

# Development of quality matrix to measure the effectiveness of quality management systems in Turkish construction industry

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Received 21 November 2003; received in revised form 29 November 2004; accepted 7 December 2005

## Abstract

Quality Management Systems (QMS) are being operated in some sectors in Turkey but it is rare to meet these systems in construction industry. There are many hinderances that make it difficult to apply these systems effectively due to the nature of construction and therefore, no objective way of measuring the effectiveness of these systems exists in construction industry.

This study aims to light the way for the studies and further researches in finding a way to measure the effectiveness of QMS. Two matrix models are developed as a way to measure the effectiveness of QMS. Towards this goal, firstly a questionnaire survey has been conducted to a sample of construction firms that have or have not passed through these systems in all over the Turkey. Appraising some findings from the survey results; the number of QMS operating firms and their way of implementing QMS principles are determined by using the most common statistical software 'SPSS 10.0 for Windows'. These principles are evaluated on a case study by means of developing quality measurement matrices for QMS operating firms and different results have been concluded.

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*Keywords:* Quality management systems; Effectiveness; Construction industry; Quality matrix analysis

## 1. Introduction

The construction industry shows a rapid pace in 21st century. Construction companies have recognized something new; the culture of quality. They have opened their doors to Quality Management Systems (QMS) in order to

- maintain their existencies in competitive market,
- provide satisfaction of everybody in quality, price, and amount,
- provide reliability for the reputation of firms.

To meet these objectives, construction companies adopt ISO 9000:2000 QMS series of standards that are the

updated version of ISO 9000-1994 standards. In order to implement these systems effectively, the companies need to set their objectives clearly. Each construction company has its own requirements and expectations regarding to the implementation of QMS and therefore, the measure of effectiveness of the system depends on what the company defined as its purpose. If it is not defined for what purpose the system is set to achieve, i.e. defining objectives, it is difficult to measure the effectiveness or effect of the system [1].

Many discussions appear on the effectiveness of QMS in construction industry in recent years. The Latham's Report [2] highlighted the issue surrounding the uncertainty of the effectiveness of Quality Systems as "Quality Assurance certification should continue to be encouraged within the construction industry as a potentially useful tool for improving corporate management systems. But more evidence is needed that it will also raise standards of site

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performance and project delivery before it should be made a qualification condition for consideration for public sector work". According to Husband [3], the issue of whether quality methods can be effectively utilized by small and medium enterprises remains uncertain.

The effectiveness of these systems in the construction industry remains a matter of controversy and uncertainty although many years have passed since ISO 9000 first appeared [1].

Quality Liaison Group's [4] research reveals that the defects arising today are virtually unchanged from those identified 20 years ago while some parts of the construction industry have invested a great deal in improving quality.

In United States the applicability and the uncertainty in the effectiveness of ISO 9000 in US construction firms and the barriers that hinders its acceptance are determined. In result, it is concluded that ISO 9000 is an appropriate and effective tool for construction firms in the United States [5].

Despite of all discussions on the uncertainty surrounding the effectiveness of QMS, some researchers [1,6] stated the need for measuring the effectiveness of QMS. Measuring quality enables managers to know how close they are to their targets and how to make the right decisions for improving work processes.

Hoyle [6] has stated that installing any system without some means of verifying whether it is doing the job it is intended to do is a waste of time and effort. He also stated that it is necessary to install measures that will inform management whether the system is being effective after establishing a quality system.

Researches have been performed on seeking a way to measure the effectiveness of the systems implemented. In a study [1], a model in the form of a matrix has been developed to measure the effectiveness of Quality Assurance systems and the difficulties faced in attempting to develop this model were discussed. Because of the nature of construction, there are many quality-influencing factors such as different sites and teams that make it difficult to measure the system's effectiveness and thus the method remains subjective.

Measurement of quality is less advanced in construction. Unfortunately, the lack of developed practice in measuring the quality of services often becomes an impediment for successful quality improvement in services. Measurement of effectiveness seems to come more required in apparently less objective of area services such as construction. Doubts will remain regarding the suitability and the applicability of QMS in construction industry without developing a measure to determine the effectiveness of such systems and the quality achieved.

This paper is based on the current research at the University of Gaziantep on developing a quality measurement matrix as a way to measure the effectiveness of QMS. The research includes the determination of the way of implementing QMS principles by using statistical software. The matrix models will be evaluated through a case study.

## 2. Uniqueness of construction industry

Within the construction industry, the implementation of QMS has been slower. There are number of factors specific to the construction industry, which make it a "special case" when considering the quality issue.

A construction project is usually a unique collection of people, equipment, and materials brought together at a unique location under unique weather conditions, while most manufacturing is a system of mass production wherein all of these factors are consistent with producing typical products over and over again [7].

In recent years, many efforts have been seen in developing countries towards quality concept as the demonstration of quality management techniques and their applicability to the construction projects [8].

The factors presented below complicate the direct transfer of the concepts of continuous improvement from manufacturing to construction. Features that make construction industry different from other industries and make it hard to implement QMS can be summarized as

1. Long time is required in completion of construction projects.
2. Human relationships generally formed once.
3. Difficulty in the definition of Quality Standards.
4. Difficulty in feedback of the processes.
5. Difficulty in the determination of cost estimation.

## 3. Effectiveness of quality management systems

The ISO 9000, a series of international quality management standard has changed fairly dramatically as of December 2000. This change is probably the most major change in the history of the standard and is considered to have brought it up to date with modern developments in quality thinking and practice.

ISO 9000:2000 QMS Standards are referred to as the process-based standards [9].

In order to lead and manage an organization successfully, it is necessary to direct and control it in a systematic and transparent manner. Success can result from implementing and maintaining a management system that is designed to continually improve performance while addressing the needs of all interested parties. Managing an organization encompasses quality management amongst other management disciplines and QMS principles must be implemented effectively.

If a company has an aim to pass through ISO 9001:2000 QMS Standards, all the requirements and responsibilities of that system must be established in the company [10].

Quality improvement without measurement is useless. Without developing a measure to assess the effectiveness of QMS there will always be some doubts on the system's performance [11].

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