long have you been working in this institution

   0 – 5 yrs ( )   6 -10 yrs ( )   11 – 15 yrs ( )   15 – 20 yrs ( )   20 yrs and above ( )

3. How long has your organization been

   0 – 5 yrs ( )   6 -10 yrs ( )   11 – 15 yrs ( )   15 – 20 yrs ( )

   20 rs and above ( )

4.Position Held: Project/Contract Manager ( )   Civil Engineer (   )Materials Engineer ( )   Quality Manager ( )   Others please specify ………………..

Section B: Level Of Quality Management In The Ghanaian Road Construction Industry

Please tick as appropriate

How often do you implement Quality Management Systems in your Organisation?

Never ( )   Rarely ( )   Sometimes ( )

Often ( )   Always ( )

1. Does your company implement a formal quality management system?
   Already implemented ( )   In preparation ( )   Not planned ( )
2. What type of quality improvement program do you have?
   Total Quality Management (TQM) ( )   ISO 9000 ( )
   Quality Control / Quality Assurance ( )   Lean Construction ( )
   Others (please specify) …………………………………………………
3. Your organisations quality improvement program can be described as?
   There is no formal program ( )
   Periodic short-range solutions or motivational program ( )
   A formal program is underway with widespread employee awareness ( )
   Others (please specify)…………………………………………………
4. Do you think that quality management works in your organization?
   Very well ( )   To some extent ( )
   Does not work ( )   Cannot say ( )
5. After the implementation of your quality improvement program, quality has?
   Drastically improved ( )   Improved ( )
   Remained the same( )   Decreased( )
   Cannot say( )   Not applicable( )

Section C: Identifying Challenges In Implementing Quality Management In Road Construction

How significant are these challenges in implementing quality management in your organisation. Please tick as appropriate

Not Significant – (1);   Slightly Significant - (2);   Moderately Significant– (3);   Very Significant– (4);   Extremely Significant – (5)

Challenges in Implementing Quality Management in Road Construction	1	2	3	4	5
Management Issues					
1.1 Lack of Top Management Support And Commitment					
1.2 Poor Project Definition					
1.3 Delay in Materials					
1.4 Lack of Equipment					
1.5 Lack of Time For Innovation					
1.6 Unsuitable Organisational Structure					
1.7 Weak Administration					
1.8 Inadequate Preplanning					
1.9 Inadequate Resources					
1.10 Lack of Client and Supplier Involvement					
1.11 Absence of Long Term Planning					
1.12 Lack of Customer Focus					
1.13 Poor Communication					
1.14 Use of Substandard Components					
1.15 Lack of Steady Work Engagement					
1.16 Poor Planning					
1.17 Poor Procurement Selection Strategies					
Delay In Decision Making					
Lack Of Steady Work Engagement					
Long Implementation Period					
Financial Issues					
2.1 Inadequate Project Funding					
2.2 Inflation					
2.3 Implementation Cost					
2.4 Poor Professional Wages					
2.5 Lack Of Incentives And Motivation					
2.6 Risk Aversion					
2.7 Corruption					
Educational Issues					
3.1 Lack Of Understanding					
3.2 Lack Of Technical Skills					
3.3 High Level Illiteracy					
3.4 Lack Of Training					
3.4 Lack Of Holistic Implementation					
3.5 Inadequate Knowledge					
3.6 Lack of Awareness Programmes					
3.7 Difficulty in Understanding Concepts					
3.8 Lack of Information Sharing					
3.9 Lack of Project Team Skills					

3.10	Inadequate Exposure to Requirements for Quality Implementation					
Government Issues						
4.1	Government Bureaucracy,					
4.2	Inconsistency In Policies					
4.3	Lack of Social Amenities and Infrastructure,					
4.4	Materials Unavailability and Unsteady Price Commodities.					
Technical Issues						
5.1	Lack of Buildable Designs					
5.2	Incomplete Designs					
5.3	Poor Performance					
5.4	Measurement Strategies					
5.5	Lack of Agreed Implementation Methodology					
5.6	Uncertainty In Supply Chain					
5.7	Lack of Design Constructability					
5.8	Inaccurate and Incomplete Designs					
Human Attitudinal Issues						
6.1	Lack of Transparency					
6.2	Cultural Change					
6.3	Lack of Team Spirit					
6.4	Lack of Self-Criticism					
6.5	Lack of Teamwork					
6.6	Lack of Cooperation,					
6.7	Poor Leadership					
6.8	Leadership Conflict					
6.9	Fear of Unfamiliar Practices.					

Please do you have any recommendation for improving the implementation of quality

management of road works? Kindly indicate below

....

....