



# TOTAL QUALITY MANAGEMENT IN CONSTRUCTION INDUSTRY

## *A brief report on Quality Management*

<sup>1</sup> Tanaji Demgunde, <sup>2</sup> Prathamesh Patil, <sup>3</sup> Aaditya Katare, <sup>4</sup> Prof. Khultej Gurav

<sup>1</sup>Student BE, <sup>2</sup>Student BE, <sup>3</sup>Student BE, <sup>4</sup>ME Construction Management, PhD pursuing

<sup>1-4</sup>Department of Civil Engineering, MGM's College of Engineering & Technology, Kamothe, Navi Mumbai, India - 410209

**Abstract:** Total quality management (TQM) is a management idea, broadly applied to the construction and the service sectors. It can enhance the quality in the areas in question. Some studies attempted to shine the light of this idea to construction management. Unfortunately, TQM principles are yet to be applied to the entity of construction sectors. There are many contractors that have succeeded in implementing TQM in their corporate. Their number decreases at the practical approach of their suppliers and subcontractors. The aim of this project report is to pinpoint the latest studies made on the elements that affect the implementation of the principles of TQM in the ground field of construction management.

**IndexTerms - Total Quality Management (TQM), construction, Construction management, Project, Implementation.**

## I. INTRODUCTION

In this quest of achieving project competitiveness companies need to adopt highly proven effective quality policy like total quality management (TQM). For an Indian construction sector willing to capture sizeable market across globe, it is indispensable that completed projects surpass the quality standards of the competitors with the help of TQM philosophy, which has potential to bring evolutionary changes in organizations.

### 1. WHAT IS TOTAL QUALITY MANAGEMENT?

1. It involves everyone in an organization and associated business processes cooperating to furnish products and services that meet their customer's needs and expectations.

2. It's an all-encompassing dynamic process in an organization to promote never-ending improvement in the effectiveness and efficiency of all elements of a business.

3. TQM is a philosophy, a set of tools and a process whose output yields customer satisfaction and continuous improvement. It exposes "win-win" attitude differentiates cost versus price and provides added value.

### 2. KEY ELEMENTS OF TQM

1. Commitment & leadership of the chief executive officer
2. Culture Change
3. Planning & Organization
4. Education and Training
5. Involvement, recognition and measurement
6. Customer focus and Satisfaction
7. Strategic Quality Planning
8. Cost of quality
9. Supplier involvement

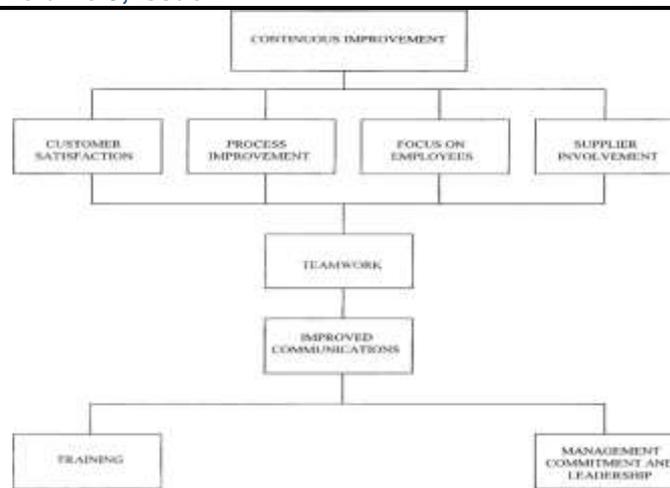


Figure1.1 The Structure of TQM

### 1.3. SCOPE OF WORK

TQM is a customer-oriented and quality focused management philosophy for achieving continuous improvement. As TQM is successfully implemented in the manufacturing industry, it has become source of innovation for the construction industry. This aspired to adopt and implement TQM in the construction industry.

## II. LITERATURE REVIEW

This literature review is a survey of scholarly sources on Total Quality Management in Construction Industry. This provides an overview of current knowledge, allowing us to identify relevant theories, methods and gaps in the existing research related to this topic. It is a series of searches conducted across all possible sources such as books, research papers; surveys, cases etc.

## III. BENEFITS OF TQM IN THE CONSTRUCTION INDUSTRY

TQM is widely recognized as an enabler for performance in the industry, after being successfully implemented worldwide by many highly competitive organizations to improve performance and productivity, especially within the service and manufactured industries. In s related development observes that TQM adoption within an organization has become vital strategy for all organization aspects after being considered an important operational level element by some firm.

### 3.1 OTHER BENEFITS OF TQM IN CONSTRUCTION INDUSTRY

1. More repeat customers
2. Reduced rework
3. Improved employee job satisfaction
4. Improved relationships with architect/engineers
5. Higher productivity

## IV. RESEARCH METHODOLOGY

The use of multiple methodologies allows the data to be viewed from several perspectives to improve the validity of the findings and enable greater depth of the results. Both quantitative and qualitative methods were utilized in this research. However, the emphasis was on the qualitative approach since an important element of this research is to improve our understanding of a complex problem.

### 4.1 RESEARCH REASONING

Research design refers to the types of inquiry within quantitative, qualitative and mixed methods approaches (Creswell, 2014). The level of clarification that researchers have in the early stage of their research leads to two contrasting approaches, namely deductive and inductive reasoning (Saunders, et al., 2016). It is essential to understand the difference between these two reasonings as that consideration represents the significant foundation of the research (Farquhar, 2012).

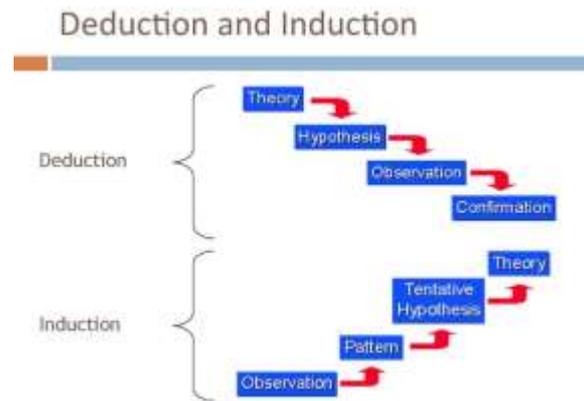


Fig 4.1 Deduction and induction reasoning methods (Farquhar, 2012)

This research study approach followed the inductive research reasoning, since the research method aligned with the interpretivist paradigm as previously explained. The current research was specifically concerned with explaining how the different external factors either impeded successful implementation of TQM or drove successful deployment of that system in the CIBS.

Whilst there were some ideas from, and affiliations to, extant theories identified by the critical analysis of literature, a comprehensive understanding of, and explanations concerning, the impacts of external factors surrounding TQM implementation have yet to be explored within the field. In addition, since the other major approach adopted is the case study methodology, an inductive approach was the most appropriate method to guide this current research.

## 4.2 DATA COLLECTION

The data for this research was collected with the use of four questionnaires targeting contractors and clients in the Construction Industry:

1. To identify the level of effectiveness in implementing managerial practices of TQM in the construction industry.
2. Determine the areas or phases of construction with which the clients are dissatisfied.
3. Use TQM tools to identify the major sub causes of client dissatisfaction areas.
4. Finally develop an Improvement Index to determine the areas that need improvement.

Questionnaires were developed to elicit information about quality management practices in their businesses. The questionnaire was divided into six parts namely:

1. Their knowledge of TQM,
2. Their perception of quality,
3. The data acquisition methods used by them,
4. The degree of training provided to their employees towards TQM, and
5. The obstacles faced by them in implementing TQM in their businesses.

The questionnaire was divided into four parts namely:

1. administrative,
2. project management and engineering,
3. construction and logistical.

Each area had several activities, which were obtained from various technical papers, journals and existing projects. The clients were asked to identify the activities with which they are most dissatisfied. After reviewing their feedbacks, the major areas of client dissatisfaction were identified.

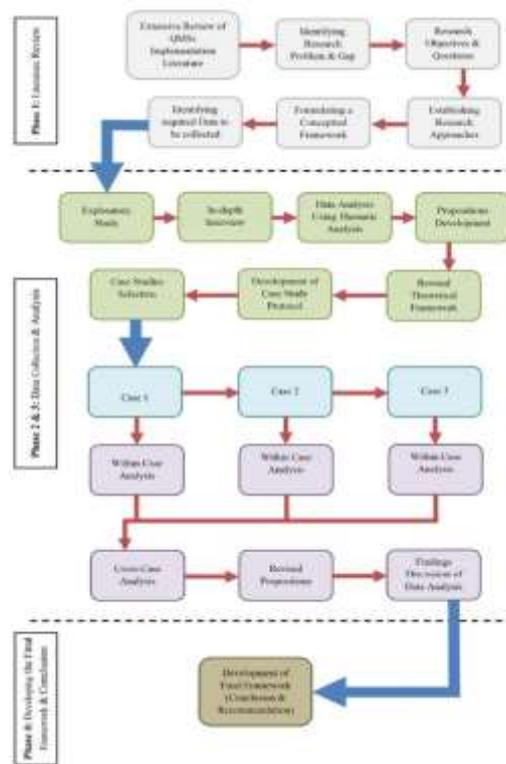


Fig 4.2 Research Plan for Data Analysis

## V. IMPLEMENTATION OF TQM

This chapter examines the extant literature on total quality management (TQM) implementation in the construction industry by investigating concepts, definitions, benefits, problems, and processes of TQM deployment. It also clarifies the perceptions of TQM in the construction sector and critically reviews the preceding research and other topics related to TQM implementation. It outlines the major motivations and benefits of adopting a TQM on building projects and implementing such systems in construction projects.

### 5.1 BACKGROUND OF TQM IMPLEMENTATION IN THE CONSTRUCTION INDUSTRY

TQM have been implemented and adopted in the construction sector worldwide over the last two or three decades. Despite this, it is clear that the construction industry still commonly encounters problems, such as decreased productivity, poor safety and health systems, poor working conditions, insufficient quality, cost and time overrun and workmanship defects.

By examining these studies using the following criteria, a further research gap has been identified:

- Objectives of research;
- Research scope;
- Targeted group of research, and;
- Essential theories.

### 5.2 THE EFFECTIVENESS OF TQM IMPLEMENTATION IN THE CONSTRUCTION INDUSTRY

The successful implementation of a TQM on a construction project requires effective operation, planning, review and continuous improvement of the system across the project team. Since each construction firm sets its own requirements and expectations regarding implementing its TQM, the effectiveness measure of the system depends on the definition of the purpose of the system. Measuring the effectiveness of the implemented system is significant in order to evaluate the goals of managers and to enable them to improve work processes by making the right decisions. Therefore, the effectiveness of a TQM is considered one of the most important factors for the internal stakeholders of organizations. Hence, the above definition can be broadly used to describe the effectiveness of any TQM, including those adopted by organizations because effectiveness in that definition represents the original aim for adopting that TQM.

### 5.3 UNIQUENESS OF THE CONSTRUCTION SECTOR

In the construction industry, a number of factors make the sector an 'exceptional case' compared with other industries, thus when considering the quality issues around the implementation of a TQM, it should be noted that it differs significantly from other sectors, such as manufacturing. This difference is due to several factors which make the construction sector different from others. Unlike the

manufacturing industry, the uniqueness of construction projects results in non-repetitive products, so this hinders the deployment of a TQM to the same level as demonstrated in other sectors. Many studies have stated the features that have made the construction industry unique. Oztaş, et al. (2007) stated that several factors differentiated the construction industry from other industries and made implementing a TQM harder, namely:

1. Required time to complete construction projects;
2. Relationships formed;
3. Ambiguous definition of quality standards;
4. Difficult for feedback of the processes; and,
5. Difficult to determine an estimated cost.

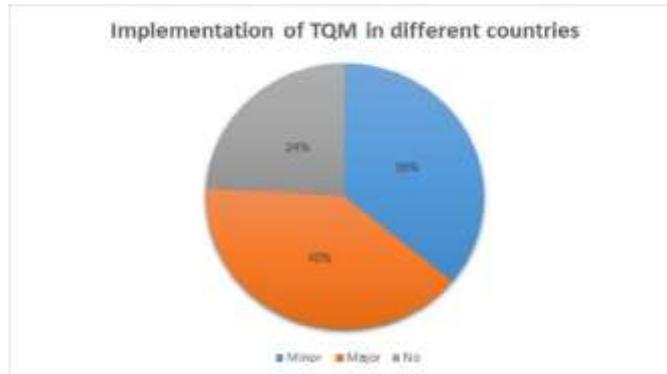


Figure 5.1 Implementation of TQM in different Countries

#### 5.4 BENEFITS OF A TQM IMPLEMENTATION IN CONSTRUCTION

1. Improving communication;
2. Reducing rework;
3. Improving quality requirements of products;
4. Saving additional money and time;
5. Enhancing continuous improvement and work performance;
6. Improving market share and company competitiveness;
7. Improving productivity, and;
8. Enhancing origination ability in problem-solving and non-conformance detection.

#### 5.5 CSF IN EFFECTIVE IMPLEMENTATION OF TQM

The construction industry is one of the most important sectors in the economy of most countries, not only because of the key contribution of this industry to the Gross Domestic Product (GDP) of a national economy, but also due to the association of such industry with other sectors through a complex set of interrelationships. Therefore, achieving a satisfactory performance of the construction industry is fundamental to the well-being of several other industries and, vice versa. Some studies have been carried out since the 1960s, focused on the identification of the concepts and applications of Critical Success Factors (CSFs), (Ammar et al., 2009) in the context of metrics for managing and measuring success in organisations. Although in the context of project management, the notions of success and failure were initially introduced by Rubin and Seelig (1967), the terminology critical success factors were used for the first time by Rockart (1982a) to examine the existing methodology of management information systems, as mentioned by Sanvido et al. (1992).

#### 5.6 THE CSFS FOR EFFECTIVE IMPLEMENTATION OF TQM IN CONSTRUCTION

1. Top Management Commitment
2. Leadership Support
3. MANAGEMENT REVIEW AND FEEDBACK
4. Continuous Improvement
5. Attitude To Change
6. Quality Culture
7. Teamwork
8. Communication and Coordination
9. Education and Training
10. Employee Empowerment
11. Customer Satisfaction

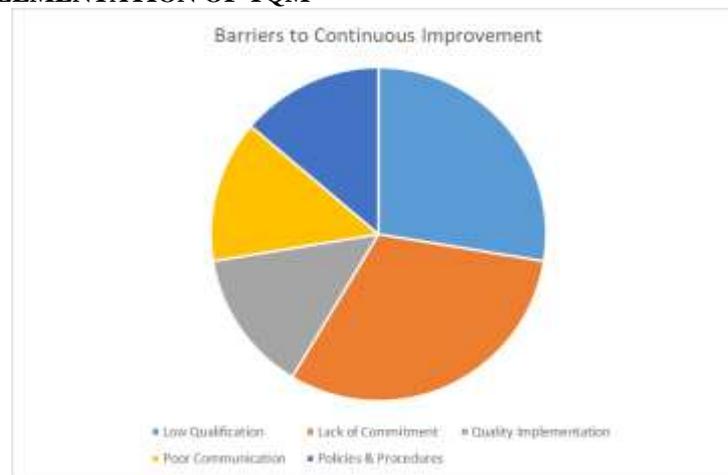
**VI. DIFFICULTIES IN IMPLEMENTATION OF TQM**

Figure 6.1 Barriers to Continuous Improvement

The core issue that distinguishes the philosophy of TQM from other quality system philosophies is a continuous improvement strategy, meaning that the improvement processes in any of the company's activities never end. The barriers to continuous improvement extracted from the interviews are as follows:

1. Low qualification of top management
2. Unwillingness of employees to seek improvement
3. Lack of attention given to employees' training for improving quality implementation regarding their activities
4. Poor communication

The qualification of the top management includes their level of degree and the quality of training they hold. The high qualification of employees in general leads to the understanding and development of the continuous improvement strategy. The researcher observed that some employees dislike and are in fact unwilling to seek any kind of improvement as they thought that such improvement means changes in their activities or positions. The adoption of a continuous improvement strategy needs a successful implementation of the quality system and then proceeding to further improve it. The improvement of the communication between employees and departments is essential to the successful adoption of the continuous improvement strategy.

**VII. RESULTS AND OBSERVATIONS**

This chapter has presented the results of the interviews, which was conducted during this study. The qualitative results demonstrated and reported the situation of the construction companies in India and identify the concept of TQM from different angles.

Serial No	Main Theme	Description
1	Organisational Structure	The organisational structure of the company described in the official documents is not implemented in reality and it may be case across the construction companies in India.
2	Employee Recruitment	Although, the preferred method used recruit new employees is via recruitment agencies, placement cells and interviews, but other methods are also used for the recruitment of staff and a broad variation in the process exists.
3	Informal Relationships	There are good positive relationships between the management (employer) and the employees exist and it was more apparent among those from the similar culture and background.
4	Concept of Quality	The concept of quality is well understood terminology within the employees in the company and staffs are well aware of the effect of quality on the outcome of the company's profile and annual profits.
5	Lack of Monitoring	Lack of monitoring of the standard operating procedures and the bureaucratic processes are the main problems relating to the quality issues, which act as a barrier at a number of stages and there is a need to streamline these processes.
6	Cultural Barriers	Cultural barriers do exist in the company, as variety of cultures do exist and very often become a barrier / obstacle in the implementation of TQM.
7	TQM Concept	The Total Quality Management (TQM) concept is almost unknown for the majority of employees among the company.
8	Top Management Structure and their skills	Top management structure requires overhauling, as top management is very often not qualified to understand the exact processes, which is due to lower qualification. Unwillingness of employees to seek improvement, lack of

		attention given to details, training for improving quality implementation regarding their activities and poor communication are the main barriers towards continuous improvement.
9	Unskilled Workers, lack of availability of resources and adoption of proper systems.	Unskilled workers, lack of availability of resources and adoption of proper systems are some of the main factors that have an impact to the continuous improvement cycle and in additions, these factors can adversely affect the progression and products of the company, which will have an impact on the profitability of the company.

### VIII. CONCLUSION

This paper has addressed Total Quality Management (TQM) concept in general and the elements of Total Quality Management. The Total Quality Management elements that have been presented in this chapter will be utilized as a basis for the Total Quality Management data questionnaire. The literature review related to Total Quality Management in the Construction Industry has also been covered. A description of the Indian Construction Industry has been provided.

Hence, we conclude that from the factors chosen for the Quality Management survey the factors most affecting the Quality Management of any construction site are listed below as per their importance.

1. Material Quality
2. Types of Material
3. Equipment Availability
4. Techniques
5. Training
6. Proper Scheduling

This are the top factors which were considered the more important and useful factors to achieve Total Quality Management in any construction site.

Other Identified Factors which affect Total Quality Management are as follows:

1. Inspection
2. Design Rectification
3. Overmanning
4. Supervision
5. Labour Strike
6. Absenteeism
7. Safety Training
8. Government Policies
9. Experience
10. Site Environment

Some other factors were also identified in survey, these factors were also important for maintain Total Quality Management on construction site. But on most of the sites the necessary care is taken regarding these factors.

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