

# Analysing The Effectiveness of Quality Management in Construction Projects

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**Abstract**—Time, money, resources, and quality performance standards which are created to satisfy clients and ensure their satisfaction are the constraints on construction projects. The implementation of a quality management system is covered in this paper. Quality is now a tactical tool in the battle for increased market share and profitability. The Quality Management System (QMS) has created a framework with procedures and documentation. The construction industry has seen beneficial changes as a result of QMS over time. Defective rework and repair are caused by insufficient QMS, which also results in low productivity. Therefore, the goal of the study was to examine the essential elements of a successful quality management system, whereby important aspects impacting QMS application were identified, along with the advantages of encouraging QMS adoption and the requirements or needs of QMS implementation. The results show that top management commitment is one of the most important factors influencing QMS practice. Other top benefits that encourage implementation include improved image, increased competitiveness, and reputation of the organization. Project quality plan and staff QMS training are also top requirements for QMS.

**Index Terms**—ISO, ISO 9000 Family; Quality Management System (QMS); Construction Projects; Critical Factors. Project Success Criteria, Customer's Satisfaction.

## I. INTRODUCTION

Finding the secrets to successfully establishing a quality management system is the goal of my research. The first chapter of my study topic is devoted to an introduction, which covers the problem statement, research aim, objectives, and research background. Businesses from all over the world, especially those from developing nations, are vying for a spot in the burgeoning global marketplaces by attempting to

achieve internationally recognized production standards. Unfortunately, when it comes to implementing Total Quality Management (TQM), which provides expertise in customer experience through continuous innovation to products, processes, or offerings, the construction industry has lagged behind many other industries. To find out more about current quality management procedures and supervisors' opinions of what elements are essential for effective quality management, a survey of general contractors was examined. This research looks on planning for organizational continuous improvement, early quality management methods, and organizational development excellence in infrastructure projects related to the growth of the Indian construction industry. Construction organizations are adopting quality management as a proactive measure to address quality issues and satisfy client demands.

## II. LITERATURE REVIEW

Behnam Neyestani (2021), "Effectiveness of quality management system in construction projects" defines that quality management system provides generic guidance and requirements for establishing an appropriate quality management procedure, in order to lower cost, increase productivity, customer's satisfaction and market share in the organizations since the last two decade In construction industry, it can assist the companies to achieve successfully their objectives, and ensure that all phases of construction project consistently meet client's requirements (need). The main aim of this article was to evaluate the impact of QMS implementation on main factors of construction projects. In this study, literature review describes that the importance of QMS can be an

effective technique to achieve the objectives of project successfully through process approach, which is based on PDCA methodology towards the optimization of project performance and problem solving.

N Rajiv S R and Dr. S Harinath, "Effectiveness of Total Quality Management in the process of construction" illustrates that, in the competitive world the delays and reworks, time and resource wastes are not acceptable. There is a great scope of improving the quality to minimize the resource waste, effective utilization of resources and manpower. The TQM implementation is advantageable in minimizing the wastes, effective monitor and control the construction activity. From the research it is found that the effective implementation of elements of TQM will leads to success of a construction industry. The quality elements are team work, training, supplier's involvement, cost of quality, customer service, management commitment and leadership, statistical methods. Quality management system should be implemented either at the organization level or at the project level itself.

Grigorios L. Kyriakopoulos (June 2011), "The role of quality management for effective implementation of customer satisfaction, customer consultation and self-assessment" This paper summarizes the common procedures and measures used on construction sites to control the quality of executed works. The presence and implementation of a quality management system will ensure that the construction meets client requirements. The presence of a quality management system alone is not sufficient; the correct and strict implementation of a quality management system is substantial. The implementation of a quality management system in construction requires the collaboration of the client, contractor, and engineer. This paper is mainly focused on quality in construction projects. Controlling the quality of construction projects will pass through various stages. And it is not limited to construction activities. The control of construction activities is not sufficient to produce a final product.

P.P Mane, J.R Patil (March 2015), "Quality management system at construction project: A questionnaire Survey" Recognized that an internal quality system covers activities aimed at providing

confidence to the management of an organization that the intended quality is being achieved. This is called a "QM system". Successful implementation of quality management system can contribute to an increase in product quality. Meanwhile an external quality system covers activities aimed at inspiring confidence in the client that the suppliers' quality system will provide a product or service that will satisfy the client's quality requirements. This is called a "quality assurance system". An effective planning requires the organization to plan for the resources and the construction work by providing the work program, cost program, project quality plan, labour, material and plan schedule

Mohammad Shaz, Mohammad Arshad Khan (2021), "Quality management and improvement in construction projects" demonstrated that, in the building and construction sector, the performance management System (PMS) refers to planning phase, product testing, and control and improvement of the quality. The primary goal of the building sector is that construction projects are completed successfully within the constraints of good standard, specified time frame, and cost involved. According to the QMS research, construction companies should create a flexible and conducive overall organizational environment that encourages the advancement of quality management in all facets of the business. The project's people who participated have included the investor, a project financial analyst, a construction company, as well as various contractors and supply chain partners. This article involves collection of data gathered during contractor's survey interview.

Cao Jinbao (2014), "Research on Construction quality management of construction project" describes that with the continuous development of society and the continuous improvement of people's life quality, the proportion of construction industry gradually increases in our national economy, and has been a pillar industry of the national economy. The healthy development of construction industry directly affects the stable development of our national economy, and involves the interests of security of the public service in China. Therefore, much attention should be paid to the construction quality of construction project by the related department, and the research work on the construction quality management of construction

project should be promoted. This paper defines the characteristics of quality management of construction project, analyzes the current situation of quality management and control of construction project in China.

Joseph M. Juran (March 2020), "The history of quality management system" According to Juran's Quality Handbook, quality had two meanings which are defined by the father of quality, Joseph M. Juran. Quality defines as those features of product which to meet the satisfactions and needs of customer in order to increase the market share or provide sales income. Higher quality provides greater customer satisfaction and increases income. However, higher quality requires an investment and usually costs more. Another meaning of quality is defined on Juran's Quality Handbook. Quality means freedom from deficiencies or freedom from errors such as reduce rework, avoid customer dissatisfaction and improve delivery performance.

W. Edward Deming and P.B. Crosby (February 1990), "A note on quality: The views of Deming, Juran and Crosby" furthermore, quality is defined by W. Edward Deming who is the founder of quality management that quality ought to consider and plan into the product as well as the process of project. As for a further explained by him, good quality represents a foreseeable level of consistency and reliability with a lower price and a quality standard acceptable to the customer and market. Philip B. Crosby who is "quality guru" defines quality as conformance to requirement. Quality can be calculable and obviously listed terms in order to take actions in organization according to targets, rather than experience or opinions. Deming's approach points how quality is all about exceeding and meeting customer satisfaction while for Crosby, quality is continuous improvement of the production process. Both these approaches agree on the concept of how quality can be improved through these approaches. As competition increases and changes occur in the business world, companies look for high levels of effectiveness across all functions and processes and choose quality management as a strategy to stay in the business.

Nafees Ahmed Memon, Qazi Muhammad Abro and Farida Mugheri (June 2011), "Quality management in

the design and construction phase: A case study" discussed the importance of quality control in a building project. The development of construction industry depends on the quality of construction products and projects. Quality is one of the critical factors in the success of construction projects. They resolve the outcomes using quality control and assurance documents discussions. Improvement in the quality of construction projects is linked with quality management in the project life cycle. Although quality management at every stage of project life cycle is important but the quality management at the design and construction stage contributes significantly on final quality outcome of construction projects. This paper therefore highlights the importance of quality management in the design and construction phase.

Moza T.AI Nahyan (2014), "Quality management practice and their impact in construction projects" Provided a clear example of a major capital construction on the topic of project management methods and their influence on parties involved. In the UAE, an examination of big highway building was conducted. Data was gathered through a variety of approaches, including standard of validity, interviews with key stakeholders, a field study, and a constructive debate. The outcome emphasizes the need of improving coordination, interaction, and judgement call abilities, as well as exchanging ideas with all participants. Authors created questionnaires regarding quality facets in infrastructure projects for builders or contractors, advisors, and buyers of buildings. This document assists in exposing the primary aspects that impact building quality and is also effective in decreasing waste production, cost of time and indirect waste.

Luai Jraisat, Lena Jraisat (March 2015), "Quality in construction management: an exploratory study," The success of a project found in the literature depends on the project quality as a key concept. The concept of quality as meeting the legal, aesthetic, and functional requirements of a project. Quality can be translated into the quality dimensions that include: levels of quality, reliability and safety, quality performance, durability, and serviceability. it is the role of management to ensure the achievement of established requirements in a project as competition increases and change occurs in the business world. Understanding

how closely the project conforms to its requirements, a high-quality project can be described by such terms as ease in understanding drawings, level of conflict in drawings and specifications, construction economy, ease of operation and maintenance, and energy efficiency. Quality requires radical change to traditional management practices. Effective control for quality reduces the possibilities of change, mistakes and omissions, which in turn result in fewer conflicts and disputes. Most of the engineers and architects were in total control during the design phase. During the construction phase, they carried out a role described as “supervision,” ensuring that the owner received his money’s worth in terms of quality. Recently, owners became increasingly concerned with cost and schedule, areas where design professionals were not providing good control. In response, this paper explores the factors affecting quality in construction management in a developing country. Jordan is looking to develop a better management strategy for its construction projects, and this is a priority for other developing countries too. The aim of this paper is to identify the relative importance of factors affecting quality in the Jordanian housing sector. This study addresses the following research objectives: to identify the factors affecting quality in the housing sector; to examine the relative importance of such factors from the view point of architects and contractors; and to develop an integrated conceptual framework for quality factors.

#### SUMMARY OF LITERATURE REVIEW

From the literature survey it had been learnt concluded there are many issues about quality in construction industry. Due to time constraint for the project, the descriptive survey method is to be adopted, whereas other methods may take long duration. Several methods for collecting information from the industry were evaluated from various literatures. According to literature review, quality systems involve internal and external aspects. An internal quality system covers activities aimed at providing confidence to the management of an organization that the intended quality is being achieved. This is called a “quality management system”. Successful implementation of quality management system can contribute to an increase in product quality, improvement in workmanship and efficiency, a decrease in wastage, and increase profit. Engineers and architect should

work together to achieve specific goals of quality management and liability control.

### III. RESEARCH METHODOLOGY

Methodology of research is a study of the framework, logical creation, ways and tools of a systematic activity or approach. It is the specific procedures or techniques used to identify, select, process, and analyze information about a topic. It evaluates a study’s overall validity and reliability. My research is designed as a systematic planning to study the quality management system applied in construction industry. There is a necessity that few of the process should be design as well as consider in this chapter for used to collect data or information and data analysis. The rationale offers this study to become object of perception, learning outcome and systematization in the generation of questionnaire survey. It is vital in any research due to make sure the process of study going smoothly and achieve the effectiveness.

### IV. DATA COLLECTION

Data collection is the vital stage to achieve the desired objectives within the scope of work. The task in this stage is to identify project data and to conduct study for further details of the research. The data sources were classified into primary sources and secondary sources.

#### Primary Data

Primary sources provide data and information from using questionnaire survey for the research. A total number of 20 closed-ended questionnaires send out by email and distributing in construction site.

#### Questionnaire Survey

A questionnaire is the set of questions given to participants for the research project. The purpose of questionnaire is to gather data from a target audience. They are most popular research methods because they offer a fast, efficient and inexpensive means of gathering large amounts of information from sizeable sample volumes. A survey is the process of collecting, analyzing and interpreting data from many individuals. It aims to determine insights about a group of people. One of the quantitative research methods is established through questionnaire survey that has two

types of question, namely open-ended question and close-ended question. The respondents are expected and required answering the set of questions which are written and prepared by the researcher. Open-ended question is a set of questions without provide possible answer and allow respondents to write out his or her opinions. On the other hand, close-ended question is provided with the option with according to level of measurement such as nominate, ordinate, interval and ratio options and the respondents require ticking the answer.

#### Target Respondents

The questionnaires are distributed by the researcher for focusing on site staffs. Due to larger population, questionnaire survey is the better way to collect my data for identifying the requirements and factors influencing QMS implementation as well as investigating the advantages and disadvantages of QMS

#### Questionnaire Design

Questionnaire consisted of two parts in which the first part is to indicate the introductory part of the respondents and the second part is to list out critical factor influencing quality management system applied in construction industry which include success factors and failure factors. The scale of measurement is a Five-point Likert Scale: 1=Not Very Important factor influencing the quality/Strong disagree, 2=Not Important factor influencing the quality/disagree, 3=moderately important factor influencing the quality/Neutral, 4=Important factor influencing the quality/Agree and 5=Very Important factor influencing the quality/Strongly agree. it can provide a hierarchical ordering in order to identify what is the major factor influencing quality, benefit and requirements regarding application of QMS in construction industry.

#### Secondary Data

Secondary data is written or collected by other researcher such as journal, academic book, newspaper and report. Secondary data is saving time to analyze as well as providing larger database and understanding to researcher before researcher plan to collect primary data. These data are basically second-hand pieces of information and are already collected. So, these are comparatively less reliable than the primary data.

#### Data Analysis

Secondary data is written or collected by other researcher such as journal, academic book, newspaper and report. Secondary data is saving time to analyze as well as providing larger database and understanding to researcher before researcher plan to collect primary data. These data are basically second-hand pieces of information and are already collected. So, these are comparatively less reliable than the primary data.

#### Ranking of questionnaire

The ranking question asks respondents to compare items to each other by placing them in order of preference. In the Analyze Results section, an average ranking is calculated for each answer choice, allowing to quickly evaluate the most preferred answer choice. It involves determining which answer choice is most preferred overall by finding the average of all responses with respect to the values assigned to each rank. The answer choice with the largest average ranking is the most preferred.

#### Average Ranking

Ranking questions calculate the average ranking for each answer choice so we can determine which answer choice was most preferred. The answer choice with the largest average ranking is the most preferred choice. The average ranking is analyzed using MS Excel.

## V. CONCLUSION

In this research, the concept of quality can be defined from the viewpoints of contractors and architects combined as; how closely the project conforms to its requirements and meeting the requirements of the designer, constructor, and regulatory agencies as well as the owner. This research contributes theoretically in providing a conceptual frame work for quality factors in the quality field. Implementation of QMS can be an effective technique to achieve the objectives of project successfully through the process approach, which is based on PDCA methodology towards the optimization of project performance and problem solving. Over the years, QMS practice has been on a growing trend in construction Industry. According to current quality survey, it is forecasted that more than 10,000 organizations have been certified ISO 9001 through QMS practice. In this research, the aim is to investigate the successful key issues in QMS practice.

The construction sector occupies a large portion of any economy, and it is essential for the growth of any nation. As a result, the correct implantation of QMS is important to produce a durable and sustainable product. However, the study concluded that QMS is an appropriate quality management and marketing tool for developing and improving organizational performance. In this research, it is suggested to implement QMS standards in project to improve organizational performance. For future research the study suggests to identify the best ways for the sustainable development of construction projects from the perspective implementation of Quality management system. Quality management systems have played a pivotal role in ensuring consistent product and service excellence for organizations across industries.

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