

# Major Factors Affecting the Execution of Total Quality Management in the Construction Industry in India

K. Kiruthiga

Department of civil Engineering, Bharath University, Chennai

\*Corresponding author: E-Mail:k\_kiruthiga@gmail.com

## ABSTRACT

The aim of this paper is to study the most serious and vital issue which will affect the completion of Total Quality Management (TQM) in the construction field in the India. It also examine the most effected task effect from implementing TQM. A structure was also proposed depending on the past studies. The scheme used in this paper is a quantitative study. A survey with a sample of 80 respondents was created and distributed in a construction industry in India, which includes 18 questions to examine the most important factor that will affect the execution of total quality management in addition to the most effected project result from implementing TQM. The survey showed that Organization Obligation is the most important factor in executing TQM in a construction industry. Also it showed that Assignment cost is most effected outcome from the execution of TQM.

Organization Obligation is very important for implementing TQM in any company. If the Organization loose interest in quality then everyone in the organization will do so. The success of TQM will depend mostly on the top of the pyramid. Also cost is minimized and fund is saved when the project team implement TQM. While if no quality procedures are present within the team, the project will suffer a commercial failure. Based on past studies, more factors can be examined and added to the model. In addition, more construction industries could be surveyed in order to obtain more unified results. Also this study could be conducted outside the India for further enchantment.

**KEY WORDS:** Construction project, total quality management, organization obligation, cost, theoretical framework.

## 1. INTRODUCTION

The India has a high developing economy which depends on Agriculture. This economic growth is scattering into other vital sectors such as manufacturing, tourism, banking, logistics, finance, industries, defense, Energy sector, railways and education. An obvious construction boom has been experienced in the India for the past decade to support the developing economy and as per 2007 reports; the construction industry in India is valued at \$251 billion which is the highest in the region.

The construction industry around the world faces almost the same problems such as bad workmanship, time delays and over cost, lack of resources. Such problems in a country like India with a high construction industry value will cost construction firms millions. According to, construction is the backbone for any economy or infrastructure. Unless each company in the construction sector initiates changes within their own organization, the industry problems will be carried on over and over.

This paper will focuses on the implementation of Total Quality Management (TQM) in a construction industry within the India market and the factors which affect it. The concept of TQM develops the traditional view of quality from looking only at the quality of the final product to the quality of the whole process. The aspect of quality is becoming a vital need for clients in India, so any activity that implements TQM may have a competitive advantage in the market.

The main objective of this paper is to test and discuss the most major success factors effecting TQM implementation along with the outcomes of implementing it. A literature review section will show how the factors were derived then a questionnaire of Eighteen questions were developed is to examine those factors. The data obtained from the study will show the most important factors in implementing TQM in the construction industry.

The importance of this study is to provide a better understanding of Total Quality Management in the Indian construction industry. Most of the researches and articles talk about TQM implementation in many parts of the world such as USA, Hong Kong, Ghana, South Africa, UAE, Canada, France, New Zealand and Australia. India has different laws and working environment from other countries so the study will be helpful for India based construction industry. The following research questions will be looked upon throughout the paper:

- What is the most important factor that will affect the implantation of TQM in a construction company in India?
- What is most effected aspect in the performance of a construction project the India after taking into consideration implementing TQM?

**Total Quality Management (TQM):** According to, TQM is the adoption of quality assurance through all levels of

an organization. Quality assurance is the process of ensuring that errors do not occur in the first place which is referred to 'get it right first time every time'. Total quality management is a broad management methodology which aims to satisfy and delight customers. Also TQM works horizontally across all departments through all employees top to bottom in an organization. TQM has been defined by the international Academy of the American Society for Quality as: 'The management approach of an organization centered on quality, based on the participation of all of its members and aiming at long-term success through customer satisfaction and benefits to all members of the organization'.

**According to the goal of TQM is to achieve:**

- Cost efficiency
- Defect free work
- Customer agreement

So many researches and articles talk about TQM and its elements since the 1980s and 90s. Defining the elements varies from author to author and the most recent one which summarizes most of the articles since the 80s are:

- Leadership and Organization Obligation
- preparation
- statement
- Team cooperation
- Customer agreement
- Continues development
- Empowerment

It can be concluded that TQM is mainly focusing on customer agreement and is the implementation of quality assurance and quality control throughout the entire segment of any organization.

**Quality and Performance Factors in Construction Industry:** In the construction industry, consultants, contractors, specialists, subcontractors and engineers, project engineers and managers have their own specialized practice which may affect the building procedure. The construction industry is not like manufacturing which makes TQM more challenging. The construction industry is a one-time process and is unique in the following ways

- Staff's mobility
- Miscellany of projects
- Environmental distribution
- Contractual Associations
- Frequent prototyping of projects
- Un observed fragile forms of waste.

Many scholars discussed the success factors in construction projects and derived many variables influencing the quality of buildings. Reference identified important factors and these are ranked below in their order of importance:

- Poor labor
- Unclear drawings and qualifications
- Cost and time are ideal over quality
- Poor coordination between Contractors and Subcontractors
- Completion period is not practical

Reference conducted a research through 12 projects in Brasil and concluded the following difficulties faced in those construction projects:

- Alteration works due to rejection of workmanship (57%).
- Conflict between time, cost and quality (35%).
- Announcement of quality standards (15%).
- Incompetence of staff (7%).

**Factors Affecting the Implantation of TQM in Construction Industry:** There are varieties of factors that affect the implementation on TQM positively or negatively. Reference researched the implementation factors and found out the following success ones ranked in their order of importance:

- Management assurance and involvement
- Customer focus
- Well-developed preparation
- Participative management style
- Continuous improvement measurements
- Workers trained in TQM

The results above show clearly that Management assurance and involvement are the key factors for a successful TQM implementation. Managers must provide the initiative to apply TQM and must support quality programs. Meanwhile workers involvement is rare and this must be solved because labors are the main source for a construction company. As shown in many references, some critical barriers in implementing TQM were found and are listed below ranked in their order of importance:

- Too much official procedure
- Lack of attention with in subcontractors and supplier
- Low proposal from subcontractors
- Lack of education
- Rigid development
- Nature of construction

Few more references introduced some barriers in their research which are listed below:

- Obvious threat to roles of foreman and project manager.
- Indifference in TQM at sites.
- Lack of information.
- Fear of losing jobs

Many references examined the five key success factors usually considered in TQM accomplishment in Nigerian construction industry. His results showed a relationship between the five success factors as independent variables and the implementation of TQM as dependent variables. The five success factors according to are; Organization Obligation, training, motivation, benchmarking and customer satisfaction. The result of his research showed that management commitment is the most important successful factor in implementing TQM.

Some barriers in implementing TQM were also recognized were one of the major difficulties is the traditional way of accepting tenders and the lowest price. Also the long term implementation of TQM can sometimes lead to major troubles like the sudden change of the market. Also changing the organization's culture is a difficult task in order to implement TQM. Another study was made on implementing TQM in a company located in India, and demonstrated the following obstacles:

- Lack of knowledge regarding TQM
- Doubts about management intentions
- Lack of commitment especially in the managerial level
- Not knowing the effectiveness of TQM

**Impact of TQM on Construction:** In order to understand the importance of applying TQM, the benefits of TQM to an organization should be known. Reference researched the benefits of applying TQM in some Australian Construction organizations and reported the following:

- The process starting from design to delivery is being more controlled.
- Reduced series time.
- Reduced goods damaged.
- Reduced delivery time.
- Better extent of performance
- Better customer satisfaction.

Also reported in their research other benefits of implementing TQM which included:

- Reduction in rework
- Client approval
- Better staff morale
- Better extent of performance
- Successful bidding

Many articles and studies have shown almost the same results of implementing TQM such as better work performance, customer satisfaction and reduction in cost. The decision of implementing TQM is to understand clearly how it works and set a plan to over pass the barriers. Construction business is different of the manufacturing one so more studies must be conducted on how to apply TQM on the construction industry globally.

This paper as discussed is more concerned on the factors that affect TQM implementation and how Project outcomes were affected by it. The following research questions are considered in this paper:

RQ1. What are the most influencing factors that affect the implantation of TQM in a construction company in India?

RQ2. What is the impact of TQM on the performance of a construction project in the in India?

#### **Framework:**

**Model:** The following model which is presented in Fig. 1 will be used in the study.



**Figure.1. Research Model**

**Independent Variables:** The literature review discussed some factors which effect the implementation of TQM.

- Organization Obligation and role: it was found in many studies that it was the main factor affecting TQM.
- Lack of knowledge: not understanding the concept of TQM and its benefits.
- Motivation: the level of interest in applying TQM.
- Culture and different diversities: the atmosphere and traditions the employee lives within and the level of accepting TQM.

The factors above will be considered as independent variables that will affect directly the TQM implementation in the construction industry in India as per the Past studies. The aim of this paper is to find the most critical factor which will affect implementing TQM either positively or negatively.

**Channel (Moderating Variable):** Total quality management is considered the channel for connecting the independent with the dependent variables. In other words TQM will be considered as a moderate variable in the model. The basic role of TQM is to control the factors which affect the performance of construction by reducing the negative effects and empowering the positive ones.

**Reliant Variables:** Finally, the three basic outcomes of any project as discussed in most theories talking about TQM are Quality, Cost and time. The outcomes are directly affected by TQM so they are considered dependent variables in the proposal.

**Cost:** the total cost of the project, or the cost up-to-date against the budget. Also the cost project is important since it will help in future planning.

**Quality:** the quality of completed job and how much it's error-free.

**Time:** time schedule of meeting the milestone and implementation the project on time.

## 2. RESULTS

A 5-scale 18 questions survey was distributed to 80 employees in a Construction company in which all respondents answered the full survey. Three questions were used for each variable in addition for four questions which ask about years of experience and level in the company. The following are the demographics of the employees that answered the survey along with the results:

**Table.1. Experiance**

Experiance	Number
5 to 10 years	1
10 to 15 years	20
15 to 20 years	30
20 and above	9
Total	60

**Table.2. Position in the organization**

Level	Number
Top Management	13
Middle Management	28
Senior Management	19
Total	60

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Management Commitment	60	1	5	4.72	0.728
Knowledge	60	1	5	3.12	0.535
Motivation	60	1	5	3.73	0.667
Culture	60	1	5	4.53	0.778
Cost	60	1	5	4.52	0.721
Time	60	1	5	4.09	0.621
Quality	60	1	5	4.18	0.735

**Analysis:** As mentioned the sample size is 60 personnel in which 13 are in the top management, 28 in middle management and 19 for senior employees. One has 5 to 10 years of experience, 20 have 10 to 15 years, 30 have 15 to 20 years and 9 have above 20 years. A descriptive analysis was made with the survey results which calculated the important statistical values (Mean and Standard Deviations). The following figures show the means for each variable:

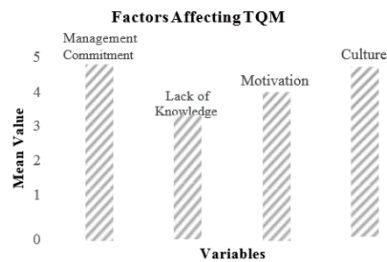


Figure 2. Independent variables Mean values

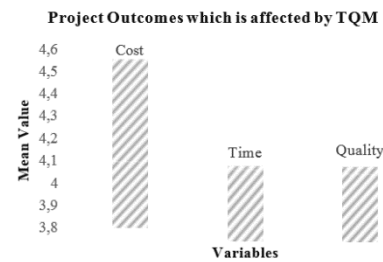


Fig. 3. Outcomes Mean values

## DISCUSSION

The survey didn't contain any errors or missed values in addition to that all the respondents had answered the study. The study showed that Management Commitment and culture are the most important factor in effecting the implementation of TQM were management commitment is a bit higher in value. Also project cost is found to be the most effected variable from applying TQM. This study will give an idea for management on the factors that they should consider when applying TQM. Top management should take into consideration that their commitment for applying TQM is the key for such strategy. Also they must expect that cost will be reduced in projects that implemented TQM. More research on TQM should be conducted in order to enhance companies' productivity as this paper proved.

**Boundaries:** The survey was only conducted in one company in the India. Further studies can involve many construction companies which will enhance the data and introduce new factors which will affect TQM. Also this study can be conducted worldwide since TQM is a global phenomenon and must be merged with every culture on this planet.

## 3. CONCLUSION

This study focused on the factors that effects TQM implementation in a construction organization in the India. The objective of the research is to examine the most important factors affecting the execution of TQM along with the benefits of applying TQM and how it will affect the cost time quality triangle. Past studies was conducted to understand the concept of TQM and to derive the factors related to the main objective. Then theoretical framework was developed were factors affecting TQM were the independent variables and the project outcomes were the dependent ones. After knowing the framework, the paper discussed the methodology and how the survey was conducted. The results showed that Organization Obligation is the most important factor in implementing TQM and that cost will be affected mostly if TQM is applied.

The study at the end proved that the factors derived from previous papers can comply in the Indian industry. Further research in more companies could be conducted to derive more factors effecting TQM from inside the Indian market rather than depending on previous researches.

## REFERENCES

- Dean J & Bowen D, Management Theory and Total Quality, Improving research and practice through theory development. Academy of Management review, 9 (3), 1994, 392-418.
- Fening, Impact of Quality Management Practices on the Performance and growth of small and Medium Sized Enterprises in Ghana. International Journal of Business and Social Science, 3 (13), 2012, 33- 67.
- Harrington J, & Voehl F, Applying TQM to the construction industry, The TQM Journal, 24 (4), 2012, 352-362.
- Haupt TC, & Whiteman DE, Inhibiting factors of implementing total quality management on construction sites, The TQM Magazine, 16 (3), 2004, 166-173.
- Love PE, Edwards DF & Sohal A, Total quality management in Australian contracting organization, pre-conditions for successful implementation, Engineering, Construction and Architectural Management, 11 (3), 2004, 189-198.
- Low S & Goh K, A framework for implementing TQM in construction, The TQM Magazine, 8 (5), 1996, 39-46.
- Nesan & Holt, empowerment in construction organizations, the way forward for performance improvement. Somerset: Research Studies Press Ltd, 1998.
- Randeree & Chaudhry, Leadership – style, satisfaction and commitment. Engineering, Construction and Architectural Management, 19 (1), 2012, 61-85.
- Rwelamila P, Quality management in the SADC construction industries. International Journal of Quality & Reliability Management, 12 (8), 1995, 23-31.

Ubani, Empirical analysis of success factors in the implementation of total quality management in construction industries in Nigeria. *Interdisciplinary Journal of Contemporary Research in Business*, 2 (12), 2011, 55.

Wong A & Fung P, Total quality management in the construction industry in Hong Kong: A supply chain management perspective, *Total quality Management*, 1999.

Sharmila S, Jeyanthi Rebecca L, Das MP, Production of Biodiesel from *Chaetomorpha antennina* and *Gracilaria corticata*, *Journal of Chemical and Pharmaceutical Research*, 4 (11), 2012, 4870-4874.

Anbazhagan R, Satheesh B, Gopalakrishnan K, Mathematical modeling and simulation of modern cars in the role of stability analysis, *Indian Journal of Science and Technology*, 6 (5), 2013, 4633-4641.

Gopalakrishnan K, Prem Jeya Kumar M, Sundeep Aanand J, Udayakumar R, Analysis of static and dynamic load on hydrostatic bearing with variable viscosity and pressure, *Indian Journal of Science and Technology*, 6 (6), 2013, 4783-4788.

Brintha Rajakumari S, Nalini C, An efficient cost model for data storage with horizontal layout in the cloud, *Indian Journal of Science and Technology*, 7, 2014, 45-46.

Jeyanthi Rebecca L, Susithra G, Sharmila S, Das MP, Isolation and screening of chitinase producing *Serratia marcescens* from soil, *Journal of Chemical and Pharmaceutical Research*, 5 (2), 2013, 192-195.

Kerana Hanirex D, Kaliyamurthi KP, An adaptive transaction reduction approach for mining frequent itemsets: A comparative study on dengue virus type 1, *International Journal of Pharma and Bio Sciences*, 6 (2), 2015, 336-340.

Sharmila S, Jeyanthi Rebecca L, Naveen Chandran P, Kowsalya E, Dutta H, Ray S, Kripanand NR, Extraction of biofuel from seaweed and analyse its engine performance, *International Journal of Pharmacy and Technology*, 7 (2), 2015, 8870-8875.

Sachithanantham P, Sa Nkaran S, Elavenil S, Experimental study on the effect of rise on shallow funicular concrete shells over square ground plan, *International Journal of Applied Engineering Research*, 10 (20), 2015, 41340-41345.

Brindha G, Krishnakumar T, Vijayalatha S, Emerging trends in tele-medicine in rural healthcare, *International Journal of Pharmacy and Technology*, 7 (2), 2015, 8986-8991.

Vanangamudi S, Prabhakar S, Thamotharan C, Anbazhagan R, Dual fuel hybrid bike, *Middle - East Journal of Scientific Research*, 20 (12), 2014, 1819-1822.

Vanangamudi S, Prabhakar S, Thamotharan C, Anbazhagan, R., Turbo charger in two wheeler engine, *Middle - East Journal of Scientific Research*, 20 (12), 2014, 1841-1847.

Vanangamudi S, Prabhakar S, Thamotharan C, Anbazhagan, R., Drive shaft mechanism in motor cycle, *Middle - East Journal of Scientific Research*, 20 (12), 2014, 1810-1815.

Thamotharan C, Prabhakar S, Vanangamudi S, Anbazhagan R, Coomarasamy C, Hydraulic rear drum brake system in two wheeler, *Middle - East Journal of Scientific Research*, 20 (12), 2014, 1826-1833.

Vanangamudi S, Prabhakar S, Thamotharan C, Anbazhagan R, Collision control system in cars, *Middle - East Journal of Scientific Research*, 20 (12), 2014, 1799-1809.

Anbazhagan R, Prabhakar S, Vanangamudi S, Thamotharan C, Electromagnetic engine, *Middle - East Journal of Scientific Research*, 20 (3), 2014, 385-387.