Declaration

I hereby declare that the thesis entitled "**Barriers affecting of the implementation of ISO (9001) organization"** has been carried out in deanship of development and quality, College of Graduate Studies, Sudan University of Science & Technology, Khartoum, Sudan under the guidance of Prof. Dr. Saud Sadig Hassan Abdallah. The work is original and has not been submitted in part or full by me for any degree or diploma at any other university.

I further declare that the material obtained from other sources has been duly acknowledged in the thesis.

Anass Mohammed Abdel Wahab Osman

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DEANSHIP OF DEVELOPMENT & QUALITY

Barriers Affecting of the Implementation of ISO (9001) Organization

معوقات تطبيق نظام ايزو (9001) في المؤسسات

by: Anass Mohammed Abdel Wahab Osman

Supervisor: Prof. Dr. Saud Sadig Hassan Abdallah

A thesis submitted for the award of:

The degree of Master of Science in Quality Management and Excellence.

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Preface

(It is" the artistry of Allah, who perfected all things. Indeed, He is acquainted with that which you do)

God Almighty has spoken the truth
From the verse [88] - Surat An-Naml

(صُنْعَ اللَّهِ الَّذِي أَتْقَنَ كُلَّ شَيْءٍ ۚ إِنَّهُ خَبِيرٌ بِمَا تَفْعَلُونَ)

صدق الله العظيم

من الآية (88) - النمل

Dedication

This thesis work is dedicated to my wife, Mayada, who has been a constant source of support and encouragement. I am truly thankful for having you in my life. This work is also dedicated to my parents, Mohammed and Laila, who have always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve.

Acknowledgments

I would like to express my sincere gratitude to my advisor Prof. Dr. Saud Sadig for the continuous support to complete this thesis, for his patience, motivation, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisor and mentor for my master study.

Besides my advisor, I would like to thank the rest of my thesis committee for their encouragement, insightful comments, and hard questions.

I thank my fellow colleagues for enlightening me the first glance of research.

Last but not the least; I would like to thank my brother Abu-Obaida, my sisters, Raja and Hiba for supporting me spiritually throughout my life.

Abstract

The standard “ISO 9001:2008” is a way for an organization to manage internal and external customer satisfaction and demonstrate continuous improvement. In this observational cross-sectional study, we used ISO framework as an example of a quality management system to identify the barriers that affect the implementation of a QMS in the research sample organization throughout analyzing different types of data which approaching research objective.

From the literature review and earlier data analysis, a final conceptual framework was developed. There is a lack of empirical research on barriers affecting ISO standard implementation especially to the project-based QMS. Based on the research questions and objectives, a mixed methodology of both quantitative and qualitative approaches was employed to collect the relevant information associated with the current status of QMS practices.

The most important barriers facing the organization are “Insufficient resources allocation, Lack of management and employee’s commitment and factors related to organization’s internal systems” The gap in implementing of QMS is affected largely by inherited deficiencies in planning and preparatory phase in which the strategic quality deployment process must ensure the quality improvement efforts are aligned with the corporate mission, vision, goals, and objectives. In this thesis we recommended that organization to revaluate the current QMS to establish appropriate degree of flexibility within the key and supporting processes and to have the right level of documentation of records, procedures and reports. Therefore, this research makes a contribution by adding to the limited literature. Another contribution of this research is that it has specifically filled the gap in knowledge for project-based QMS studies in general. Some recommendations for further research have been derived from this research.

مستخلص الدراسة

يعتبر معيار " ISO 9001:2008 " من الوسائل التي يمكن استخدامها من قبل الشركة لتحقيق رضا العملاء في الداخل والخارج وتحقيق التحسن المستمر. في هذه الدراسة الرقابية لقطاع عينة البحث قمنا باستخدام إطار مواصفة الايزو (ISO) 9001:2008 كمثال في تطبيق نظام إدارة الجودة لتحديد العوائق المؤثرة على تطبيق النظام من خلال تحليل الأنواع المختلفة من البيانات التي تحقق أهداف البحث ، ومن خلال مراجعة وتحليل الدراسات والبيانات السابقة، تم وضع الإطار النظري للبحث.

هناك نقص في الأبحاث التجريبية حول الحواجز التي تؤثر على تنفيذ معيار ISO خصوصاً على نظام إدارة الجودة القائم على المشروع و بناءً على أسئلة البحث وأهدافه تم استخدام منهجية مزدوجة من كلا الأسلوبين الكمي والنوعي لجمع المعلومات ذات الصلة والمرتبطة بالوضع الحالي لممارسات نظام إدارة الجودة بالشركة المختارة للبحث.

تشمل أهم المعوقات التي واجهت الشركة المختارة للبحث "تخصيص موارد غير كافية، عدم التزام الإدارة والموظفين بنظام إدارة الجودة وبعض العوامل المتعلقة بالنظم الداخلية للشركة". تتأثر الفجوة في تطبيق نظام إدارة الجودة إلى حد كبير بالقصور المتوارث في عملية التخطيط والمرحلة التحضيرية التي يجب ان تضمن ان عملية التهيئة الاستراتيجية لتطبيق الجودة تماشى مع جهود تحسين الجودة و مهمة الشركة ورؤيتها وأهدافها.

في هذه الأطروحة أوصينا بأن على الشركة أن تقوم بإعادة تقييم نظام إدارة الجودة الحالي من أجل إنشاء درجة مناسبة من المرونة بين العمليات الرئيسية والداعمة وتوفير المستوى المطلوب من التوثيق للمستندات والإجراءات والتقارير.

يعتبر هذا البحث مساهمة إضافية إلى الأدبيات والدراسات المحدودة التي تمت على ارض الواقع للدراسات التي اجريت على استنباط معوقات تطبيق أنظمة الجودة بشكل عام وعن طريق ملئ الفراغ المعرفي يسهم هذا البحث في بيان معوقات التطبيق المرتبطة بتقديم خدمة أو الوصول إلى نتيجة معينة في فترة زمنية محددة (نظام إدارة الجودة القائم على المشاريع) بشكل خاص.

بعض التوصيات لإجراء مزيد من البحوث في هذا المجال قد تم استخلاصها من هذا البحث.

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List of symbols/abbreviations

ISO	International Organization for Standards
QMS	Quality Management System
QMS-ISO	Quality Management System-ISO 900:2008
QA	Quality Assurance
QC	Quality Control
CI	Continual Improvement
QI	Quality Improvement
QM	Quality Management
The certification	ISO 9001:2008 Certification
The standard	ISO 9001:2008 Standard
PQP	Project Quality Plan
SPSS	Statistical Package for Social Science

List of appendices

Chapter One- Introduction

1.1 Introduction

This chapter comprises of seven sections that introduces the overall picture of the research. It discusses; background of the research subject, problem statement, research questions, research objectives, significance of the research, research sample organization and research structure.

1.2 Background

1.2.1 Construction industry

The construction industry not as a single industry but made up of several different market areas. For the purpose of classification (Langford and Male, 1992) divide it into four market areas; Building, Civil engineering, Repair and maintenance and Materials manufacture. In Japan it is customary to divide construction activities into construction and civil engineering, whereas the US industry does not make this distinction (Hasegawa, 1988). In defining the construction industry, (Pheng 1993) notes certain important characteristics of the industry as being; Size, Fluctuations in workload, Wide variety of participants, Duration, Site-specific and Custom-made product. (Latham 1994) decided to adopt a wide definition of the construction industry, including engineering construction and small house-builders, as there were lessons to be learned in and from all sectors. On another way it could be considered as process of constructing a building or infrastructure. Construction differs from manufacturing in that manufacturing typically involves mass production of similar items without a designated purchaser, while construction typically takes place on location for a known client.

In general, there are three sectors of construction: buildings, infrastructure and industrial. Building construction is usually further divided into residential and non-residential (commercial/institutional). Infrastructure is often called heavy/highway, heavy civil or heavy engineering. It includes large public works, dams, bridges, highways, water/wastewater and utility distribution. Industrial includes refineries, process chemical, power generation, mills and manufacturing plants. There are other ways to break the industry into sectors or markets (Chitkara, K. K. 1998). Construction starts with planning, design, and financing; and continues until the project is built and ready for use (Halpin, Daniel 2010).

The construction industry is a significant part of countries economy, globally is one of the largest contributors to Gross Domestic Product (GDP), as well as playing an important role in determining a country's economic growth. According to (Betts et al. 2011) in their written report on global forecasts for the construction industry over the decade 2011 to 2020, it was observed that this sector currently accounts for more than 11% of global GDP and it is estimated that by 2020 it will account for 13.2% of the world's GDP. It comprises six to nine percent of the gross domestic product of developed countries. (Halpin, Daniel 2010).

Quality Management (QM) practices has been widely implemented in the manufacturing and other services industries, and it shows how significant it can improve the quality in these fields. Few articles and studies attempted to bring the benefits of this philosophy to construction industry.

Quality management is critically required for a construction companies to sustain in current construction market which is highly challenging and competitive. (Harris and McCaffer 2001) explained that quality management has to provide the environment within which related tools, techniques and procedures can be deployed effectively leading to operational success for a company. The role of quality management for a construction company is not an isolated activity, but intertwined with all the operational and managerial processes of the company, to be competitive in today's market, it is essential for construction companies to provide more consistent quality and value to their owners/customers. Now is the time to place behind us the old adversarial approach to managing construction work.

1.2.2 Quality management in construction industry

Implementing of Quality Management (QM) is expected to improve customers' satisfaction and, at the same time, reduce non-quality costs. When these practices are implemented, some organizations encompass many beneficial, in terms of productivity, increasing their survival probability and superiority. However, many organizations cannot reach their goals due to many barriers and hindrances. Literature showed that main barriers found to be are deficiencies in management & leadership. These deficiencies can take a few different forms but usually look something like; Lack of a desire to change or improve, Lack of strategic planning needed to identify improvements, Poor communication & oversight of needed changes, A lack of empowerment & accountability to drive improvements, Poor collaboration between leaders & their departments and Having the wrong perspective of quality as a short term initiative.

In this study we used the ISO 9001 framework as an example of a QMS to highlight the barriers and implementation related problems. In our opinion ISO 9001 is the foundation of which other types of quality tools and methods rely upon, such as the LEAN and Six Sigma approaches. It implies strict documentation, employee and management commitment, quality thinking and creating a quality culture within the organization (Lupan & Bacivarof, 2005). Using the fundamentals of ISO 9001 will help us approach our research problem and identify the factors that are most important to examine when preparing an organization for the implementation of a QMS.

Looking at the different elements of the implementation process of ISO 9001 will give us the background for where the biggest changes are needed and ultimately where most problems are likely to arise.

In this context, this research aiming to study implementation practice of quality management system in order to identify barrier that have been encountered during (QMS-ISO 9001:2008) implementation in the research organization. The study utilized a sequentially mixed quantitative/qualitative methodology in a way that more information will be extensively extracted and validated

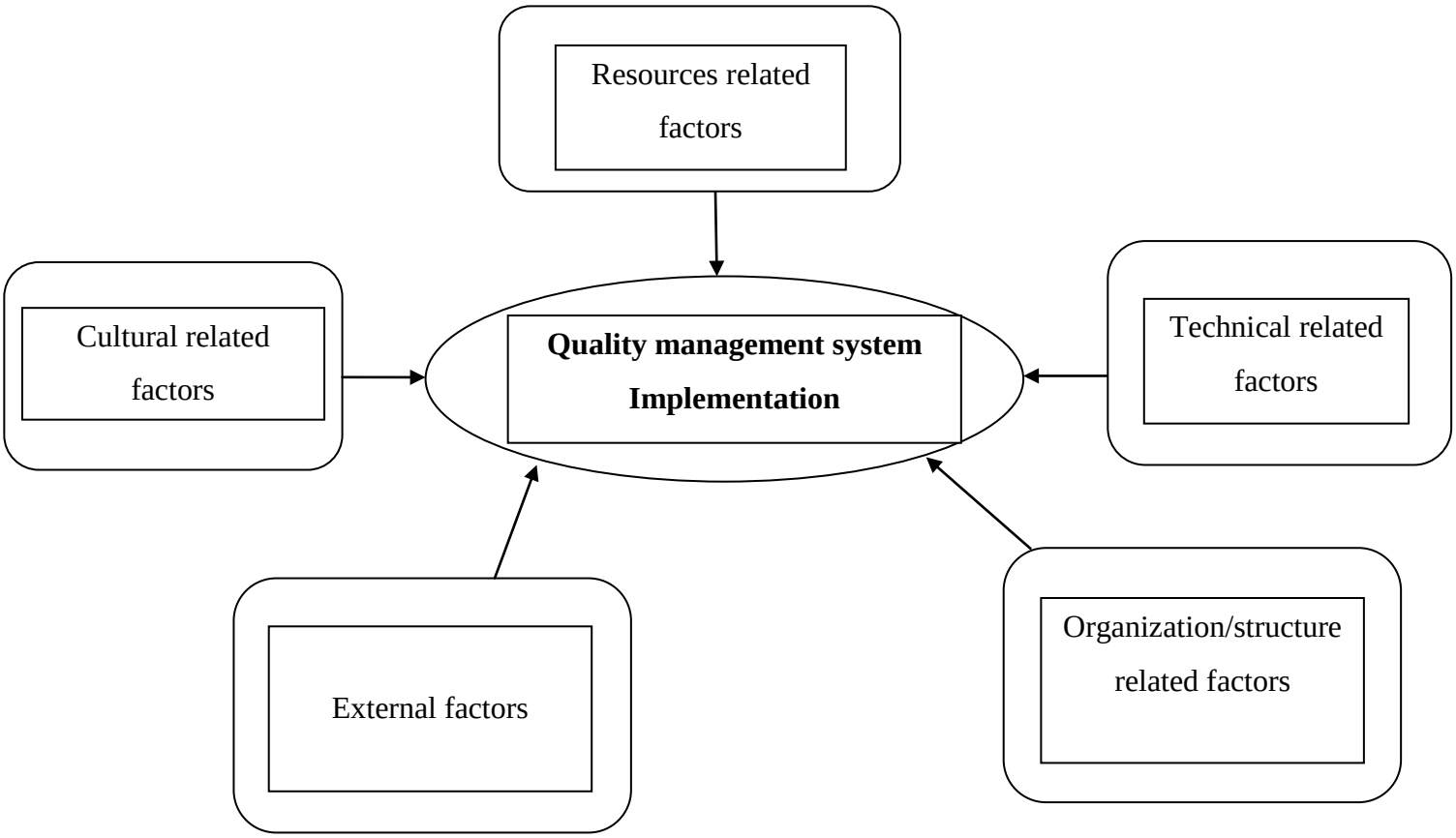

Figure 1.1 - Conceptual framework of barriers affecting QMS implementation (Reconstructed from David Sandström, 2011)

1.3 Problem statement

Identification of barriers and hindrances encountered during QMS implementation is very essential for its success. Gap in implementing ISO-9001 has been noticed in research sample origination. This necessitates addressing these barriers in order to be identified for the sake of achieving advanced implementation levels.

1.4 Research questions

I. What is the quality management practice in the tested organization in terms of framework, tools and techniques been used?

II. What are the critical barriers been encountered during the quality implementation?

III. Are there any opportunities to be used to recommend solution to overcome mentioned barriers?

1.5 Research objectives

1.5.1 General objective

To study implementation practice of quality management system in order to identify barrier that have been encountered during QMS implementation for the sample organization.

1.5.2 Specific objectives

I. To determine critical barriers according to top management and employee view

II. To recommend actions and measure to overcome these barriers

1.6 Significance of the research

QMSs researches have been focused in how the organizations can implement the QMS to the best abilities and what results they can expect. On the other hand, few researches have studied the problems and barriers in their implementation. This research addresses this knowledge gap.

Company-based QMSs are common to construction related organizations especially to those with the ISO certification. Literature showed that most of the QMS related researches focused on the company-based QMS. Project-based QMS researches are lacking. If available, they are more on the development of the individual Project Quality Plan (PQP)

of the construction team. This research provides an observational descriptive cross-sectional study framework of project based QMS barriers.

1.7 Research organization

Research sample organization has been awarded the project contract as design and build with approximate project value of six billion US$. The construction operations to be implemented within 60 months, project operations integrate civil and electromechanical activities; these will be executed by six companies as well an internal project management body. Total staff number for the project was 2814.

1.8 Research structure

This thesis is divided into five chapters:

Chapter 1 introduced the overall picture of the research, briefly discussing the background information for the selected topic, problem statement, as well as lists research questions and research objectives, significance of the research, research sample organization and the research structure.

Chapter 2 introduced the background of the development and principles of quality and quality management system (QMS) especially the ISO 9001:2008. It also reviewed the basic constructs of the ISO-QMS and identified the fundamental elements that have to be addressed for the implementation of the QMS. It also highlighted the barriers of implementing ISO 9001:2008 standards. The combination of these findings and the quality elements have led to the formulation of research theoretical frame.

Chapter 3 described the methods employed for the study, types of research paradigm, design, approaches, methodology for data collections and analysis.

Chapter 4 reported the research main results which collected during the data collection processes, the presented data visualized via statistic tables and figures.

Chapter 5 provided a discussion and interpretation of the findings. This chapter carried out comparison with difference or concordance with local, regional and international results, and then highlighted the main conclusions of the research study, outlined the findings contribution to the general body of knowledge. Finally, the chapter acknowledges some of the limitations of the current study and gives recommendations for further researches.

Chapter Two-Literature Review

2.1 Introduction

This chapter presents an overview of current literature in the frame of the presented research problem. The literature review was been set to enable the knowledge and understanding of the concepts, theories and models of quality management system. On the other hand, it highlighted all barriers facing some organizations during the implementation of their quality management systems. The theories presented herein have also been used to develop the framework for the guide of the research data collection tools and techniques "Questionnaire, Interviews and Checklist".

2.2 Historical background

2.2.1 Quality

Dating back to the early crafts, product quality was a very personal product characteristic. Craftsmen earned their reputation by producing quality goods for each customer. With the industrial revolution and mass production, the one-to-one relationship between craftsmen and customer was gone. Specifications or standards for how to produce a product became the substitute for the craftsman's personal touch. QC was the function of inspecting the end product to determine if it met the specification or standard (Federal Transit Administration-QMS Guidelines-2012).

Quality thinking began with the rise of inspection in the early 1920s (Garvin, 1988). The next phase was statistical process control in the US industry; Shewhart's methods date back to 1930s. During World War II, the military department added standards to quality thinking.

Discussions and empirical studies of quality related topics date back to the late 1950s, where implementation of development tools mostly designed to assure the standard level of manufacturing. These development tools were designed in a customer's point of view and aimed to eliminate the statistical inspection of industrial goods and to share responsibility of quality amongst employees (Garvin, 1988, Juran, 1988).

Hewlett-Packard (HP) started to criticize US chip manufacturers for poor product quality in the early 1980s and shortly after TQM was introduced by W. Edward Deming. However, the Japanese that were known for their good quality adopted the philosophy while the USA rejected its principles. During the following years, the Japanese improved and successfully made progress with quality and production by adopting the TQM principles of Deming along with Josep M. Juran, Genichi Taguchi, and others.

Yet even ten years after Hewlett-Packard introduced TQM in 1985, domestic companies in the US were still struggling with the theory and practical use of TQM. However, many companies did succeed with implementing TQM. A survey made by the magazine Electronic Business in 1992 showed that no companies contacted had ended their TQM programme and 91 percent of 70 companies using TQM had indicated that their quality had improved when compared with their competitors (Talha, 2004).

Quality as an important strategic dimension has been emphasized by many well-known companies throughout the world; like Hewlett-Packard (Canada, USA), Ford Motor Company (Canada, USA), British Telecom (United Kingdom), Fujitsu (Japan), Toyota (Japan), Crysel (Mexico) and Samsung (South Korea) (Talha, 2004).

2.2.2 Quality management system (QMS)

The history of quality management can be traced all the way back to the middle ages. Works completed by journeymen and apprentices were evaluated and inspected by the skilled worker to ensure that quality standards were met in all aspects of the finished product, ensuring satisfaction of the buyer. And while the history of quality management has gone through a number of changes since that time, the end goal is still the same (Quality Management System Education and Resources).

It was during the 1920's when quality management systems, as we know them today, have started to surface. While the focus of quality management was still on the end product, it was the first time that statistical theory was applied to product quality control (Quality Management System Education and Resources).

Product quality control was determined through inspections; involving the measuring, examining and testing the products, processes and services against specific requirements to ensure that each element is adhering to the specified standards and guidelines. This algorithm worked for quite some time. Over time, however, businesses began to grow and expand. More and more products were manufactured throughout the day. Companies started to experience difficulties in following through with quality control standards and it became evident that there was a great need for change and development, which were brought forth during the 1940's by industry leaders and experts like Deming, Dodge, Juran and Roming, which would be considered the beginning of Total Quality Management as we know it today.

Inspections were then being carried out by production personnel; responsible for inspections during specific production intervals, which changed the focus from simply inspecting the end product to actually preventing end product problems through early detections on the production line.

It was also during the 1940's that Japan caught wind of Total Quality Management. At that time, Japanese products were considered poor quality imitations. Hearing about the success of quality management in the west, Japan employed the assistance of quality management experts like Deming and Juran. Little did the Western culture know at that time, Japan would soon push the envelope and set new standards in TQM.

During the first international quality management conference in 1969, Armand V. Armand V. Feigenbaum had first used the phrase Total Quality Management. Feigenbaum, however, did not meet the depth of understanding of the term that Japanese attendee and speaker Ishikawa would. Ishikawa had indicated during the conference that TQM should apply to all employees within the organization – from the workers to the head management.

The Western culture would soon catch up, however. It's by the 1980's that the Western culture could take notice of Japan's success and start to set and adhere to higher Total Quality Management guidelines. At this time, however, it was unclear as to what exactly TQM involved.

The U.S. Government would soon be responsible for making those guidelines and standards clear with their development of the Malcolm Baldrige Award; an award that could be won by businesses that exhibited quality management excellence. Other countries, in Europe, have followed in the United States' footsteps and developed similar awards.

Today, companies all over the globe compete for the hundreds of Excellence Awards now given. The purpose of quality management, however, still remains the same as it has, all through history to ensure that customers receive an excellent, quality product.

2.3 Concepts of quality and QMS

2.3.1 Quality

When the word quality is used it conveys ideas of elegance, luxury, craftsmanship. The quality requirements involve availability, delivery, reliability, maintainability and cost effectiveness (Oakland, 2000). The perception of quality has shifted over the past 30 years. Quality was previously measured by; presumably, the results in order to attain some allowable level of defects. It is now defined as meeting customer requirements and go beyond to its expectations (Withers and Ebrahimpour, 2001). There are a number of quality definitions from well-known quality gurus. Juran and Gryna (1988) define quality as "Fitness for purpose or use". Deming (1986) defines quality as "Quality should be aimed at the needs of the consumer, present and future".

Armand V. Feigenbaum (1991) defines quality as "The total composite product and service characteristics of marketing, engineering, and manufacture and maintenance through which the product and service in use will meet the expectation by the customer". Crosby (1996) defines quality as "Conformance to requirements and it is conforming to specifications".

With the increased globalization of markets and liberalization of local economies, quality has become the major factor in achieving competitiveness, and then it is necessary for businesses all over the world to develop competitive strategies (Madu, 1997). Also, Madu, (1997) quoted Hames who further notes that quality, too, is a series of behaviours — ways of thinking and of working — and can only thrive in a compatible environment. However, Liang Tan (1997) defines quality as "A long-term business strategy, which strives to provide goods and services to fully satisfy both internal and external customers by meeting their explicit implicit expectations.

Furthermore, this strategy employs the talent of all employees. Nowadays in the emerging market given competitive environment, industries should achieve internationally accepted quality levels, to ensure a place in this market. Global competition calls for higher levels of quality, efficiency and service (Motwani et al., 1996).

The customer is defining the new quality, which is part of a company's culture; it must start with the chief executive officer and be part of the top management team's performance practices (Ludwig-Becker, 1999). ISO 9000 (2000) defines quality as "The degree to which a set of inherent characteristics fulfils requirements". By combining the definitions of quality and requirements in ISO 9000/2000, quality can be expressed as "The degree to which a set of inherent characteristics fulfils a need or expectation that is stated, generally implied or obligatory" (Hoyle, 2001). Quality is a fundamental strategy for the support and improvement of competitiveness in different sectors.

Quality now represents a philosophy, a system of methodologies, practices, and an ongoing commitment to business excellence that encompasses all issues and engages all individuals within an organization (PP&S White Papers, 2011).

2.3.2 Quality management systems

A quality management system is a management tool consisting of a set of rules to direct and control an organization with regard to quality, which is intended to assist in establishing policy and objectives and in achieving those objectives. It is a dynamic process that brings resources, activities and behavior together to focus on the achievement of success (World Meteorological Organization-QMS Guidelines-2011)

An effective QMS is not just one where good products and services are delivered. Rather, it is one that continually seeks to improve the products and services being delivered and the corresponding delivery processes used by the organization. In order to establish an effective QMS, seven characteristics are required. Leadership; by Adopting a Quality Policy, instilling a culture that values quality, involving all levels of management in quality initiatives, identifying a senior Quality Manager (QM), providing resources and personnel to accomplish quality objectives, delivering products and services that always meet customer expectations. Secondly, Design Quality and Prevention; through developing products and services that meet customer expectations and reduce life cycle cost. Strategic Quality Planning is to be established through a vision for the future of where and what the organization wants to be and developing a plan to arrive at that destination. Focus on Customer Satisfaction; by clearly identifying internal and external customers, their requirements, and making decisions that support the commitment to meet those requirements. Continual Improvement by identifying key areas for improvement, whether they are products and services or processes. Teamwork and Employee Participation as to all employees participate to the best of their ability and within the bounds of their areas of expertise to deliver products and services that meet requirements for performance, cost, and schedule. And last but not least, Training and Development; all persons at all levels within the organization receive basic and advanced quality training relative to their functional and managerial responsibilities within the organization (Federal Transit Administration-QMS Guidelines-2012).

2.4 QMS models (framework)

Generally the Quality Management Systems are providing a framework that helps in getting necessary requirements and fulfilling them. Throughout the history of the quality movement, there have been several approaches (Models for Quality Improvement) developed from the philosophies of the “quality gurus”.

Despite there are many commonalities between these approaches, it’s important to realize that contradictions are also existed (PP&S White Papers, 2011). As a result, many Models for Quality Improvement in use today that cover product, process and/or people-based improvement, including:

I- ISO: (International Organization of Standardizations) Guidance on use for process improvement and process capability determination

II- QFD: Quality Function Deployment, also known as the House of Quality approach, that focuses on customer wants or needs in the (re)design of a product or service

III- Kaizen: Japanese for change for the better; the common English term is continual improvement

IV- Zero Defect Program: created by NEC Corporation of Japan (Nippon Electric Company), based upon statistical process control and one of the inputs for the inventors of Six Sigma

V- Six Sigma: combines established methods such as statistical process control, design of experiments and failure mode and effects analysis (FMEA) in an overall framework

VI- PDCA: Shewhart/Deming's plan, do, check, act cycle for quality control purposes. Six Sigma's DMAIC method (Define, Measure, Analyze, Improve and Control) may be viewed as derivation of this

VII- Taguchi Methods: statistical oriented methods including quality robustness, quality loss function, and target specifications

VIII- Toyota Production System: reworked in the west into “Lean manufacturing”

IX- TQM: Total Quality Management is a strategy aimed at embedding awareness of quality in all organizational processes. First promoted in Japan with the Deming prize, it has been adapted in the U.S. as the Malcolm Baldrige National Quality Award and in Europe as the European Foundation for Quality Management award (each with their own variations)

X- BPR: Business Process Reengineering, a management approach aiming at 'clean slate' improvements (abandon existing practices)

Several of these approaches have evolved as principle quality systems since they address the whole business and thus are more widely used. Some organizations also engaged a blend of quality philosophies and implementation methodologies to best align with their business goals and strategies.

The choice of what quality system organizations should adopt is essentially dependent on the objectives of the organization and the existing structure of the organization (Maguad, 2006). The selected system for quality management should be adapted to the specific requirements of the organization because there is no model that provides a solution that fits every organization (Maguad, 2006).

The ISO (International Organization of Standardizations) 9000 family addresses various aspects of quality management and contains some of ISO’s best known standards. The standards provide guidance and tools for companies and organizations who want to ensure that their products and services consistently meet customer’s requirements, and that quality is consistently improved. Standards in the ISO 9000 family include but not limited to (**9001** sets out the requirements of a quality management system), (**9004** focuses on how to make a quality management system more efficient and effective) and (**19011**sets out guidance on internal and external audits of quality management systems).

ISO 9001 is the world's most used tool regarding organizational change and norms, and ISO claims that they reached their one million mark of certificates in December 2009, spread across 178 countries and economies (www.iso.org). The most common and most recognized QMS is the one created by (ISO) and its framework of ISO 9001:2008 (Gutiérrez et al., 2010).

"ISO 9001:2008 is the standard that provides a set of standardized requirements for a quality management system, regardless of what the user organization does, its size, or whether it is in the private, or public sector. It is a unique statistical-based approach that provides QMS requirements, tools and framework to institutionalize the right attitude by policies, procedures, documentation, resources and structure. It is the only standard in the family against which organizations can be certified – although certification is not a compulsory requirement of the standard (PP&S White Papers, 2011).

Implementation of QMSs in the construction industry promises several benefits such as more repeat customers, reduced rework, improved employee job satisfaction, higher productivity, improved budget performance, improved schedule performance, better chances in bidding process with pre-qualification, and increased market share.

ISO 9000 compliance is rapidly becoming a prerequisite for construction companies seeking contracts and a competitive position in the construction market. In addition, owners are increasingly transferring the responsibility for quality assurance to contractors. This situation has forced construction companies to implement ISO 9000-based quality systems and in several cases to seek ISO 9000 certification (Ribeiro, 2000).

2.5 ISO 9001:2008 standard

Quality Management Systems (QMS) have been developed from 1979 first known and followed by the British Standard (BS) 5750 then transformed into the now widely used ISO 9000. Quality Management systems have had a revolutionary experience for companies internationally by keeping the customers first at all times working on a process approach measuring various non-conformances and being both pro and reactive with respect to non-conformance by implementing corrective and preventive actions. The fundamental foundation of QMS is on the basis of continual improvement and always striving to exceed customer expectations.

The global standardization (standardized marketing approach) requires companies to follow the recognized ISO standard which allows clients the confidence to trade with other companies in having international recognition with respect to quality.

The International Accreditation Forum (IAF) in line with ISO and the 164 representative countries gives various certification bodies the authority to certify companies on the basis of audits to ensure that they comply with the standard and follow good practice.

Organizations need to develop and implement their own quality management system that strive to consistently provide product and/or service that meets all three requirements i.e. customer, statutory and regulatory requirements, and to address customer satisfaction through the effective application of the system, including continual improvement and the prevention of nonconformity. Characteristics of principal products/services are specified by the customers or their consultants, which are then considered and tried to be met by the organization. ISO 9001:2008 helps the organization by providing opportunities to set up such QMS system.

2.5.1 Main chapters of ISO 9001:2008

There are total eight chapters in this ISO standard. First three chapters consist of general vocabulary and nomenclature whereas last five are core ones which provide main Quality Management System framework that helps organizations to get QMS in place. Details of those chapters are given in the following sections:

2.5.1.1 Quality management system

(Chapter 4 from ISO 9001:2008) deals with the procedures and processes that are necessary for setting up the quality management system and their application throughout the organization. It guides the sequence and interaction of these processes, assesses methods and criteria required to ensure that both the operation and control of these

processes are effective. Through this chapter it is also ensured that resources and information necessary to support the operation and monitoring of these processes are available. Finally planned results are achieved by proper monitoring, measurement and continual improvement of these processes.

It is mandatory for organization to manage these processes in accordance with the requirements of the ISO 9001:2008. If organizations choose to outsource any process by QMS, they can still have even control over such processes. The type and scope of control of proposed outsourced processes are identified within the quality management system.

For the implementation and function of the quality management system main processes needed include processes for management of activities, management of documents, assessment & provision of resources, product realization, and measurement, analysis, and improvement of such processes.

Following documents are considered necessary for the implementation of Quality Management System:

A. List of documents

a) Statements of a quality policy and quality objectives in a documented form, b) A quality manual that may contain all information related to QMS in one place, c) Documented procedures, processes and records required by the ISO 9001:2008, and d) Documents, including records necessary to ensure the effective planning, operation and control of its processes properly worked out by the organization. It is noted that ISO 9001:2008 does not impose any specific type for documentation. It can be in any form or type of medium.

B. Quality manual

Organizations have to establish and maintain a quality manual based on ISO requirements to accommodate all procedures and processes that include; a) Scope of the quality management system and details of and justification for any exclusions b) Documented procedures written for the quality management system, or reference to them, and c) Description and details of the interaction among the procedures and processes of the quality management system.

C. Control of documents

All documents as required by the quality management system are controlled. A documented procedure is established to define the controls that are necessary for approval and adequacy of documents prior to their issue. This procedure also defines the controls to review and update of the documents as necessary and to re-approve if required, to ensure that changes and the current version of documents are identified and documents are available at points of use, to ensure that documents remain legible and readily identifiable, to ensure that documents of external origin are identified and their distribution is controlled and to prevent the unintended use of obsolete documents.

D. Control of records

Records are established for that they are required for finding the conformity of a product or service to the requirements and/or the effective operation of the system. These records are controlled. A documented policy and procedure will be established by the organization to define the controls needed for the proper management of the records i.e. identification, storage, retrieval, protection, retention time and finally their disposition. Legibility, readily identification and retrieval of the records is mandatory as per ISO 9001:2008 standard.

2.5.1.2 Management responsibility

(Chapter 5 from ISO 9001:2008) identifies and defines responsibilities of the top management towards development, implementation and continual improvement of Quality Management System. Details are given in the following sections.

A. Management commitment

As per ISO, top management should be committed to develop and implement quality management system and continually improve its effectiveness by:

a) Communication of the importance of meeting customer's as well as statutory and regulatory requirements to the organization,

b) Developing a quality policy,

c) Defining quality objectives,

d) Management reviews, and

e) Management of proper resources for successful establishment and smooth functioning of Quality Management System.

B. Customer focus

Top management has to focus on client's satisfaction and ensures that their requirements are determined and met with the aim of enhancing business through their satisfaction.

C. Quality policy

Organization should have a specific quality policy. This policy can be drafted by quality related personnel but top management needs to ensure that:

a) The quality policy is appropriate and fulfils its purpose,

b) It includes a commitment to comply with the requirements and continually improve the effectiveness of the quality management system,

c) It provides a framework for defining, establishing and reviewing quality objectives,

d) It is communicated and understood within the organization, and

e) It is reviewed for continuing suitability.

D. Planning

Top management first sets specific objectives and performance indicators for the organization and then ensures that these quality objectives are achieved through monitoring of performance indicators. The quality objectives should be measurable and consistent with the quality policy and:

a) They meet or exceed customer requirements and expectations,

b) Through them customers could be provided with high quality products and services, on time and at a reasonable cost.

c) They can effectively manage organization's products, processes, and services to achieve customer's satisfaction.

d) They may promote the safety, awareness, and well being of employees through training and education.

E. Responsibility, authority and communication:

- **Responsibility and authority:**

An effective structure of the quality system is designed by the top management that ensures that responsibilities and authorities are defined and communicated within the organization. Respective roles of members of the organization e.g. who will manage, perform, and verify etc. will be illustrated by organization chart. Changes to the quality system could take place but within the framework of management reviews. These changes may become inevitable due to changes in circumstances, such as product, service, process, capacity, or other operational or organizational changes; or to improve the effectiveness and efficiency of the quality system.

- **Management representative:**

A management member will be nominated by the top management who, along with other responsibilities, has the following responsibilities as management representative;

a) He/she has to ensure that processes needed for the quality management system are established, implemented and maintained,

b) He/she will report to the top management on the performance of the quality management system and any need for improvement, and

c) He/she will promote the awareness of customer requirements throughout the organization. Management representative may also liaise with external parties on matters relating to the quality management system.

- **Internal communication:**

Establishment of appropriate communication processes within the organization for the effectiveness of the quality management system is also the responsibility of the top management.

F. Management review:

Management review is important to check whether QMS is working properly and what changes are important for continuing suitability, adequacy and effectiveness of this system. The review may include assessment of any improvement and consequently any need for change to the quality management system, including the quality policy and quality objectives. Records of management reviews are maintained.

The input to management review may include the following information:

a) Previous audits results,

b) Clients and Customers feedback,

c) Performance of different processes,

d) Product conformity and status of preventive and corrective actions,

e) Follow-up plan and actions from the previous management review,

f) Possible changes that could affect the system, and

g) Recommendations for betterment of the system

Output from the management review may include:

a) Improvement of the effectiveness of the quality management system,

b) Improvement of the QMS processes,

c) Improvement of product and service related to customer requirements, and

d) Resources requirements.

2.5.1.3 Resource management

(Chapter 6 from ISO 9001:2008): Proper resource management will help in determining and providing the resources needed for:

a) Implementation of the quality management system and continual improvement of its effectiveness, and

b) Enhancement of customer's satisfaction by meeting their requirements.

c) Resources can be classified as Human, Infrastructure, Financial and IT, etc. Details are given in following sections:

A. Human resources

Human resources are most important among resources and difficult to manage as well. First people are prepared with respect to their commitment to the organization, their job satisfaction and their involvement in the product or service. Then people are asked to work to prepare a product that meets the requirements of the customer or they directly provide service to the client as per its needs. Efficiency in both cases depends upon appropriate education, training, skills and experience of the personnel. Taking care of human resources based upon their education, experience, training and skill is considered as Human Resource Management. By proper Human Resource Management;

a) Level of competence necessary for personnel performing work affecting conformity to product requirements is determined,

b) Training can be proposed and provided to achieve the necessary level of competence,

c) Effectiveness of the actions taken is evaluated,

d) It is ensured that personnel are aware of the relevance and importance of their activities and they know how to contribute to the achievement of the quality objectives and

e) Records of education, training, skills and experience are maintained properly.

B. Organization infrastructure:

ISO recommends appropriate infrastructure needed to achieve conformity to product and service requirements. Infrastructure may include;

a) Offices, buildings, workspace, warehouses and associated utilities,

b) Process running equipment (Computers and software), and

c) Logistic support (such as vehicles to move personnel and materials, communication and information systems etc.)

C. Work environment:

Organization needs to determine and manage the work environment required to achieve conformity to product and service requirements. Proper light i.e. lux level, level of noise, temperature requirements etc. are few parameters which fall under work environment.

2.5.1.4 Product realization

(Chapter 7 from ISO 9001:2008): The term "Product realization" is used to define the work that an organization goes through to develop, manufacture, and deliver the finished goods or services. Hence this chapter is about the quality of product either sold or purchased and services provided to the client. 'Product Realization' process helps organization to go smoothly through concept phase of the product to the finished product. Framework of the process provides guidelines for each segment of the product e.g. planning, manufacture, delivery and maintenance, etc.

A. Planning of product realization:

After having concept of the product, first step is planning. A process is planned and developed by the organization for product realization i.e. to deliver contracted project to the customer. Planning of 'product realization' should be consistent with the requirements of the other processes of the quality management system. During planning phase, organization determines and takes care of quality objectives; specific product requirements, necessary processes, sufficient resources for the product realization, different phases of product realization i.e. verification, validation, monitoring, measurement, inspection, test activities, acceptance criteria and product conformity documents and records.

The output of the planning can be given in any form suitable for the organization and its methods of operations.

Quality Plan: For each product, project or contract, a document specifying the processes of the quality management system (including the product realization processes), resources applied to that product, organization charts and workflow charts, is referred as the quality plan.

Going back to planning phase; it's divided into four sections, details of each section is given below:

- Customer-related processes:

Determination and review of customer related processes are important phenomenon and ISO provides complete guidelines for them.

- Determination of requirements related to the product:

Organization will determine all types of requirements that are;

a) Requirements specified by the clients, b) Requirements not specified by the client but required, c) Regulatory and statutory requirements applicable to the product, and d) Requirements other than those mentioned above considered necessary by the organization for best quality of the product.

- Review of requirements related to the product

After determining requirements related to the product, organization needs to review them. It has to conduct this review prior to any commitment for supply of a product to the customer (e.g. submission of bid, acceptance of contracts or orders, delivery time and product quality and acceptance of changes to the contracts or orders) and ensures that:

a) Requirements of product are defined and clear,

b) Any variation in contract conditions or product requirements differing from those previously expressed, are addressed, and c) Organization has proper resources and capability to meet the defined requirements.

Working results of the review and actions arising from the review are recorded and maintained. If in case there is no documented statement of requirements from the customer, they must be confirmed by the organization before acceptance. And if product requirements are changed, organization needs to ensure that relevant documents are

amended and relevant personnel are made aware of the new/modified requirements.
In case of purchases, sometimes the review before purchase might not be possible, then the review can be made through relevant product information such as catalogues or advertising material.

- Customer communication

Organization needs to set up a strong communication system with customer in order to communicate product information, inquiries regarding contract conditions & amendments and feedback during and after the project completion.

B. Design and development

Organization will take care of 'Design and development' by going through all its stages (as enlisted by ISO 9001:2008) i.e. planning, inputs, output, reviews, verification, validation and control of changes. Depending upon the importance and effect of the product on subsequent product realization, the type and extent of control applied to the product is decided.

C. Purchasing:

- Purchasing process:

Conformance of purchased product to the specified purchase requirements has to be ensured by the organization. Type and extent of control to be applied by the organization is dependent on the volume and nature of the business related to that product. Suppliers are selected, evaluated and re-evaluated as per methodology set by the ISO 9001:2008.

- Purchasing information

The following requirements will be taken care of by the organization when it wishes to purchase any item:

a) Approval of product, fulfilment of the procedures, running of processes and related equipment. b) Qualification of personnel who will use the product, and c) Quality Management System.

Organization should check specified purchase requirements for their adequacy prior to their dispatch to the supplier.

- Verification of purchased product

It will be ensured by the organization that purchased product meets specified purchase requirements. For that inspection check lists will be developed and inspection and other necessary activities will be carried out to make sure that the product is in line with the requirements. Where it is required to perform inspection at the supplier's premises, organization should state the intended inspection arrangements and method of product release in the purchasing information.

D. Production and service provision

- Control of production and service provision

Depending upon the nature of contract, organization will plan and carry out production and service provisions under following controlled conditions:

a) Information describing the characteristics of the product is available,

b) Instructions describing the work are available,

c) Suitable equipment and/or resources are available,

d) Monitoring and measuring equipment are available,

e) Monitoring and measurement activities to be implemented, and

f) Product release, product delivery and post-delivery activities to be enlisted and implemented.

- Validation of processes for production and service provision

If output results cannot be verified by subsequent monitoring or measurement activities and deficiencies become apparent only after the product is in use or the service has been delivered then organization should validate those processes for production and service provisions. Validation will demonstrate the ability of these processes to achieve results as planned. Organization will arrange:

a) Review and approval of the processes by defining criteria,

b) Equipment approval and approval of qualification of personnel,

c) Specific methods and procedures used in processes,

d) Records keeping and Revalidation.

E. Identification and traceability

Product status with respect to monitoring and measurement requirements will be identified by the organization throughout the product realization and where traceability is a requirement; organization controls the unique identification of the product and maintains the records.

F. Customer property

If any customer property remains under organization use or in its custody then it must take care of that property. Organization will identify, verify, protect and safeguard client's property provided for project use or for incorporation into the product. Organization will report to the client and keep records if any client's property is lost, damaged or otherwise found to be unsuitable for use.

G. Preservation of product

Organization will make sure that the product during internal processing and delivery to the intended destination is preserved so that conformance to the requirements is maintained. Depending upon the product, preservation may include identification, handling, packaging, storage and protection. Preservation is also applied to the constituent parts of the product as well.

H. Control of monitoring and measuring equipments

Necessary processes for monitoring and measurement will be established by the organization and measuring equipment will be:

a) Calibrated and/or verified

b) Adjusted or re-adjusted as required

c) Identified with respect to calibration status

d) Safeguarded from adjustment that may invalidate the measurement

e) Protected from damage and deterioration while handling, maintenance and storage

Assessments and records of previous nonconforming results will be taken care of by the organization.

2.5.1.5 Measurement, analysis and improvement

(Chapter 8 from ISO 9001:2008):

A. General

Organization will plan and implement monitoring, measurement, analysis and improvement processes needed:

a) To ensure conformance of products and services with requirements,

b) To demonstrate conformity of the quality management system, and

c) To ensure continual improvement of effectiveness of the quality management system. This phenomenon will include determination of appropriate applicable method, including statistical technique, and the scope of their use.

B. Monitoring and measurement

- Customer satisfaction

Organization will consider feedback and perception of the customers and clients. This is one of the measurements of the performance of the quality management system, as to whether organization has met customer's requirements or not. Appropriate methods for obtaining and using this information are determined by the quality department of the organization.

- Internal audits

Organization will make sure that internal audits are planned and performed at specified intervals to determine whether the quality management system is achieving following goals:

a) It conforms to the requirements of ISO 9001:2008 and to the requirements of specific quality management system of the organization, and

b) It is effectively implemented and maintained.

Planning of audit program depends on the status and importance of the processes and areas to be audited as well as the results of previous audits. Some other requirements are given below:

Criteria of audit, its scope, its frequency and methods to perform audit are defined. Objectivity and impartiality of the audit process will be ensured by proper selection of auditors and their conduct. Auditors do not audit their own work. The responsibilities and requirements for planning and conducting audits, and for reporting results and maintaining records are defined in a documented procedure. The management responsible for the area being audited will arrange necessary correction and corrective actions without undue delay to eliminate detected nonconformities and their causes. Verification of the actions taken and the reporting of verification results will be followed up by the quality management system of the organization.

- Monitoring and measurement of processes

Organization will develop and apply suitable methods for monitoring and measurement of the quality management system processes. These methods will demonstrate the ability of the processes to achieve planned results. If planned results are not achieved then correction and corrective action are taken, as appropriate.

- Monitoring and measurement of product

Organization will monitor and measure the characteristics of the product so that it can confirm its conformity with the requirements. This is carried out during all stages of the product realization processes in accordance with the planned arrangements. Evidence of conformity with the requirements is maintained. Authorized personnel will release the product for delivery to the customer. Planned arrangements will be satisfied prior to the release of product and delivery of service to the customer, unless otherwise approved by a relevant authority or by the customer.

C. Control of nonconforming product

Organization will make sure that non-conforming products are identified and controlled to prevent its unintended use or delivery. Organization will also establish a documented procedure to define the controls and related responsibilities and authorities for dealing with nonconforming products. Where applicable one or more of the following ways will be adopted to deal with the nonconforming products:

a) To eliminate the detected non-conformity by any appropriate action,

b) If non-conformity is of minor type and it could be released or accepted under concession by a relevant authority and/or by the customer, and

c) By taking action to change or alternate the use of product.

d) If a non-conformity is detected after the product has been delivered to the customer then organization will take appropriate action to the effects, or potential effects, of the non-conforming product.

If a non-conforming product is corrected then the product will be re-verified to demonstrate conformity to the requirements. Records of the nature of non-conformities and any subsequent actions taken, including concessions obtained, are maintained.

D. Analysis of data:

Appropriate data will be determined, collected and analyzed to exhibit the suitability and effectiveness of the quality management system and to mention where continual improvement of the effectiveness of the quality management system is required. Data will include data generated as a result of monitoring and measurement and received from other relevant sources. The analysis of data will provide information about:

a) Customer's or client's satisfaction,

b) Conformity of product to its requirements,

c) Characteristics and trends of processes and products including opportunities for preventive actions, and

d) Suppliers and subcontractors

E. Improvement

- Continual improvement

Through consideration and use of quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management reviews, organization will continually improve the effectiveness of the quality management system.

- Corrective action

Organization will take necessary actions to eliminate the causes of non-conformities in order to prevent recurrence. Corrective actions should be appropriate so that to encounter the effects of the non-conformities. Organization will establish a documented procedure that will:

a) Review non-conformities (including customers' and clients' complaints),

b) Determine the causes of non-conformities,

c) Evaluate the needs for action that will ensure that non-conformities do not recur,

d) Determine and implement required action,

e) Record the results of actions taken, and

f) Review the effectiveness of the corrective actions taken.

- **Preventive action**

Organization will determine actions that could eliminate the causes of potential non-conformities in order to prevent their occurrence. Preventive actions should be appropriate to the effects of the potential problems. Organization will establish a documented procedure that will:

a) Determine the potential non-conformities and their causes,

b) Evaluate the needs for actions to prevent occurrence of non-conformities,

c) Determine and implement actions required,

d) Record the results of actions taken, and

e) Review the effectiveness of the preventive actions taken.

2.6 Barriers of ISO 9000 standards implementation

When introducing a quality management system regardless of its intentions, there are several obstacles, or rather barriers, which an organization will face and ultimately have to deal with in order to assure a successful implementation of a QMS.

Specifically in construction sector, in spite of the benefits of implementing QMS yet, there are several barriers to the extensive deployment of QMSs. The construction industry is different from other industries in many aspects such as one one-of-a-kind product, lack of top management's leadership and support, unqualified workforce, lack of effective teams, etc. It is commonly believed that ISO 9000 cannot be successfully implemented due to these peculiarities.

Moreover, many construction companies consider quality programmes as extra cost because of the fact that they are not totally aware of that the cost of non-conformance to quality is much higher than that of operating a quality programme. (Yalcin Tatar, 2011)

Beside the common known general barriers within implementing a quality management system, there are specific barriers for each and every organization. It is of significant importance that organizations become aware of those areas of which they need to pay the most attention to when implementing a QMS. There will be forces for and against the change process of a QMS and the latter needs to be anticipated and dealt with for a successful implementation of a QMS. Several studies explore the general barriers and problems faced by organizations during the implementation process. On the other hand, organization specific barriers that include the elements of a QMS such as the ISO framework can be identified and extracted from the implementation process and the activities /tasks (Beckford, 1998).

In Beckford (1998) we can find barriers of implementing a management system with the purpose of pursuing quality:

a) The systems and procedures inhibiting the pursuit of quality
b) The organizational culture preventing quality
c) The design of the organization inhibiting the strive for quality
d) The managerial and employee recognition of the importance of quality and attitudes towards it.

The first barrier is systems and procedures, which may inhibit the pursuit of quality due to the fact that most organizations have long established processes and organizational systems with a certain bureaucratic process. When adding a new organizational system, such as the QMS, organizations have to change or adapt their original systems and procedures to the new one. It is likely that the original systems and procedures will conflict with the new ones as QMS implies standardized procedures. When adopting a QMS, standard requirements should be met by the organization through its systems and procedures and as they become “fixed” they may become frozen into the organization. This means that when introducing new requirements for specific procedures, the pressure for change and adaptation may cause resistance from those in charge of the procedures (Beckford, 1998).

The second barrier is the organizational culture that may prevent the successful introduction of quality. Adopting a QMS brings changes to the organizational culture, or business culture, and it is important to consider how the organizational culture should be dealt with. Culture is by definition "a set of behavioral and attitudinal norms, to which most or all members of an organization subscribe, either consciously or unconsciously, and which exert a strong influence on the way people resolve problems, make decisions and carry out their everyday task" (Clutterbuck & Crainer, 1990). Ultimately changing the culture can be a long lasting task for the organization and is most often met with resistance, which makes the barrier of culture one of the most difficult tasks.

The third barrier presented by Beckford (1998) is the design of the organization inhibiting striving for quality. By 'design' Beckford (1998) means it is not only the hierarchical structure of the organization but also the interaction between units, the information and management systems and their inter-relationships. The barrier of organizational design includes smaller issues, which together make up the design barrier, which Beckford presents. The first of these issues are the risk of institutionalized conflicts, that is, conflicts between quality and for example productivity. The second issue is the design of the organizational information system. The third issue related to the design barrier is the organizational understanding of roles and articulation. The final issue of the design barrier is the irrelevant or inappropriate activities.

The fourth and final barrier presented by Beckford (1998) is the managerial and employee recognition of quality. Beckford suggests that management have to acknowledge the importance of quality and that it is of concern to the entire organization. Quality has to be treated as a part of the problem when things do not go as expected and that a lack of quality may be a cause to decline. The attitude towards maintaining quality as a key issue in organization's operations, products and services, and performance must be consistent in all levels of the organization. Management needs to recognize that sacrificing quality in lieu of meeting customer demands is not a desirable sacrifice. Management should not emphasize on being purely productive but on being productive with quality. This attitude needs to be communicated and adopted by employees as well.

Carlsson & Carlsson (1994) found in their study that the Swedish organizations (in their study) had the most difficulty with the time and resources consumption. The organizations in study stated that they had problems of assessing the time it would take to implement the QMS and estimate how much resources they would consume in the process. Average time spent on fully implementing ISO 9001 was 1.5 years and the average expenditure for certification was SEK 300,000. Carlsson & Carlsson (1994) meant that this showed the fundamental problems for any organization to allocate the right amount of resources and necessary time on implementing a QMS such as ISO 9001.

The authors also found that the organizations had problems in understanding and interpreting the standards of ISO 9001 and that it provided too bureaucratic documentation with little room for flexibility. When management communicated and shared the visions and objectives of the QMS they were met with problems of employees not fully understanding and thus not accepting certain changes. However the answers provided by the organizations were not consistent. Some organizations experienced high levels of employee acceptance of the QMS and some organizations did not.

Amar and Zain (2002) performed an empirical study to examine the obstacles encountered by manufacturing companies in the implementation of quality programmes. The authors identified eleven pertinent factors which act as barriers to implement quality programmes in Indonesia. The factors are: human resource, management, attitude towards quality, organizational culture, interdepartmental relations, raw materials, machines and equipments, information, methods, training, and finance.

On the other hand a study conducted in Saudi Arabia (Mohammad Asiri 2004) explored that the major hindrances during the implementation of QMS, in descending order, were as follows: lack of employee involvement, difficulties in cooperation among middle managers over quality problems, lack of training programmes related to quality, insufficient project time, and lack of customer cooperation.

Chapter Three- Research Methodology

3.1 Introduction

This chapter describes and discusses the types of research paradigm, research design, research approaches and research methods, then gives the reasons for adopting them in this research.

3.2 Research approach

The approach of collecting and analyzing the data was built as a function of research objective. As mentioned, the main objective of this research is to study the barriers of implementing ISO 9001:2008 throughout analyzing deferent types of data that is specific to the research sample organization. Collecting diverse types of data best provides an understanding of a research problem; this necessitates the utilization of sequentially **quantitative and qualitative** methodology. The study begins with an initial quantitative instrument phase, followed by a qualitative data collection phase, in which the qualitative phase builds directly on the results from the quantitative phase. In this way, the quantitative results are explained in more detail through the qualitative data. The basic premise of this methodology is that such integration permits a more complete and synergistic utilization of data than do separate quantitative or qualitative data collection and analysis.

3.3 Research design

Applying the research design selection criteria of Robert K. Yin “Type of research questions, Extent of controlling investigation and the degree of focus on contemporary as opposed to historical events”, the research favored an observational **descriptive cross-sectional design**. This design used to gain in-depth understanding of the information necessary to identify and investigate the barriers that faced sampled organization during the implementation of the QMS, as well to presents a complete description of a phenomenon within its context.

3.4 Data collection methods

To ensure that meaningful data was collected and analyzed, a mixed methodology involving both quantitative and qualitative methods was adapted to this study. As noted from the research approach, aforesaid methods will be used for collection and analyzes the study data. For the phase of initial quantitative instrument, a survey methodology with survey tool of **Questionnaire** was regarded as appropriate to answer the "What?" type research questions, and semi-structured **Interviews** were appropriate to answer the "How?" type research question intended for the qualitative data collection phase, while QMS assessment **Checklist** was used to assess the major gaps for the QMS implementation using certain indicators. The indicator status of the organization was described by compare it to the standard.

3.4.1 Questionnaire

A semi-structured questionnaire was developed and followed by minor revisions in order to have a well-validated survey instrument. All statements were primarily based on information derived from the literature and preliminary studies.

Questionnaire constructed for the research was consisted three parts.

Part I was focused on the biographical and general respondent's details in order to establish the nature of the sample attributes such as total years of experience, relevant quality experience, vocational training, occupation, employment level and department.

Part II was designed to investigate the employee's level of knowledge and Quality perceptions (QMS practices and effectiveness). Respondents were asked about their agreement with each one of the commonest QMS disappointments that have been extracted from the literature.

Part III was elicited the information on the most common barriers that faced organizations in implementing, preparing or thinking to establish QMS. Respondents were asked to give the level of importance of each barrier from a list of obstacles extracted from the literature. The instrument used was a five-point Likert Scale: (5) very high, (4) high, (3) unsure, (2) low and (1) very low or no knowledge. The questionnaire was tested through a pilot study.

3.4.1.1 Pilot study

A pilot study was conducted for some individuals at other project. This study process was undertaken to assist in the knowledge of exact areas to solicit information for the QMS barriers. The outcome of this study authenticated the final version of the research questionnaire to be administered. The test instrument was evaluated for content validity items that cover all aspects of the variable being measured were all been included.

3.4.1.2 Questionnaire design

For this study the aim is to gain a greater understanding of the organization and consequently determine all barriers facing the organization prior to and during the implementation of QMS. The questionnaire data were collected as to facilitate all existing and potential QMS barriers; accordingly the questionnaire was designed by the following steps:

1. Defining the questionnaire objective in light of the research main objectives; studying the barriers of implementing ISO 9001:2008, throughout analyzing specific data relative to the research sample organization.

2. Converting the measures of quality perception and barrier into a set of sub-questions that can achieve the objective of this research, an instrument was designed to obtain evidence about QMS practices and effectiveness and the barriers of adopting QMS. The instrument was derived from the research literature performed for this study and was adjusted to add more clarity to the questions. The instrument used a five-point Likert scale ranged from (5), to (1). The research instrument contained forty-one questions - forty were “closed-ended” questions. The last question was “Open-ended” to facilitate provision and extraction of more information that was not included in the research theoretical frame. Questionnaire is being attached in (Appendix A).

3.4.2 Semi-structured interviews

Interviews in this study were based on interview guide that based on the research theoretical framework. The interview questions were merely guidelines to direct the discussion and the respondent should feel free to express his opinions within the themes of the interview in a descriptive manner. The interviews have been conducted through face-to-face meetings however with one exception of a phone-interview. The meetings have been held at mutually agreed locations and with a set time at the convenience of the respondents. The aim was to perform as many face-to-face interviews as possible since it is generally easier for the respondent to answer open-ended questions and talk more freely.

Sample frame of the interview was represented management personnel that had knowledge about the organization and that would be involved in the implementation process when implementing a QMS. The number of respondents interviewed was also dependent on and limited to how many respondents in the organization that was available and relevant for our study. The interviews were recorded by using notes of lesser detail, audio recording and memory. The respondents were told before each interview that we would record the conversation and that we would only do so if we had their permission. The advantage of using audio recording is that we could, when transcribing the interview, be precise in what the respondents answered and minimize the risk of misinterpretation and bias. Interview guide is being attached in (Appendix B).

3.4.3 Checklist

Checklist was designed to assess implementation level of quality Management System in the sample organization in concordance with standard (ISO9001:2008). It is also aimed to extract evidences about certain indicators for items vital to successful implementation of QMS. For example top management commitment, resource allocation and availability of measures to minimize culture related factors. Checklist is being attached in (Appendix C).

3.5 Population and sample of the study.

Approval of the research sample organization was initiated after a meeting with Project Manager. At the meeting we presented our research topic and its purpose and the Project Manager gave feedback and ideas for what they would be interested in finding out through our thesis, his approval was subjected to precede all information as highly confidential and company name must be hidden for published information. The population was all project teams which consist of 32 companies; (7 Main Contractors, 3 Engineering “consultant” and 22 Subcontractors), the number of target population was 198. Sample size calculations were carried out using following formula:

$$\frac{\frac{z^2 \times p(1-p)}{e^2}}{1+\left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

Where:

N is population size, e is margin of error (as a decimal), z is confidence level (as a z-score), p percentage value (as a decimal)

A representative sample of this study was obtained with margin of error at a 95% confidence level. It was 131 employees; who were selected randomly in order to get the highest generalizability of findings, and more efficiency.

3.6 Data processing and method for analysis

3.6.1 Questionnaire

Data collected from the questionnaire was of quantitative nature. This data was then processed, analyzed and interpreted by using statistical techniques, to provide the information needed. Quantitative data analysis involves both looking at the general trends in the data and fitting statistical test for association to the data. Descriptive statistics, measuring of frequency, correlation statistics, and means analysis were used. The Statistical Package for Social Sciences (SPSS) was used for the statistical analysis. A descriptive statistical analysis of frequency distribution (numbers and percentages) was first undertaken to show characteristics of sample in terms of education level, years of quality experience, occupation, departments, the level of knowledge about the quality standards and the quality perceptions among staff. Results were presented in forms of frequency distributions, percentages and means.

Measuring of variations was used mainly to test any significant differences between groups or variables. Chi-Square test is useful as a general test to check whether significant differences exist between groups in contingency tables. The difference is considered significant if it is less than or equal to 0.05.

Level of quality perception was assessed by processing five point Likert Scale data. A mean score of 4 or more indicates high agreement about particular concept; a score between 3 and 4 (excluding 4) indicates moderate agreement; and a score of less than 3 indicates low agreement.

Identification of the most important barriers in implementation of the ISO 9001:2008 system was carried by analyzing the five point Likert Scale. A mean score of 4 or more indicates high severity that a particular factor is significant for hindrance implementation of QMS; a score between 3 and 4 (excluding 4) indicates moderate severity; and a score of less than 3 indicates low severity.

3.6.2 Semi-structured interviews

The audio-recorded data through interviews was been processed as soon as possible after the interview has been completed, this because it is easiest to recollect the interview from memory. After each interview a quick recap and discussion was made to highlight the answers that we believe had most significance. Notes were compared and completed to assure consistency of respondent's response. The transcribed interviews were initially handled individually and categorized according to the themes and interview topics that we had decided upon prior to the interviews. The categorization was made to facilitate the process of connecting the answers the theoretical framework. To further facilitate the understanding of the data, answers of all managers in one category were compared to give an overview of what each respondent had answered in that category.

3.6.3 Checklist

Major gaps in organizations implementation of ISO 9001:2008 was been assessed using certain indicators. The indicator status of the organization was described by compare it to the standard.

Chapter Four- Results

4.1 Introduction

This chapter presents the data analysis and the research results of the study. A detailed analysis of the responders was conducted on a question to question basis. As mentioned in chapter three the main source of research data was obtained from Questionnaire, Semi-Structured Interviews and QMS assessment Checklist.

Before the semi-structured interviews were conducted, the questionnaire was submitted to the targeted respondents to provide their opinions regarding the barriers affecting QMS implementation in the research sample organization. Questionnaire questions were regarded to answer the “What?” type research questions. By performing interviews we are able to gain greater understanding to the meanings of the respondents answer and greater depth and significance to the data that we obtain from the questionnaire and comparing these with lecture findings will provide us with an insight of what barriers are most likely to occur. Checklist was used as an additional source to extract evidences about certain indicators for items vital to successful of QMS. Checklist was designed in concordance with standard (ISO9001:2008). With this information we are able to generate knowledge and give recommendations on how organizations should prepare for the implementation and how capable it overcomes QMS barriers.

4.2 Questionnaire outcome

Data gathered from the questionnaire was entered into a data file and analyzed using SPSS statistical package, the participants' responses were examined using frequency test for all questionnaire parts. This type of analysis is expected to provide information about the number of occurrences of each response chosen by the respondents with regard to “diversity and character of the biographical data”, “agreement or disagreement of the items within QMS practices & effectiveness” and “the level of importance which respondents give to QMS barriers”.

The frequencies data was utilized by extensively analyses to extract the major misconception for Part II and to rank the most important barriers for Part III. Part II data analyses was used to investigate the major perception about the QMS practices & effectiveness, respondents were asked to give the level of their agreement or disagreement of certain concepts on a five-point Likert scale ranging from (5) strongly agree , (4) slightly agree , (3) no strong opinion , (2) slightly disagree and (1) strongly disagree. Part III data analyses was carried to rank the major barriers relevant to the research sample organization, respondents were asked to give the severity or the negative effect for each

QMS barriers on five-point Likert scale ranging from (5) very high , (4) high, (3) neutral , (2) low and (1) very low.

Obvious difference has been noticed in the result of part III "QMS Barriers" for the quality staff respondents and others. A comparative analysis has been conducted to determine the significance of this difference. Likewise, the analysis of the responses of quality staff and others is presented in table 4.45.

Of the 131 questionnaires sent, 92 surveys were returned, giving 70% response rate, this rate was considered a high response rate, due to contacting participants prior to sending the surveys to get their approval to participate.16 responses were deemed to be unusable due to wrong response way. 13 responses were having large portion of uncompleted data. Analysis was based on the remaining 63 questionnaires. The response rate is shown in the following table:

Table:4.1 - Questionnaire response rate

Description	Number	Percent
Distributed questionnaires	131	100
Received questionnaires	92	70
Unusable/uncompleted questionnaires	29	

4.2.1 Frequency test results

4.2.1.1 Part I: Biographical data

Table 4.2 - Total years of experiences

Response	Frequency	Percent
0-5	12	19.0
6-10	30	47.6
11-15	13	20.6
16-20	5	8.0
Above 20	3	4.8
Total	63	100

A question of the total years of experiences was asked; 48% were having experience within a range of 6-10 years, 13% were more than 15 years, while 20% of respondent were within 11-15 range and 19% were 0-5 total year of experience range.

Table 4.3 - Total years of relevant quality experience

Response	Frequency	Percent
0-5	17	27.0
6-10	30	47.6
11-15	9	14.3
16-20	3	4.8
Above 20	4	6.3
Total	63	100

A valuable question was asked about the relevant quality experience. Half respondents 51% were 6 to 10 years of experience where 27% were less than 5 years. The rest (20%) were more than 10 years.

Table 4.4 - Occupation

Response	Frequency	Percent
Engineer	39	61.9
Supervisor/Superintendent	17	27.0
Accountant/Purchaser	2	3.2
Administration Officer	5	7.9
Total	63	100

The question of occupation was asked and results shows that 62% were engineers and 27% supervisor/superintendent.8% at administration jobs and 3% were accountant.

Table 4.5 - Level

Response	Frequency	Percent
Manager	2	3.2
Middle Manager	5	7.9
Senior	13	20.6
Supervisor	40	63.5
Others	3	4.8
Total	63	100

Regarding the level of occupation question, 64% were supervisors, 21% were senior. Manager and middle manager represented 11%.other level were about 5%.

Table 4.6 - Department

Response	Frequency	Percent
Construction	8	12.7
Technical	10	15.9
Project Control	8	12.7
Contracts	8	12.7
Quality	18	28.6
Safety	6	9.5
Finance/ Accounting	4	6.3
HR/ Admin/ Services	1	1.6
Total	63	100

The results of this question present the department of participating employees. Department's representation was 29% for Quality, 16% for Technical team, 13% for Execution, Project Control and Contracts have the same percent of execution, 9 % for Safety and 7% for others.

Table 4.7 - Work function

Response	Frequency	Percent
Civil	34	54.0
Electromechanical	15	23.8
Management	14	22.2
Total	63	100

As can be seen from the table 54% of the respondents work function were Civil, 24% were Electro mechanical and 22% were Management.

Table 4.8 - Have you been attending training programs related to quality during job?

Response	Frequency	Percent
Yes	38	60.3
No	25	39.7
Total	63	100

Of the total respondents 61% have been attending training programs related to quality during their jobs.

Table 4.9 - If yes / please specify the training level

Response	Frequency	Percent
Awareness	12	31.6
Introductory	23	60.5
Advance	3	7.9
Total	38	100

Above table shows the level of quality related training that been attended by respondents; 61% as an introductory level, 32% as awareness level while 7% stated that their training was advance.

Table 4.10 - If no/ please give the reasons

Response	Frequency	Percent
Training sessions were not conducted	5	20
I have not been selected	7	28
I could not attend due to work volume	7	28
I am not interested	6	24
Total	25	100

From the above result, the reasons behind not attending quality training were; Respondent has not been selected or he/she could not attend due to work volume was 28% for both, respondent is not interested was 24% on the other hand it was 20% for unavailability of the training sessions programmes.

4.2.1.2 Part II: QMS practices & effectiveness

Table 4.11 - QMS is too difficult to learn and implement

Response	Frequency	Percent
Strongly Agree	3	4.8
Slightly Agree	21	33.3
No Strong Opinion	7	11.1
Slightly Disagree	13	20.6
Strongly Disagree	19	30.2
Total	63	100

In this question, respondents were asked to identify if the QMS is difficult to learn and implement. Of the total respondents, 51% were not agreed, 38% were agreed while 11% were not having the strong opinion.

Table 4.12 - Quality system implementation is associated with extensive changes

Response	Frequency	Percent
Strongly Agree	28	44.4
Slightly Agree	11	17.5
No Strong Opinion	23	36.5
Slightly Disagree	1	1.6
Total	63	100

For the question of "Quality system implementation is associated with extensive changes"; 62% were agreed, 36% of the respondents were not having the strong opinion while 2% revealed that they are slightly disagreed.

Table 4.13 - Quality system implementation is associated with high cost

Response	Frequency	Percent
Strongly Agree	2	3.2
Slightly Agree	27	42.9
No Strong Opinion	4	6.3
Slightly Disagree	12	19.0
Strongly Disagree	18	28.6
Total	63	100

For “Quality system implementation is associated with high cost”; Survey results revealed that 48% of the respondents were disagreed, 46% were agreed, and only 6% were not having the strong opinion for this question.

Table 4.14 - Quality system implementation success is a top management responsibility only

Response	Frequency	Percent
Strongly Agree	25	39.7
Slightly Agree	8	12.7
No Strong Opinion	6	9.5
Slightly Disagree	22	34.9
Strongly Disagree	2	3.2
Total	63	100

In this question, respondents were asked to identify whether or not the successful of QMS is a responsibility of the top management. Of the total respondents, 53% were agreed, 38% were not agreed while 9% were not having the strong opinion.

Table 4.15 - Quality system implementation decreases productivity

Response	Frequency	Percent
Strongly Agree	2	3.2
Slightly Agree	3	4.8
No Strong Opinion	7	11.1
Slightly Disagree	27	42.9
Strongly Disagree	24	38.1
Total	63	100

Findings show a general agreement (81%) for “QMS is NOT decreasing productivity”, 11% of the respondents were not having the strong opinion while 8% revealed that they are agreed.

Table 4.16 - Quality system implementation inflates the organizational structure

Response	Frequency	Percent
Strongly Agree	24	38.1
Slightly Agree	6	9.5
No Strong Opinion	3	4.8
Slightly Disagree	29	46.0
Strongly Disagree	1	1.6
Total	63	100

“Implementation of the QMS is a reason of organizational structure inflating”.

48% agreed, 48% disagreed and 4% not having strong opinion.

Table 4.17 - Quality system implementation creates functional conflicts

Response	Frequency	Percent
Strongly Agree	1	1.6
Slightly Agree	31	49.2
No Strong Opinion	1	1.6
Slightly Disagree	9	14.3
Strongly Disagree	21	33.3
Total	63	100

Of the total respondents, 51% were agreed and 48% were disagreed.

Table 4.18 - QMS implementation does not depend in employees training and education

Response	Frequency	Percent
Strongly Agree	27	42.8
Slightly Agree	2	3.2
Slightly Disagree	8	12.7
Strongly Disagree	26	41.3
Total	63	100

46% of the total respondents were agreed QMS implementation does not depend in employees training and education while 54% were disagreed.

Table 4.19 - Quality system implementation increased workload

Response	Frequency	Percent
Strongly Agree	21	33.3
Slightly Agree	12	19.1
Slightly Disagree	10	15.9
Strongly Disagree	20	31.7
Total	63	100

Of the total respondents, 53% were agreed that implementation of the QMS will increase the workload and 47% were disagreed.

Table 4.20 - QMS is managerial luxury

Response	Frequency	Percent
Strongly Agree	23	36.5
Slightly Agree	2	3.2
No Strong Opinion	1	1.6
Slightly Disagree	10	15.9
Strongly Disagree	27	42.9
Total	63	100

In this question, respondents were asked to identify if the QMS is managerial luxury. Of the total respondents, 59% were disagreed, 40% were agreed while 1% were not having the strong opinion.

Table 4.21 - Quality is mostly product oriented approach, not suitable for construction business

Response	Frequency	Percent
Strongly Agree	23	36.5
Slightly Agree	7	11.1
Slightly Disagree	8	12.7
Strongly Disagree	25	39.7
Total	63	100

The results of this question present the opinion of participating employees regarding QMS whether suitable with construction projects or not. Of the total respondents, 53% were agreed that QMS can be suitable with construction projects and 47% their feedback stated that quality is mostly product oriented approach.

Table 4.22 - QMS implementation is associated with increase and complex paper work

Response	Frequency	Percent
Strongly Agree	24	38.1
Slightly Agree	12	19.0
No Strong Opinion	24	38.1
Slightly Disagree	2	3.2
Strongly Disagree	1	1.6
Total	63	100

57% of the total respondents were agreed that implementation of QMS can increase and complicates the paper work, 38% were not having the strong opinion while 5% were disagreed.

Table 4.23 - QMS implementation has not much perceived benefits (financial, managerial productivity ..... etc)

Response	Frequency	Percent
Strongly Agree	20	31.7
Slightly Agree	8	12.7
No Strong Opinion	2	3.2
Slightly Disagree	13	20.6
Strongly Disagree	20	31.8
Total	63	100

A valuable question has been asked to the respondents if the QMS implementation has not much perceived benefits related to the (financial, managerial productivity ..... etc). 52% were disagreed with this statement, 45% of the total respondents were agreed while 3% were not having the strong opinion.

Table 4.24 - Quality system implementation does not match the KSA working culture

Response	Frequency	Percent
Slightly Agree	6	9.5
No Strong Opinion	25	39.7
Slightly Disagree	7	11.1
Strongly Disagree	25	39.7
Total	63	100

51% of the total respondents were disagreed that implementation of QMS does not match the KSA working culture, 40% were not having the strong opinion while 9% were agreed.

4.2.1.3 Part III: QMS barriers

Table 4.25 - Lack of top management commitment to develop and implement of QMS

Response	Frequency	Percent
Very High	24	38.1
High	16	25.4
Neutral	20	31.7
Low	3	4.8
Total	63	100

For the barrier of "Lack of top management commitment to develop and implement of QMS", 38% of respondents gave very high score, 25% gave high score, while it was neutral for 32%. 5% marked this barrier as low.

Table 4.26 - Lack of middle management commitment to develop and implement of QMS

Response	Frequency	Percent
Very High	23	36.5
High	13	20.6
Neutral	5	8.0
Low	22	34.9
Total	63	100

For "Lack of middle management commitment to develop and implement of QMS", survey results revealed that 37% and 20% of respondents marked very high and high. On the other hand 35% were giving low score. 8% were neutral.

Table 4.27 - Insufficient resources allocation

Response	Frequency	Percent
Very High	23	36.5
High	37	58.7
Neutral	1	1.6
Low	1	1.6
Very Low	1	1.6
Total	63	100

59% and 35% of respondents respectively have marked high and very high for "Insufficient resources allocation".

Table 4.28 - Lack of employee's commitment towards the QMS

Response	Frequency	Percent
Very High	3	4.8
High	56	88.8
Neutral	1	1.6
Low	3	4.8
Total	63	100

By marking high and very high findings shows a general agreement (93%) that "lack of employee's commitment towards the QMS" is a significant barrier. 5% marked as low while 2% were neutral.

Table 4.29 - Lack of measures to prevent culture barriers ex. (continuous training, quality awareness programs, recognizing and reward superior quality performance, etc).

Response	Frequency	Percent
Very High	26	41.3
High	11	17.4
Neutral	24	38.1
Very Low	2	3.2
Total	63	100

41% and 18% of respondents have marked very high and high respectively. 38% were neutral while 3% marked as very low.

Table 4.30 - Employee's resistance to change

Response	Frequency	Percent
Very High	23	36.5
High	12	19.0
Neutral	2	3.2
Low	24	38.1
Very Low	2	3.2
Total	63	100

For the barrier of "Employee's resistance to change", 37% and 19% of respondents have marked very high and high respectively.38% marked this barrier as low .the barrier was considered of very low effect for 3% where it was neutral for the rest.

Table 4.31 - Prevalence of bureaucratic culture in the company

Response	Frequency	Percent
Very High	28	44.4
High	17	27.0
Neutral	13	20.7
Low	1	1.6
Very Low	4	6.3
Total	63	100

For the barrier of “Prevalence of bureaucratic culture in the company”, 44% of respondents gave very high score, 27% gave high score, while it was neutral for 21% and 6% marked this barrier as very low.

Table 4.32 - Conflict between new QMS processes and the existed company processes

Response	Frequency	Percent
Very High	25	39.7
High	7	11.1
Neutral	2	3.2
Low	9	14.3
Very Low	20	31.7
Total	63	100

For the barrier of “Conflict between new QMS processes and the existed company processes”, 40% of respondents gave very high score, 11% gave high score, while it was very low for 32%, 14% marked this barrier as low and 3% as neutral.

Table 4.33 - Quality related procedures are difficult to interpret

Response	Frequency	Percent
Very High	24	38.1
High	7	11.1
Neutral	1	1.6
Low	8	12.7
Very Low	23	36.5
Total	63	100

For the barrier of "Quality related procedures are difficult to interpret", 38% of respondents gave very high score, 11% gave high score, while it was very low for 36%, 13% marked this barrier as low.

Table 4.34 - Lack of employee's involvement

Response	Frequency	Percent
Very High	26	41.3
High	10	15.8
Neutral	24	38.1
Low	1	1.6
Very Low	2	3.2
Total	63	100

41% and 16% of respondents have marked very high and high respectively. 38% were neutral while 3% marked as very low.

Table 4.35 - Inappropriate allocation of personnel responsibilities and authority

Response	Frequency	Percent
Very High	27	42.8
High	8	12.7
Neutral	23	36.5
Low	3	4.8
Very Low	2	3.2
Total	63	100

For the barrier of "Inappropriate allocation of personnel responsibilities and authority", 43% and 13% of respondents have marked very high and high respectively. 36% were neutral while 5% marked this barrier as low.

Table 4.36 - Poor performance of quality department staff

Response	Frequency	Percent
Very High	29	46.0
High	5	7.9
Low	7	11.1
Very Low	22	35.0
Total	63	100

For the barrier of "Poor performance of quality department staff", 46% of respondents gave very high score, 8% gave high score, while it was very low for 35% and 11% marked this barrier as low.

Table 4.37 - Poor accountability system (admitting errors)

Response	Frequency	Percent
Very High	47	74.6
High	8	12.7
Neutral	1	1.6
Very Low	7	11.1
Total	63	100

For the barrier of "Poor accountability system (admitting errors)"; 75% of respondents gave very high score, 13% gave high score, while it was very low for 11%.

Table 4.38 - Difficult in co-operation among middle managers over quality problems

Response	Frequency	Percent
Very High	23	36.6
High	36	57.1
Neutral	4	6.3
Total	63	100

For "Difficult in co-operation among middle managers over quality problems"; survey results revealed that; 57% of respondents gave high score, 37% gave very high score, while it was very low for 6%.

Table 4.39 - Lack of training programs related to quality

Response	Frequency	Percent
Very High	27	42.8
High	9	14.3
Neutral	25	39.7
Very Low	2	3.2
Total	63	100

For the barrier of “Lack of training programs related to quality”; 43% of respondents gave very high score, 40% gave neutral score, while it was high for 14% and 3% marked this barrier as very low.

Table 4.40 - In-sufficiency of project time

Response	Frequency	Percent
Very High	28	44.4
High	2	3.2
Low	13	20.6
Very Low	20	31.8
Total	63	100

For the barrier of “In-sufficiency of project time”, 44% of respondents gave very high score, 32% gave very low score, while it was low for 21%.

Table 4.41 - Poor cross-functional team communication

Response	Frequency	Percent
Very High	23	36.5
High	37	58.7
Neutral	1	1.6
Very Low	2	3.2
Total	63	100

For the barrier of “Poor cross-functional team communication”; 59% of respondents gave high score, 37% gave very high score while it was neutral and very low for 4%.

Table 4.42 - Inappropriate team working environment in the company

Response	Frequency	Percent
Very High	25	39.7
High	32	50.8
Neutral	5	7.9
Very Low	1	1.6
Total	63	100

For the barrier of “Inappropriate team working environment in the company”, survey results revealed that; 51% of respondents gave high score, 40% gave very high score while it was neutral and very low for 9%.

4.2.2 Major perception about the QMS practices & effectiveness

A mean score of five-point Likert scale responses for each QMS practices & effectiveness statement was calculated and used to identify the major misconception and disappointment. A value of mean score ≥ 3 was conceder as cut-off point.

Table 4.43 - Major perception about the QMS practices & effectiveness

Perception about the QMS practices & effectiveness	Mean Score
Quality system implementation is associated with extensive changes	4
QMS implementation is associated with increase and complex paper work	3.9
Quality system implementation success is a top management responsibility only	3.5
Quality system implementation inflates the organizational structure	3.4
Quality system implementation increased workload	3
Quality is mostly product oriented approach, not suitable for construction business	2.9
QMS implementation does not depend in employees training and education	2.9
QMS implementation has not much perceived benefits (financial, managerial productivity ..... etc)	2.9
QMS is managerial luxury	2.7
Quality system implementation is associated with high cost	2.7
Quality system implementation creates functional conflicts	2.7
QMS is too difficult to learn and implement	2.6
Quality system implementation does not match the KSA working culture	2.2
Quality system implementation decreases productivity	1.9

4.2.3 Ranking of the QMS barriers

A mean score of five-point Likert scale responses for each QMS barriers was calculated and used to identify the major barriers relevant to the research sample organization. Table (4.44) provides the ranking of QMS barriers according to respondents' opinions

Table 4.44 - Ranking of the QMS barriers

Rank	barriers	Mean
1	Insufficient resources allocation	4.6
2	Poor accountability system (admitting errors)	4.4
3	Difficult in co-operation among middle managers over quality problems	4.3
4	Inappropriate team working environment in the company	4.2
5	Poor cross-functional team communication	4.2
6	Prevalence of bureaucratic culture in the company	4
7	Lack of top management commitment to develop and implement of QMS	3.97
8	Lack of training programs related to quality	3.94
9	Lack of employees involvement	3.9
10	Lack of measures to prevent culture barriers (ex. Continuous training, quality awareness programs, recognizing and reward superior quality performance, ...etc.	3.9
11	Lack of employees commitment towards the QMS	3.9
12	Inappropriate allocation of personnel responsibilities and authority	3.84
13	Lack of middle management commitment to develop and implement of QMS	3.59
14	Employee’s resistance to change	3.5
15	Poor performance of quality department staff	3.2
16	Quality related procedures are difficult to interpret	3.2
17	Conflict between new QMS processes and the existed company processes	3.14
18	In-sufficiency of project time	3.1

4.2.4 Comparative analysis between quality staff respondents and others regarding QMS barriers

Chi-square test was conducted for part III "QMS Barriers" to check whether significant differences exist among the mean values for the QMS barriers between quality staff and others. The difference is considered significant when the P-value is less than 0.05.

Table 4.45 -Comparative analysis between quality staff respondents and others regarding QMS barriers

SN.	Barriers	Quality Staff Responses	Others Responses	P Value
1	lack of top management commitment to develop and implement of QMS	4.6	3.5	0.02
2	Lack of middle management commitment to develop and implement of QMS	4.6	3.2	0.005
3	Insufficient resources allocation	4.6	4.2	0.05
4	Lack of employee's commitment towards the QMS	4.0	3.9	0.6
5	Lack of measures to prevent culture barriers (ex. continuous training, quality awareness programs, recognizing and reward superior quality performance, etc.	4.6	3.1	0.03
6	Employee's resistance to change	4.7	2.9	0.009
7	Prevalence of bureaucratic culture in the company	4.8	3.6	0.03
8	Conflict between new QMS processes and the existed company processes	1.5	3.6	0.08
9	Quality related procedures are difficult to interpret	1.4	3.7	0.07
10	Lack of employees involvement	4.5	3.1	0.06
11	Inappropriate allocation of personnel responsibilities and authority	4.5	3.0	0.01
12	Poor performance of quality department staff	1.5	4.0	0.01
13	Poor accountability system(admitting errors)	4.2	4.2	0.35
14	Difficult in co-operation among middle managers over quality problems	4.7	3.9	0.02
15	Lack of training programs related to quality	4.5	3.6	0.07
16	Insufficiency of project time	1.6	3.5	0.005
17	Poor cross-functional team communication	4.7	4.1	0.13
18	Inappropriate team working environment in the company	4.0	4.1	0.4

4.3 Interviews outcome

The data collected through the interviews was, as stated before, audio-recorded. We preferred meeting with the respondents since it would give us the possibility not only to read verbal but also non- verbal communication which can be useful in interpreting the full meaning of the answers. After each interview a quick recap and discussion was made to highlight the answers that we believe had most significance. In addition, our notes were compared and completed to assure that we had understood respondent's answers correctly. Collected data processed as soon as possible after the interview has been completed, this because it is easiest to recollect the interview from memory.

For each of the theme and question, the respondents have given their answers as an opinion or view on our chosen topics. The respondents are all managers at different levels; we were able to perform interviews with managers across three departments. The number of respondents interviewed was also dependent on and limited to how many respondents in the organization that was available and relevant for our study, we managed to interview a total of four (4) different managers. The managers' positions range from administrative managers, operational managers to department managers.

4.3.1 Thematic analysis result

It was found that the majority of management representatives believe themselves to be well aware of the QMS implementation gap in their respective departments, underlying barriers and how to overcome them.

1. Drivers for starting QMS

All agreed that those main drivers for introducing QMS are to improve processes and to satisfy customers.

One of the senior managers said that "QMS introduce in the organization as government tender requirement, but we all know that QMS will help to improve efficiency and enhance the delivery of quality service output"

2. Preparedness for QMS

All agreed that the organization have undergone preparatory phase to introduce QMS Preparation for QMS include the following:

- Conducting gap or situation analysis to inform QMS implementation
- Resource analysis in terms of financial and human resources

3. What resources are put in place (Prioritized) for QMS?

Mainly: human resources and financial resources**.** Some also mentioned restructuring.
Majority of the respondents said that the organization reflected commitment to invest in QMS that translated into allocation of financial resources and training people in QMS.

4. Perception of risk for implementing QMS

All agreed there is no risk, it's surely useful one of the manger said "actually there is no risk it prevent risk its risk prevention tool"

5. Commitment of senior manger to embrace QMS

All expressed their commitment and full support for QMS
One of respondents said "*yes sure I am committed for QMS, because it organize my time, my resources and help me to achieve my objectives*"

6. QMS Responsibilities, roles are they clearly stated?

All agreed that roles and responsibilities were clearly sated and communicated to all concerned staff in the organization.

7. QMS Implementation (progress remark)

All agreed it is not smooth, there are some difficulties but still feasible.

One of the senior managers said *"not smooth but expected we just started we learned a lot and adjust our plan along the way"*
Another one said "*We face some resistance from some people in senior position .it all about commitment*"

8. QMS success factors

Majority agreed on the following success factors:

- Top management commitment
- Ownership of the staff
- Qualified team that supports the QMS.

9. Main QMS barriers

The main barriers mentioned by all mangers are as follows:

- Insufficient resources allocation

  All agreed its one of the key barrier.

- Inappropriate team working environment in the company

All agreed poor team work or inadequate team work might jeopardize QMS function

One of senior managers said *"poor team spirit is one of the threats of QMS as its team oriented processes so people need to work together and support each other"*

- Poor cross-functional team communication

Poor communication is important barrier as it reduce efficiency of cross functional communication and resulted in delay tasks

- Poor accountability system (admitting errors)

One of the manger said *"poor accountability put QMS at stake .QMS need strong leadership and commitment to be introduced and once it started it need to be enforced and people should be hold accountable"*

- Difficult in co-operation among middle managers over quality problems

Cooperation between the middle managers is mentioned by some manager but all agreed that is not main barrier and it arise because of poor communication.

10. Others barriers from Interviewees personal point of view

- Lack of clear target and deliverables

Lack of clear target and deliverables is also problem as it reflect in clarity about strategic target and the whole rationale of QMS

A senior managers said *" I think in clarity about the target of QMS might undermine the whole initiative and it will be a waste if they don't have clear vision .question about why we want to implement QMS , the company target and expected deliverable ".*

- Schedule and Timeline

Majority agreed that timeline are important factors for successful implementation of QMS. Proper planning of such resources is highly needed.

11. Interviewees recommendations

For successful implementation of QMS the following need to be considered:

- Commitment at all level
- Effective communication
- Facilitate the culture for QMS
- Set clear target for QMS

4.4 Checklist outcome

This checklist is to verify the implementation of quality management system in accordance with ISO 9001:2008 standards , project contractual requirement and other parameters for evidence of the general requirements, documentation requirements, quality manual, control of documents, control of records, control of production and service provision, control of nonconforming product and corrective/preventive actions.

4.4.1 Checklist result

Table 4.46 - Checklist result

ISO sect	Standard requirements	Meets	Partially meets	Does not meet
4.1	General requirements			
	a. Are processes identified	☑		
	b. Are processes monitored & measured?	☑		
4.2.1	Documentation requirements general			
	a. Are there documented statements for quality policy & objectives?	☑		
	b. Is there a quality manual?	☑		.
4.2.2	Quality manual			
	a. Scope of QMS with exclusions and justifications defined?	☑		
	b. Documented procedures established or referenced?	☑		
4.2.3	Control of documents – is procedure established to insure:			
	Documents are approved for adequacy prior to issue?	☑		
4.2.4	control of records Is procedure established to insure:			
	Records maintained to provide evidence of conformity to requirements. Records are legible, identifiable and retrievable. Records are controlled for identification, storage, protection, retrieval, retention, and disposition.	☑		

ISO sect	Standard requirements	Meets	Partially meets	Does not meet
5	Management responsibility – is evidence of management commitment available to show:			
5.1	a. Established quality policy and quality objectives.	☑		
	b. Management Reviews conducted.	☑		
	c. Ensuring the availability of resources.	☑		
5.5	Responsibility, authority and communication			
5.5.1	Is responsibility & authority defined & communicated?			☑
5.5.2	Does management representative have responsibility & authority to ensure that the processes of the QMS are established, Implemented and maintained.	☑		
6.1	Provision of resources – have resource requirements been established and obtained to:			
	a. Implement, maintain and continually improve the effectiveness of the QMS	☑		
7.1	Planning of product realization – is planning & development of the processes evidenced, and are they consistent with requirements? Is the following determined as appropriate:			
	a. Quality objectives and requirements for the product?		☑	
	b. The need to establish processes, documents and provide resources specific to the product?	☑		
8.2.2	Internal audit – are internal audits performed at planned intervals based on status and importance of processes and area to be audited by independent auditors to determine if the quality management system:			
	a. Conforms to the ISO standard and quality system requirements?	☑		
	b. Is effectively implemented and maintained?		☑	

ISO sect	Standard Requirements	Meets	Partially meets	Does not meet
8.3	Control of nonconforming product – is required procedure available and does it meet requirements? Is evidence available to show conformance to procedure and is one or more of the following in effect including records? Is corrected nonconforming product re-verified? Contained?			
	a. Taking action to eliminate detected nonconformity.	☑		
	b. Authorizing its use, release or acceptance under concession by a relevant authority and customer where applicable?	☑		
	c. Taking action to preclude its original intended use or application.		☑	
8.5.1	Continual improvement			
	Is there evidence to show the effectiveness of the quality management system is continually improved through use of quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review?		☑	

By analyzing the QMS assessment checklist, the following feature been noticed:

- Appropriate Communication takes place regarding the effectiveness of quality management system. This was proven by some Email, Outlook and transmittal process.

- QMS documentation was appearing to be successfully carried using software tool. QA team was trained to develop the manual and procedures of ISO 9001 standard, in order to independently develop the QMS documentation.

- Evidence of Subsequent reviews, audits, inspections, and witness and surveillance activities.

- Audit/review findings were partially discussed and consequently corrective action and verification were intermittently carried out.

- Unsuccessful human resources training with regard to become an agent of change. This is proven by evidence of lack of awareness of quality policy among staff and lack of record of training, education and experiences.

- Lack of defining responsibilities and authorities.

- Problems with in disseminating QMS programs to all organizational levels

Chapter Five – Discussion, Conclusion and Recommendations

5.1 Introduction

This chapter presents a discussion of the results that emerged from data collection methods, including interpretations that attempt to provide logical explanations in relation to the research aim and objectives. The findings are also related to the trends and developments outlined in the literature review in the first chapter. Also this chapter is aimed to summarize the conclusions of the study, acknowledge some limitations, and finally provide recommendations for further research.

5.2 Discussion of results

This descriptive study was carried out to explore the barriers that have been encountered during QMS implementation for the sample organization, determine critical barriers according to top management and employee view, and to recommend actions and measure to overcome these barriers.

On the basis of the results, there appears to be a substantial gap between the planned and established goals of QMS. The gap is mainly in “Human Resources Training” in a way that affects them to become an agent of change “resistance to change”. This is in concordance with Asiri study where he stated that HR related deficiencies such as lack of training programmes related to quality and lack of employee involvement are considered as major hindrances during the implementation of QMS in Saudi Arabia construction projects. On the other hand, by utilizing the questionnaire results the noticed misconception about QMS practices & effectiveness may be as a result of these deficiencies. Little attention is paid to Quality in terms of human and financial resources. Employee training looks as unnecessary cost which belittles the profits margins which is the primary objective for the existence of businesses and as a result QMS has been neglected as its implementation. Majority of the respondents “Questionnaire Part II” believed that quality system implementation is a top management responsibility and associated with extensive changes and complex paper work. This belief comes from little education on QMS and is an evidence support that there is alack in training and inappropriate preparatory phase.

Another gap explored from this study is that audit/review findings are partially discussed and consequently corrective action and verification are intermittently carried out. This could be correlated with mentioned Lack of top management commitment to develop and implement of QMS. Management commitment is considered important characteristics for quality improving.

As it appears, the Lack of defining responsibilities and authorities is also one of QMS implementation gaps that could be considered as threatening factor. When introducing a QMS the new responsibilities and roles of the employees must be uniformed with the original roles and responsibilities, otherwise there is a risk of employees rejecting the ownership of the new responsibilities.

The integrated analysis to identify major barriers and hindrances that affect the implementation of QMS reveals comparable result to that explored by other studies. Insufficient resources allocation was the most important barrier according to employee opinions. This is supported by the agreement of interviewees. Lack of financial and human resources are the most critical challenges that face QMS implementation.

In addition to that, several factors related to organization's internal systems were excessively ranked by respondents "Poor accountability, Difficult in co-operation among middle managers over quality problems, Inappropriate team working environment in the company, Poor cross-functional team communication and Prevalence of bureaucratic culture in the company" as a second rank barrier, this is line up with what mentioned by majority of interviewees to the degree that they may jeopardize QMS function.

The third most important barrier seen by respondents was the lack of top management commitment to develop and implement of QMS. On the other hand conflicting results have been drawn from the interviewees, where they stated their complete commitment towards the QMS implementation. They refer the problem to the higher management commitment in terms of allocation of resources.

Lack of training programmes whatever were their purposes has obviously been identified as a critical barrier "Fourth ranked" with high level of severity according to employee's views. Amar and Zain suggest that there is a link between education and training on one hand and the amount of engagement in and commitment to the QMS on the other, finding that those companies which started with education and training early in the process experienced a high level of awareness of quality and motivation to use the quality system. This finding is at variance with data of the high frequency of attending training programme "61%"; this could be traced-back to relatively high percentage of quality department staff.

Lack of employee involvement appears as fifth ranked barrier according to respondent's opinions. Our finding is in concordance of many studies that find the lack of employee involvement, was a barrier to implementing QMS. Employee involvement and commitment were considered key success factors for implementation, without employee involvement, the future of QMS is not encouraging. Majority of lower employees acts as if quality implementation is a "top management job", this because quality has not been taken as a joint responsibility by the management and the employees. In addition to that, lack in measures to involve the employees such as "continuous training, quality awareness programs, recognizing and reward superior quality performance, etc" could be the reason behind this gap.

The sixth barrier ranked by respondents was quality department performance. Majority of respondents thought that Poor performance of quality department staff is essential factor acting against the implementation of ISO 9001. (Zhao et al. 1995) stated that unskilled employees are other inhibitors to implement the QMS.

Finally, "Difficulties to interpret quality related procedures", "Conflict between new QMS processes and the existed company processes" and "In-sufficiency of project time" were considered as low severity barriers.

Aiming to highlight the noticed conflict between ranking of barriers according to the quality staff and others, comparative analysis has been carried out. They collectively agree on "Insufficient resources allocation, Lack of employee's commitment and factors related to organization's internal systems". On the other hand "Poor performance of quality staff, Conflict between new QMS processes and the existed, Employee's resistance to change and Insufficiency of project time" were conflicting.

On comparison interviewees' responses against the employee opinions about barriers, all answers revealed high degree of concordance. Problems with higher management commitment, their capability to provide the necessary financial resources and training programmes for the QMS implementation and maintenance are the most important barriers.

Although employees stated the inappropriate middle management role in QMS implementation, mangers deny that and insure their total commitment towards the implementation. In spite of the employee opinion about less importance of schedule and timeline, it was considered as a barrier of great contribution according to mangers view. Lack of clear target and deliverables is additional barrier been identified by interviews responders. This finding is aligned with Balzarova finding "failure to identify a clear mission as a performance measurement tool was one of the common organizational barriers to successful QMS implementation in some firms".

The interviewees refer these gaps to inherited deficiencies in planning and preparatory phase, base on known rule “the well designed QMS is the most easy to succeed and difficult to fail.

5.3 Conclusion

There appears to be a substantial gap between the established and natural goals of QMS and the management practices in the sampled organization. There remains much to be done to fully exploit the potential benefits from QMS implementation and thereby achieve quality improvement in the organization.

The most important barriers facing the organization are “Insufficient resources allocation, Lack of management and employee’s commitment and factors related to organization’s internal systems”

The gap in implementation is affected largely by inherited deficiencies in planning and preparatory phase in which the strategic quality deployment process must ensure the quality improvement efforts are aligned with the corporate mission, vision, goals, and objectives. Although, there was evidence about the efforts to implement and maintain the QMS, the nature and complexity of the project affect the successful implementation. The successful implementation of QMSs requires a total change in organizational focus. It may require an adoption of a new strategies that produced improving in operational processes at all levels within the project.

5.4 Limitations

The present study has relied partly on quantitative methodology of data collection, this make quality of some findings depend upon the knowledge of its respondents. The interviews in this study were designed for the managers. These individuals were targeted because they were most likely to be knowledgeable about the QMS implementation practices. Respondents may have been biased in answering questions that require judgment and their subjective responses may not be reflective of the actual situation. With regard to the quantitative, the sample size is relative small. Another limitation was lack of involvement of certain external respondents in data collection methods (e.g., project owners, professional associations, academics, and end-user customers), where the aim was to identify the internal implementing barriers factors. At last, the confidentiality of the subject investigated. Due to the fact that some barriers to the implementation of ISO 9001:2008 are highly confidential, a few of the interviewees seemed uncomfortable in giving some information during the interview sessions.

5.5 Recommendations

According to study findings, the organization is advised to draw these measures and actions:

1. Top management has to be visibly and explicitly committed to quality implementation. Much more attention, have to be paid to the quality implementation in both human and financial resources.

2. QMS must be supported by employee trust, acceptance and understanding of management's objectives. Employees, therefore, should be recognized by the management as vital players in the decision making processes regarding to quality improvement as involving them would have motivating effect on implementation of quality programs.

3. Detailed and clear job responsibility description is needed to be redefined to ensure that each of the project team members understand their responsible in order to achieve the required objectives. Besides that, the annual management review needs to be conducted by the top management to ensure the effectiveness of implementing the Quality Management System.

4. Establish appropriate degree of flexibility within the key and supporting processes and to implement the right level of documentation of records, procedures and reports. These are important considerations to ensure that a QMS does not become overly complex and bureaucratic.

5. The organization should provide comprehensive training, including technical expertise, communication skills, small-team management, problem-solving tools, and customer relations.

6. Analyze the critical success factors and moving on to the core processes is the most effective approach to motivate staff when engaging in a permanent change process.

7. Apply appropriate training programme, introducing motivation and empowerment measurers for all staff levels and on-going careful review to be conducted for QMS processes.

8. Take an in-depth look at QMS by assessing how benefit and barriers are interrelated, and how to overcome these barriers.

9. Future research could be conducted to measure and evaluate the performance of organizations with ISO 9001:2008 before and after certification. Further research should include more sample size and more representation of internal and external respondent in a way that give comprehension evaluation of implementation and related barriers. Also a more in- depth analysis should consider the modeling to draw relations between these factors. Testing the effect of implementing certain measure to overcome the established factors is also an area of research.

10. Future research could be conducted to study the new ISO 9001:2015, since the barriers could be pre-determined and predicted before implementation through risk management based on a “risk-based thinking approach”.

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Appendices

Appendix A - Questionnaire

Appendix B - Interview Guide

Appendix C - Checklist

Appendix A

Questionnaire

QUESTIONNAIRE

BARRIERS OF IMPLEMENTING A QUALITY MANAGEMENT SYSTEM

Dear Respondent

Thank you for donating your valuable time to completing this survey. Your reply will provide beneficial information to identify and investigate the barriers of implementing the QMS system which hopefully can provide valuable information to enhance the quality management practices in this organization.

This questionnaire consists of 42 questions and has been designed so that you can complete it very quickly and easily. It takes approximately 25 minutes. Please make every effort to answer every question to ensure the usability of the survey.

The success of this study is dependent upon a high rate of return for which your participation is essential. Your reply will provide me with the data I need to successfully complete my Master dissertation, for which I am truly grateful.

Results will be presented as a summary of all respondents. All responses will be STRICTLY CONFIDENTIAL. Should there be any queries, concerns or suggestions regarding this study, please feel free to call me at mobile # +966-557780453 or by e-mail at anssudan@hotmail.com

Thank you in advance for your response.

Sincerely,

Anass Osman
College of Graduate Studies
Deanship of Development and Quality
Sudan University of Science & Technology
Khartoum- Sudan.

PART I: Biographical Data

Kindly complete the following section by ticking off the appropriate boxes:

1. Total years of experience

☐ 0 – 05 ☐ 06 – 10 ☐ 11 – 15 ☐ 16 – 20 ☐ 20+

2. Total years of relevant quality experience

☐ 0 – 05 ☐ 06 – 10 ☐ 11 – 15 ☐ 16 – 20 ☐ 20+

3. Occupation?

☐ Engineer ☐ Supervisor/ Superintendent ☐ Accountant / Purchaser

☐ Administration Officer ☐ Other (Specify).....

4. Level?

☐ Manager ☐ A middle manager ☐ Senior ☐ Supervisor

☐ Other (Specify).....

5. Department?

☐ Construction ☐ Technical ☐ Project Control ☐ Contracts ☐ Quality

☐ Safety ☐ Finance / Accounting ☐ HR/ admin/ Services

☐ Other (Specify).....

6. Work faction?

☐ Civil ☐ Electromechanical

☐ Management

7. Have you been attending training programs related to quality during current job?

☐ Yes ☐ No

8. If yes, please specify the training level

☐ Awareness ☐ Introductory ☐ Advance

9. If no, please give the reasons

☐ Training sessions were not conducted

☐ I have not been selected

☐ I could not attend due to work volume

☐ I am not interested

PART II: QMS Practices & Effectiveness

Please mark with a cross (x) in the applicable box to rate your level of agreement or disagreement for the following Statements. Please mark one box only.

No.	Statements	5	4	3	2	1
		STRONGLY AGREE	**SLIGHTLY AGREE**	**NO STRONG OPINION**	**SLIGHTLY DISAGREE**	**STRONGLY DISAGREE**
1	Quality Management system (QMS) is too difficult to learn and implement					
2.	Quality Management system (QMS) implementation is associated with extensive changes					
3.	Quality system implementation is associated with high cost					
4.	QMS implementation success is a top management responsibility only					
5.	QMS implementation decreases productivity					
6.	QMS implementation inflates the organizational structure					
7.	QMS implementation creates functional conflicts					
8.	QMS implementation does not depend in employees training and education					

9.	QMS implementation increased workload					
10.	QMS is a managerial luxury					
11.	QMS is mostly product oriented approach, not suitable for construction business					
12.	QMS implementation is associated with increase and complex paper work					
13.	QMS implementation has no much perceived benefits (Financial, managerial productivity…)					
14.	QMS implementation does not match the KSA working culture					

PART III: QMS Barriers

Please mark with a cross (x) in the applicable box to rate the following barriers severity and negative effect in relation to QMS implementation. Please mark one box only.

Notices:

• Your selected answer must represent your opinion about what is present in overall consortium.
• If the organization faced other barriers, please write them in the last page of this questionnaire or if you want to write some comments about your answers.

No.	Barriers	5	4	3	2	1
		Very High	**High**	**Neutral**	**Low**	**Very Low**
1.	Lack of top management commitment to develop and implement of QMS.					
2.	Lack of middle management commitment to develop and implement of QMS.					
3.	Insufficient resources allocation					
4.	Lack of employees commitment towards the QMS					
5.	Lack of measures to prevent culture barriers (ex. continuous training , quality awareness programs, recognizing and reward superior quality performance…etc)					
6.	Employees resistance to change					
7.	Prevalence of bureaucratic culture in the company					

8.	Conflict between the new QMS processes and the existed company processes					
9.	Quality related Procedures are difficult to interpret					
10.	Lack of employee involvement					
11.	Inappropriate allocation of personnel responsibilities and authority					
12.	Poor performance of Quality department staff					
13.	Poor accountability system “admitting errors”					
14.	Difficulties in co-operation among middle managers over quality problems					
15.	Lack of training programs related to quality					
16.	Insufficiency of project time					
17.	Poor cross-functional team communication					
18.	Inappropriate team working environment in the company.					

Please list any other barriers you think affecting the QMS implementation in the company?

……
……
……

Notices, comments and any addition from the respondent:

……
……

Thank You Very Much

Appendix B

INTERVIEW GUIDE

INTERVIEW GUIDE

BARRIERS OF IMPLEMENTING A QUALITY MANAGEMENT SYSTEM

Part 1: General Information

Interview Date:
Interview Time:
Venue:
Job Title:

Part 2: Interview Themes & Questions

1. Why did the company initially decide on a QMS?
    a. To improve process.
    b. Satisfy customer.
    c. Customer's pressure.
    d. Competition.
    e. Survive.
    f. Improve quality (reduce costs, improve communication etc.)

2. Prior to the implementation of a QMS, did your organization assess how capable it is to meet its requirements and successfully adopt it?

3. What are the fundamental resources that the company prioritized as necessary for the implementation of the QMS? (E.g. organizational restructuring, funding, etc)?

4. Do you see any risks with a QMS?

5. Are you as a manger, willing to embrace a QMS and continually work with it?

6. Have you any stated responsibilities in implementing the QMS?

7. How does the QMS performed?
8. What are the success factors if available?
9. What are the barriers facing your organization, putting in mind the employee response did you agree that the following barriers as the most barriers facing your organization during the QMS implementation?
    g. Insufficient resources allocation
    h. Poor accountability system (admitting errors)
    i. Difficult in co-operation among middle managers over quality problems
    j. Inappropriate team working environment in the company
    k. Poor cross-functional team communication
10. If no, in your personal view, what are the barriers the organization faced during the implementation process?
11. How did the organization can overcome these barriers?

Appendix C

CHECKLIST

CHECKLIST
BARRIERS OF IMPLEMENTING A QUALITY MANAGEMENT SYSTEM

This checklist is to verify the implementation of Quality Management System in accordance with ISO 9001:2008 Standards and project contractual requirement and other parameters for evidence of the General requirements, Documentation requirements, Quality manual, Control of documents, Control of records, Control of production and service provision, Control of nonconforming product and Corrective/Preventive actions.

ISO sect	Standard requirements	Meets	Partially meets	Does not meet
4.1	General Requirements			
	a. Are processes identified			
	b. Are processes monitored & measured?			
4.2.1	Documentation requirements general			
	a. Are there documented statements for quality policy & objectives?			
	b. Is there a quality manual?			
4.2.2	Quality manual			
	a. Scope of QMS with exclusions and justifications defined?			
	b. Documented procedures established or referenced?			
4.2.3	Control of documents – is procedure established to insure:			
	Documents are approved for adequacy prior to issue?			

CHECKLIST
BARRIERS OF IMPLEMENTING A QUALITY MANAGEMENT SYSTEM

This checklist is to verify the implementation of Quality Management System in accordance with ISO 9001:2008 Standards and project contractual requirement and other parameters for evidence of the General requirements, Documentation requirements, Quality manual, Control of documents, Control of records, Control of production and service provision, Control of nonconforming product and Corrective/Preventive actions.

ISO sect	Standard requirements	Meets	Partially meets	Does not meet
4.2.4	Control of records is procedure established to insure:			
	Records maintained to provide evidence of conformity to requirements. Records are legible, identifiable and retrievable. Records are controlled for identification, storage, protection, retrieval, retention, and disposition.			
5	Management responsibility – is evidence of management commitment available to show:			
5.1	a. Established quality policy and quality objectives.			
	b. Management reviews conducted.			
	c. Ensuring the availability of resources.			
5.5	Responsibility, authority and communication			
5.5.1	Is responsibility & authority defined & communicated?			
5.5.2	Does management representative have responsibility & authority to ensure that the processes of the QMS are established, Implemented and maintained.			
6.1	Provision of resources – have resource requirements been established and obtained to:			
	a. Implement, maintain and continually improve the effectiveness of the QMS			

CHECKLIST
BARRIERS OF IMPLEMENTING A QUALITY MANAGEMENT SYSTEM

This checklist is to verify the implementation of Quality Management System in accordance with ISO 9001:2008 Standards and project contractual requirement and other parameters for evidence of the General requirements, Documentation requirements, Quality manual, Control of documents, Control of records, Control of production and service provision, Control of nonconforming product and Corrective/Preventive actions.

ISO sect	Standard requirements	Meets	Partially meets	Does not meet
7.1	Planning of product realization – is planning & development of the processes evidenced, and are they consistent with requirements? Is the following determined as appropriate:			
	a. Quality objectives and requirements for the product?			
	b. The need to establish processes, documents and provide resources specific to the product?			
8.2.2	Internal audit – are internal audits performed at planned intervals based on status and importance of processes and area to be audited by independent auditors to determine if the quality management system:			
	a. Conforms to the ISO standard and quality system requirements?			
	b. Is effectively implemented and maintained?			
8.3	Control of nonconforming product – is required procedure available and does it meet requirements? Is evidence available to show conformance to procedure and is one or more of the following in effect including records? Is corrected nonconforming product re-verified? Contained?			
	a. Taking action to eliminate detected nonconformity.			
	b. Authorizing its use, release or acceptance under concession by a relevant authority and customer where applicable?			

CHECKLIST
BARRIERS OF IMPLEMENTING A QUALITY MANAGEMENT SYSTEM

This checklist is to verify the implementation of Quality Management System in accordance with ISO 9001:2008 Standards and project contractual requirement and other parameters for evidence of the General requirements, Documentation requirements, Quality manual, Control of documents, Control of records, Control of production and service provision, Control of nonconforming product and Corrective/Preventive actions.

ISO sect	Standard requirements	Meets	Partially meets	Does not meet
	c. Taking action to preclude its original intended use or application.			
8.5.1	Continual improvement			
	Is there evidence to show the effectiveness of the quality management system is continually improved through use of quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review?			