

# Total Quality Management in Indian construction industry

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**Abstract** - Due to the present policies of globalization, the scenario of economics is changed in past decade. Construction companies in India are facing tougher competition from their counterpart companies due to large trend of global bidding. To be ahead in the bidding process they need to show competitiveness in terms of quality, cost as well as time of a construction project. To lead this competition they need to strive for customer satisfaction and delight. Total quality management (TQM) is the philosophy which can transform Indian construction sector to surpass the global competition and match the global standards. TQM is an effort that improves overall performance of company and it focuses on customer satisfaction, training, teamwork, and process improvement. This paper discusses the TQM concepts and practices adopted by construction companies & also aims at throwing light on problems related to implementation of TQM in construction. The study is carried out using questionnaire survey conducted across different companies in Pune and Nasik districts and also using face to face interview with managers & engineers & then subsequent analysis of the response from companies. For analysis purpose, importance index is used in this paper. The study is conducted in the quest of finding solutions for TQM implementation in construction industry.

**Key Words:** TQM, Customer Satisfaction, Process improvement, training, teamwork

## 1. INTRODUCTION

Indian construction companies are facing tremendous amount of competition from their counterparts across the globe. So in order to finish the bidding process of different projects on higher side, Indian companies need to show huge competitiveness in every aspect of construction project right from conception to completion like high quality work completed by company within budget and stipulated time span.

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 organisations.

Indian construction sector is facing large problem of non-attainment of acceptable quality level due to inefficient quality management systems adopted. Since construction projects are big budget endeavours, large amount of stakes are involved in them. It has found that large amount of investment in money, time and workforce is getting wasted due to lack of the efficient and effective quality management system. Hence construction sector needs the use of Total quality management system as an effective solution for the current problems of Indian construction sector like time and cost overruns, non conformance to the standard quality parameters as well as unsatisfied customers.

## 2. LITERATURE REVIEW:

TQM can be defined as standard operating procedure of work for an organization that is documented effectively for guiding the co-ordinated actions of people in best practical way in the quest of achieving the desired quality policies, customer satisfaction, high marginal profits as well as cost and time effectiveness.

The basic purpose of TQM is to achieve customer satisfaction by the way of continuous improvement of products as well as processes by the total involvement and dedication of each stakeholder of the project [1]

TQM is a philosophy involving every organization in the industry in the effort to improve performance. It permeates every aspect of a company and makes quality a strategic objective [2]

Love, et al. (2004) in their paper suggested that contractors should undertake audit of the culture currently present before implementing a TQM program, so that company objectives and behaviours can be aligned to the goals of the TQM philosophy to be adopted [3].

### 1.1 Critical success factors for tqm:

Although all the information available through the TQM expertise is sufficient for TQM Knowledge but there is still need of the work to be done on the framework for implementation of TQM for which study of critical success factors is of utmost importance. CSF's proves to be a guide for companies in construction contemplating on TQM implementation for their growth in this challenging sector.

Jha and Iyer (2006) address the determination of the critical factors affecting quality performance in construction projects. A preliminary survey was carried on

Indian construction sector and the critical success factors obtained were: project manager's competence; top management's support; monitoring and feedback by project participants; interaction among project participants; and owners' competence [4]

Following are some of the critical success factors identified for TQM in construction:

- 1] Top management commitment.
- 2] Continuous improvement.
- 3] Customer focus.
- 4] Training to employees.
- 5] Employee satisfaction.
- 6] Process Management.
- 7] Supplier chain management.

### 3. METHODOLOGY OF WORK

This research is intended to study the quality management practices in India with respect to TQM and CSF's associated with it. The research is based on research design stages to ensure the achievement of the above stated research aims and objectives. Research methodology is systematic way of solving problems.

After the research objective was decided and different project approaches were studied, descriptive method for research was finalized which tends to use survey techniques, which realize on the reality of the phenomenon as it exists in reality, and then clearly describes it by collecting main characteristics and data about the phenomenon. Finally, it is analyzed to achieve the conclusions that contribute to the understanding of the situation and achieve the aims of research. The use of a questionnaire survey allows associations between the variables to be mapped out and measured to show whether the associations are strong or weak.

The entire research data was gathered through questionnaire survey carried out across different construction companies in Pune and Nasik districts. The questionnaire was sent to nearly 100 people of 20 different construction firms out of which 25 people replied their responses, meaning that success ratio of survey was 25% which is regarded as normal for descriptive studies and face to face interview of 11 people were carried out keeping in view the main objectives of the study. Indeed, there were some limitations to the collection of data like availability of people for interview due to their busy schedule and work load they bear.

### 4. DATA PRESENTATION, ANALYSIS, and DISCUSSION:

This section aims to analyze and present the collected data with respect to the research objective. This section is intended to discuss the characteristics of the respondents as well as their knowledge about this research topic. It consist of two sections Viz. Section-I [General

charecteristics of respondents] & Section-II [Knowledge about TQM]

#### Section-I:

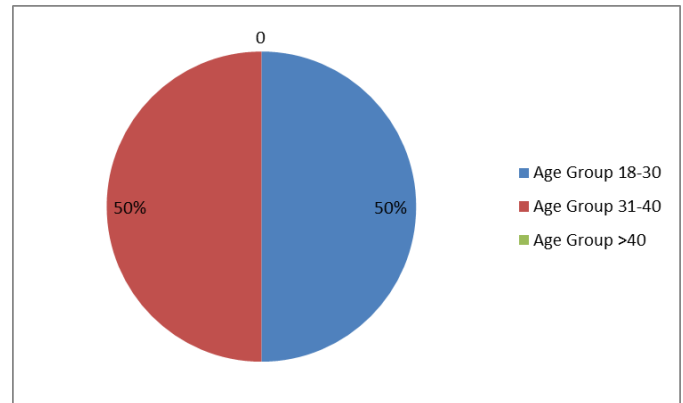


Chart-1:Age Group

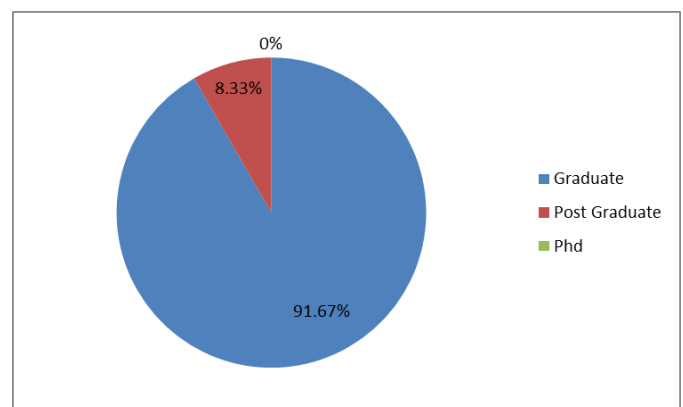


Chart-2:Qualification

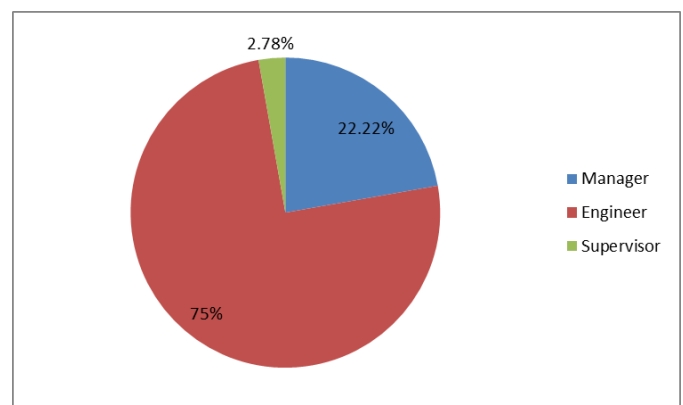


Chart-3:Post

SECTION-II [TQM Knowledge]:

Question: Word that best defines quality

**Table-1:**Quality definition

DEFINITION	N	SUM	%	RANK
Value for money	36	13	36.11	1
Defects elimination	36	11	30.55	2
Ext. Customer satisfaction	36	7	19.44	3
Increased Profit	36	1	2.77	4
Appearance	36	1	2.77	5
Int. Customer Satisfaction	36	1	2.77	6
Problem Solving	36	0	0	7

From above statistics it is clear that 2/3<sup>rd</sup> of the respondents consider value for money & defects elimination as quality and they do not consider internal and external customer satisfaction as an important element of quality

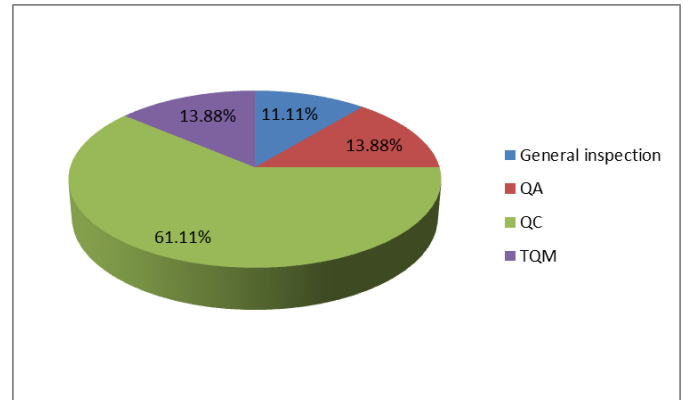
Question: Rank the following factors for successful project [1 being most important, 5 being least important]

**Table-2:**Importance of factors for successful Project

FACTOR	N	SUM	MEAN	RANK
Time	22	83	3.77	1
Quality	22	66	3.00	2
Cost	16	40	2.5	3
Safety	18	40	2.22	4
Scope	17	35	2.05	5

From the above ranking of factors it is evident that stakeholders of construction project time as most crucial parameter above quality for the successful project, meaning that completion of project is the priority for them as far as successful project management is concerned

Question:Quality improvement programme undertaken



**Chart-4:**TQM programme's adopted

Only 14% of respondents implement TQM on their project means that construction sector stakeholders on very large scale are not aware of TQM and its benefits to the construction industry. So construction industry needs a culture change by spreading benefits of TQM adoption in this sector.

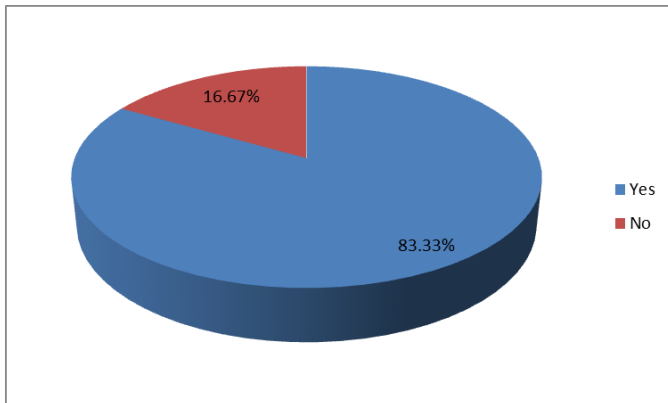
Question: Rank the quality programme objectives in the order of importance [1 being most important & 5 being least important]

**Table-3:**Quality Programme objectives

OBJECTIVE	N	SUM	MEAN	RANK
Productivity hike	32	135	4.219	1
Reduction in cost	32	120	3.75	2
Customer satisfaction	32	86	2.688	3
Involvement of employees	32	75	2.344	4
Compliance with EHS	32	71	2.219	5

Above statistics shows that majority of people consider productivity hike and reduction in cost as important objectives of quality programme above customer satisfaction, which is a matter of concern.

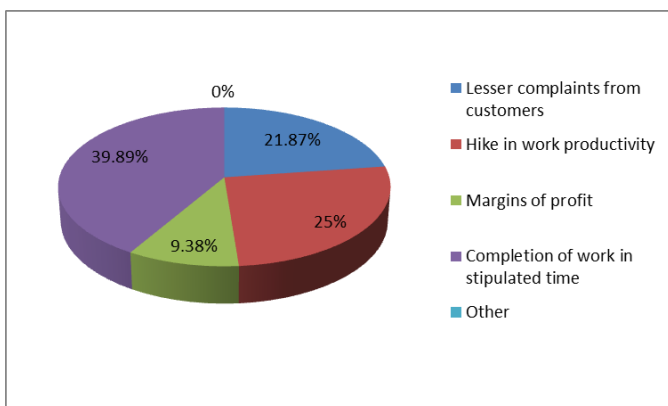
Question: Is data collection done to monitor performance of work



**Chart-5:**Performance monitoring

Large group of people do performance evaluation is a promising fact observed from above stats.

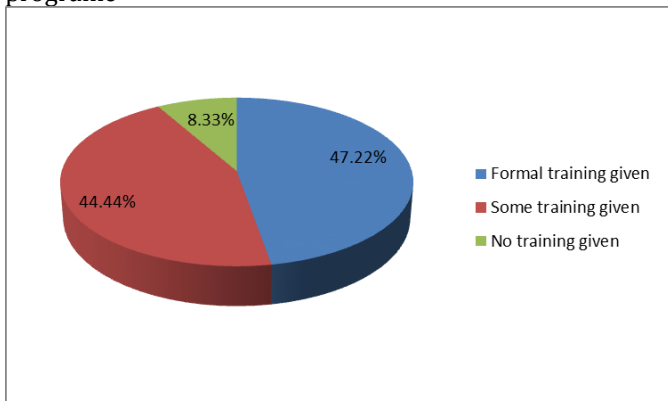
Question: Performance measurement is ascertained using?



**Chart-6:**Performance measurement basis

The grounds for performance measurement is needed to be shifted from time factor to customer satisfaction factor.

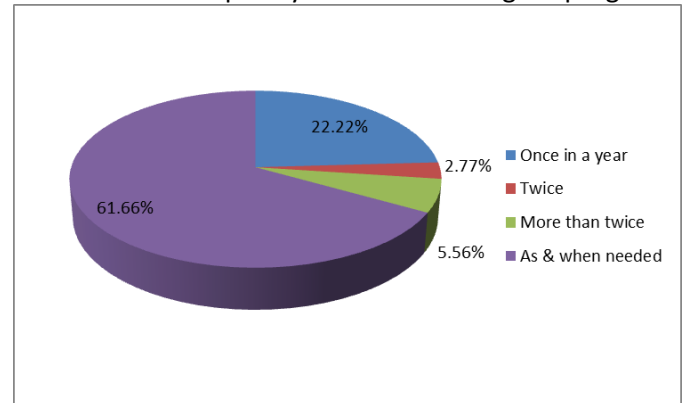
Question: Training given to stakeholders related to quality programe



**Chart-7:**Training

From above statistics it is clear that nearly 88% respondents are receiving training,which is important aspect of TQM.

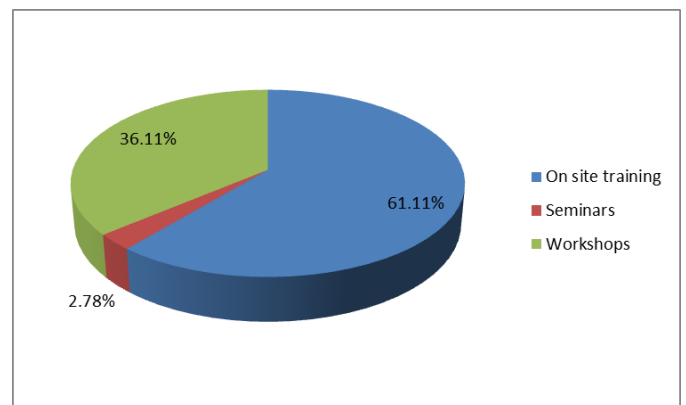
Question: Frequency of training programe



**Chart-8:**Frequency of training

From the above analysis it is proven that even after knowing that taining is driving factor for successful project,2/3<sup>rd</sup> of stakeholders of construction sector do not receive training on regular basis which is needed to be replaced with regular training programs to be scheduled.

Question: Type of training given



**Chart-9:**Type of trining

Alongwith regular onsite trainings, companies need to conduct seminars and workshops for skill improvements of their employees.

Question: Training is given on which topic?

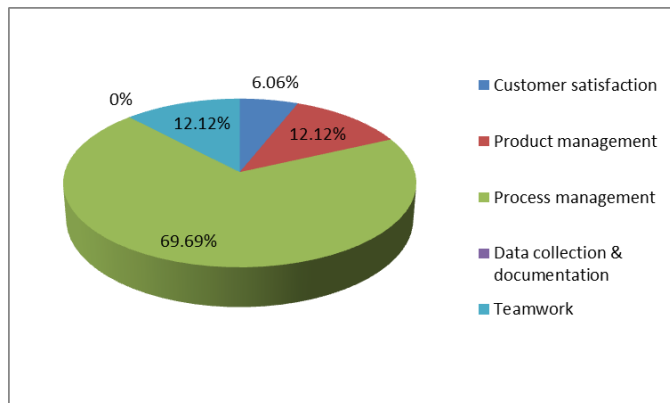


Chart-10: Training topics

Above analysis shows that process management holds a key position as far as training is concerned. But rest factors are on neglected side, which are also important for successful completion of project.

Question: Barriers in TQM implementation [1 being the biggest & 7 being the smallest]

Table-4: Barriers in TQM

BARRIER	N	SUM	MEAN	RANK
Lack of management commitment	31	187	6.032	1
Bad attitudes & behaviors	31	182	5.871	2
No developed standard procedure	31	124	4.0	3
Lack of expertise & resources	31	121	3.903	4
Excess documentation	31	98	3.161	5
Lack of statistical QC techniques	31	79	2.548	6
Difficulties in process mapping	31	60	1.35	7

Majority of respondents find management commitment as a barrier to TQM implementation. This scenario warrants a quick change.

**Critical success factors evaluation from questionnaire :**

Statistical analysis is dependent on type of scale adopted. Hence it is important to select scale type. Identification of scale resulted into 4 types viz. Nominal, Ordinal, Interval & Ratio. In the research work 5 point ordinal likert scale was used in which 1-Strongly disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly agree.

For analyzing data by ordinal scale, the importance index (I. I) of the factors was adopted as confirmed by Enshassi *et al*, (2007)[5]. They were computed using the following equation.

$$\text{Importance index [I.I]} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{5(n_5 + n_4 + n_3 + n_2 + n_1)}$$

Where: n1 = Number of respondent who answered 'Strongly Disagree'  
 n2 = Number of respondent who answered 'Disagree'  
 n3 = Number of respondent who answered 'Neutral'  
 n4 = Number of respondent who answered 'Agree'  
 n5 = Number of respondent who answered 'Strongly Agree'

Table-5: Critical Success factors ranking

FACTORS	LI	RANK
Process Management	0.819	1
Management Commitment	0.794	2
Suppliers Management	0.792	3
Employee satisfaction & Empowerment	0.743	4
Training to employees	0.739	5
Customer Focus	0.729	6
Continuous improvement	0.702	7

**Process Management**

According to respondents, drawings and specifications review prior to construction are important for successful quality management system. All the statements under Process Management having mean greater than three (3) implies that respondents agree that drawings, check sheets, and clarity of work processes play a significant role in enhancing the quality of construction works.

According to the Literature Review, Harris *et al* (2006)[6] and Tang *et al* (2005)[7] stated that process management is one of the main factors needed to ensure an excellent product. This confirms the assertion that process management issues are the most important when compared to other factors (Tari 2006)[8]

These results are similar to the results by Harrington & Voehl (2012)[9] which shown that Successful process management results in reducing time and cost overruns & reduction in defects as well.

**Management Commitment**

Clear vision of management for TQM secured first rank with I.I=0.844, shows that respondents consider Management commitment to be a key aspect for successful QMS. Management commitment secured second rank in CSFs ranking with I.I=0.794.

This result matches with the results of Arditi & Gunaydin (1996), Which considers management commitment as most critical factor that leads to the successful QMS [2].



### Supplier Chain Management

Examination of supplied material before use stood first among other factors under SCM with I.I=0.806 ,while the other factor of maintaining regular suppliers to ensure consistency was ranked second with an index of 0.777.

According to Dr.Kulkarni and Khutale (2013) mutually beneficial supplier relationships causes an increased efficiency in delivery and quality of materials[10].

### Employees' Satisfaction/Empowerment

Results shows that teamwork (I.I=0.872) is more crucial than individual work which adds to empowerment & satisfaction level of employees. Also others factors like communication as well as social environment adds to employee satisfaction.

These results matches the study carried out by Jung & Yong (2006), which tells that employee relations contributes significantly in continuous improvement process & there is need of investment in employees empowerment using training and developemnet[11].

### Training

Training ranked fifth among the seven critical success factors in TQM as the survey indicated. Regular training to employees ranked first among other factors under taining with I.I=0.772 like studies by Arditi and Gunaydin (1997) who considered training as very essential for the hike in competitiveness[2].

### Customer Focus

As a matter of the fact that Customer satisfaction is backbone of TQM,it should have got highest index unlike its sixth position in this survey with I.I=0.729

Such a less index of client satisfaction data is matter of concern for construction companies willing to adopt TQM

According to Tari(2006),Customer satisfaction should recieve first spot for ISO 9000 companies[8]. Also Oakland (2004) confirmed that giving attention and meeting customer needs is paramount in customer loyalty which ultimately results in increased percentage of customer retention[12].

### Continuous Improvement

Company evaluates performance and take measures to improve on it was the highest ranking within continuous implementation with index of 0.767.However encouraging creativity and more innovative methods of improving work processes are other factors that respondents indexed lower are the matter of concern.

### CONCLUSION :

TQM is very powerful philosophy in the quest of achieving business excellence. Construction projects are big budget endeavours so naturally large stakes are involved in it. So every event of rework, wastage as well as time overrun ultimately hits the overall budget of project. So the construction industry need to summon and effective and

efficient quality management philosophy like TQM, which has already proven its worth in manufacturing sector and in recent time in construction sector as well.

TQM can prove effective in wining considerable market share, increased company reputation, achieving customer delight which is one step ahead of customer satisfaction, time & cost overrun avoidance, employee satisfaction, continuous improvement and most important the sustained growth of an organization.

If efforts are taken by the top management people of construction companies in incorporating the TQM philosophy in their quality culture then it is evident that the organization will be positively benefited from it and ultimately the overall development of construction sector and country will take place.

From this study carried out it can be summarized that customer satisfaction as well as continuous improvement are the areas (which are placed on last two positions among other critical success factors in this research)which construction industry needs to take care of since they are regarded as a backbone of TQM philosophy.

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