Implementation and implication of total quality management on client-contractor relationship in residential projects

Swetha Murali* and V Ponmalar
College of Engineering, Guindy, Anna University, Chennai, Tamil Nadu, India-600025

*Email: swetha.murali06@gmail.com

Abstract. To make innovation and continuous improvement as a norm, some traditional practices must become unlearnt. Change for growth and competitiveness are required for sustainability for any profitable business such as the construction industry. The leading companies are willing to implement Total Quality Management (TQM) principles, to realise potential advantages and improve growth and efficiency. Ironically, researches recollected quality as the most significant provider for competitive advantage in industrial leadership. The two objectives of this paper are 1) Identify TQM effectiveness in residential projects and 2) Identify the client satisfaction/dissatisfaction areas using Analytical Hierarchy Process (AHP) and suggest effective mitigate measures. Using statistical survey techniques like set of questionnaire survey, it is observed that total quality management was applied in some leading successful organization to an extent. The main attributes for quality achievement can be defined as teamwork and better communication with single agreed goal between client and contractor. Onsite safety is a paramount attribute in the identifying quality within the residential projects. It was noticed that the process based quality methods such as onsite safe working condition; safe management system and modern engineering process safety controls etc. as interlinked functions. Training and effective communication with all stakeholders on quality management principles is essential for effective quality work. Late Only through effective TQM principles companies can avoid some contract litigations with an increased client satisfaction Index.

Keywords: Quality, Management, Analytical, Hierarchy, Process

1. Introduction
Customer satisfaction is only achieved if the project on progress has some minimal defects and the contract supplied for the projects is economic in price with offerings from other parties. The intention of TQM is to achieve customer satisfaction through continuous improvement, client and contractor involvement, team work, training and education. It is often regarded as a culture encouraging a total commitment to client gratification through innovation and amendment in all aspects of the business. The customer in an ‘perfect’ environment is often considered as the final recipient of the services from the project, but it is also considered to be every being or department or stakeholders in the organization. The construction trade often differs from the production industries in such a way that the introduction and application of TQM in the former industry is way more challenging. The uniqueness of the construction
industry is that it has its processes done only once while the manufacturing process is branded by stable condition processes. The industry often tends to muddle TQM with Quality Assurance (QA) and Quality Control (QC), considering the acquiescence of standards such as ISO 9001 and 9002 are the only application of quality on construction projects. Bahri, et al., 2012 emphasizes on the objective that TQM is to ensure continuous progress in the organization’s people, systems, environment and processes so as to attain better-quality customer service and improved profits through efficiency and efficacy in the whole organization. Flint et al. (2011), exhibited that although rising attention is paid to customer satisfaction, devotion, value by managers, and researchers, their interrelationship still demands an answer. The Total Quality culture differs from an organization to another. Irrespective of the differences, it intends to accomplish common purposes such as: implementation of lean management, cost management, improvement of client satisfaction and increased market value. As it is observed, the objectives are dynamic in nature and requires frequent upgrading in the processes. There are wide ranges of TQM tools which can be used for diverse application in the field of construction industry. There is no best tool for every application. A knowledgeable practitioner is aware of each of the tool and uses an appropriate one for the activity needed.

2. Research Methodology
The data for the project is collected via questionnaire survey which targets the clients and contractors of companies in and around Chennai. The scheme of the project includes: 1. Identify the level of effectiveness for implementing practices of TQM in construction industry and 2. Area or phases with which the clients are dissatisfied. The effectiveness of parameters relating to best definition of quality and total quality management workability in the organization were identified and analysed. Client dissatisfaction index was developed using Analytical Hierarchy Process (AHP) on the basis of four targets to be achieved in the project cycle. The four targets are cost, time, quality and attitude towards satisfaction of work.

3. Analysis of Questionnaire
This study used descriptive statistical method to analyse important characteristics and summarise survey results. Reliability is a prerequisite for measuring validity. For this analysis, the Cronbach’s Alpha is 0.761 inferring acceptability and dependability of the data for this model. About 55 respondents were surveyed for the implementation of TQM in residential projects and about 30 respondents were reviewed for the development of client satisfaction index.

4. Demographic Profile
The respondents were typically between in the age of 18-30 with experience level of 1-10 years and are university graduates. This helps in understanding that the respondents are in the preliminary stages in the organization; Knowledge and training of TQM in the organization is questionable with regard to the effective implementation of the managerial practices in the company.

5. Descriptive Statistics
As in Table 1, in pertaining to the definition of Quality, Partnership between the supplier and organizer (Mean= 3.09), teamwork (Mean=3.07) and frequent maintenance (Mean=2.81) satisfy the definition of quality. When intended for cost optimization, clients tend to go for products from bargained suppliers. Some projects with frequent maintenance assure that the resources do not go fault during the operational time and decrease the turnout during the delay. It is usually perceived that individuals made to a team achieve higher common goals than working alone. Team approach should not be restrained inside organization but should loop traders and external customers to the ring. Similarly, all the parameters
affecting the effectiveness of TQM in organization include no necessary quality program, application of knowledge and training in organizations to an extent influencing the cost divergence, decreased customer satisfaction and delay in completion of projects. In Table 2, Potential improvement for quality include onsite safety (Mean=2.75). Certifying materials (Mean=2.20) and Testing procedure in site (Mean=2.18) can help in understanding the quality grade of the materials.

| Table 1. Definition of Quality |
|-------------------------------|
| Attributes                   | Mean     | Standard Deviation |
| Expensive                    | 2.18     | 0.520              |
| Customer Satisfaction        | 2.00     | 0.518              |
| Appearance                   | 1.92     | 0.702              |
| Increased Profit             | 2.41     | 0.745              |
| Value for Money              | 2.41     | 0.980              |
| Team Work                    | 3.07     | 1.071              |
| Partnership b/w supplier and organizer | 3.09 | 0.882 |
| Frequent Maintenance         | 2.81     | 1.020              |

| Table 2. Potential Improvement in Quality |
|------------------------------------------|
| Attributes                               | Mean     | Standard Deviation |
| Onsite Supervision                       | 2.01     | 0.720              |
| Redesign                                 | 1.45     | 0.539              |
| Testing Procedure in Site                | 2.18     | 0.556              |
| Certification of Material                | 2.20     | 0.689              |
| Close out of Projects                    | 1.86     | 0.832              |
| Onsite Safety                            | 2.75     | 0.551              |
| Personal Management of Employees         | 1.88     | 0.466              |
| Onsite Supervision                       | 2.01     | 0.720              |
| Personal Management of Employees         | 1.88     | 0.466              |

6. Graphical Representation
In Figure 1, the difference between functional quality and process based quality is elucidated. The implementation or management of quality does not meet the expected goal because an organization perceive quality through a process of chains converge on inputs, functions and association among processes as they are progressed and stretched through the organization. This makes the particular department focus on their internal targets alone and exclude the external targets. This discourages the transmit of information, impart knowledge and weaken team work culture. It is impossible to institute function based management due to strong chain of command.
7. Analysis Using Analytical Hierarchy Process (AHP)
As in Figure 2, indices suggest that time pressure (44.45%) is main factor which affects quality target of the project. The clients get disinterested when there is shortage of staff members. If there is less supervision or poor workmanship, there is inadequate job completion and affects the target of the project. With the other targets, such as cost, time and satisfaction towards work, the clients emphasise the importance of proper assessment during the design and planning stage so cost efficacy can be managed. Seldom contractual and variation claims (8.62%) affects the target when there is a monetary hit. Inefficient Coordination (38.64%), Poor project planning (22.48%) and delays in resolving problems in site (18.48%) are the highest drawbacks which hit time target. Poor communication (24.75%), less customer care (13.11%), empathy towards clients (15.95%) are some areas where the attitude of clients seems dissatisfied. Figure 3 to 5 shows the percentage of variations of each parameters of individual targets.
**Figure 2.** AHP for Quality Target.

**Figure 3.** Factors affecting Cost Target.
8. Results and Discussion
Figure 6 suggests that amongst the major factors contributing to dissatisfaction of clients, Quality is regarded as the most important attribute in satisfying the clients. If there is compromise in quality, it is the highest disappointment to the clients since a quality work gives the utmost satisfaction.
9. Conclusions

From the analysis, it can be concluded that:

- From the research work, it was noticed few important points were noticed by the contractor are listed below:
  - The highlighted attributes for quality definition include partnership between organizer and supplier, teamwork and frequent maintenance. These attributes boost the quality performances and helps in maintaining a satisfied client relationship.
  - Most of the respondents agree that TQM is applied in organization to some extent even when they are knowledgeable and well trained.
  - For the improvement in quality factors, Onsite Safety is an important attribute so as to curb accidents which can be developed by improvising the onsite supervisions.
  - Functional quality parameters like expensiveness, appearance, etc are not enough to run the organization. Process based quality methods such as testing and certification of materials are preferred so that the organization hierarchical interlinks are maintained.

- For the implications of Client-Contractor relationship:
  - In order to restrain late changes in activities and material wastages, proper planning and execution of work should be done with an experienced guidance and proper lean principles must be adopted for the material handling.
  - Since, time is a major concern for project completion, improper planning and scheduling can lead to overtime. Due to this factor, solutions like crashing of activities are rendered which infer to a substandard quality progress or increase the labour demand and increase in resource levelling is demanded.
  - Planning of material delivery should have a standard cycle including the reorder level. Occasionally, if the past experiences are not recorded or studied properly, poor choice of method or usage of incorrect equipment for activities and in case of small residential projects if the quality audits are minimal, there is a chance of lacking in quality wise construction.
  - If there is poor communication between the client and contractors there are chances of high risk in misleading information, high risk in contract breaches and the variation claims may exceed 14%. This will lead to poor relationship amongst the two parties. The contractors should make the client’s satisfaction as the top priority and empathize their feelings and fulfill their needs and requirements.
References

[1] Arshida M M and Agil S O 2012 Critical Success Factors for Total Quality Management Implementation within the Libyan Iron and Steel Company Tun Abdul Razak University, Graduate School of Business MLB-254.

[2] Bahri S, Hamzah D and Yusuf M R 2012. Implementation of Total Quality Management and Its Effect on Organizational Performance of Manufacturing Industries through Organizational Culture in South Sulawesi, Indonesia. J. Bus. Manage. 5(1) 10-24.

[3] Baidoun S 2003 An Empirical Study of Critical Factors of TQM in Palestinian Organizations. Logistics Information Manage. 16(2) 156-71.

[4] Flint D J, Blocker C P and Boutin P J 2011. Customer value anticipation, customer satisfaction and loyalty: An empirical examination. Ind. Mark. Manage. 40(2) 219-30.

[5] James Harrington H, Frank Voehl and Hal Wiggin 2012 Applying TQM to the construction industry. The Total Qual. Manage. J. 24(4) 352-62.

[6] Jun M and Cai S 2010 Examining the relationships between internal service quality and its dimensions, and internal customer satisfaction. Total Qual. Manage. 21(2) 205-23.

[7] Nazhad M B, Mosavi J S and Kordabadi S S 2012 Organizational Culture and Quality Management (ISO/9001) Case Study: Tehran Universities Employees. J. Basic and Appl. Sci. Res. 2(12)12590-9.

[8] Lenka U, Suar D and Mohapatra P K 2010 Customer satisfaction in Indian commercial banks through total quality management approach. Total Qual. Manage. 21(12)1315-41.

[9] Wang S J and Yu Chu P 2000 Critical Factors Affecting the Implementation Decisions and Processes of ISO Quality Management Systems in Taiwanese Public Sectors. Institute of Public Affairs Management, National Sun, Yat-sen University.

[10] Zakuan N, Muniandy S, Saman N Z and Md Arif M S 2012 Critical Success Factors of Total Quality Management Implementation In Higher Education Institution: A Review. Int. J. Academic Res. Bus. Soc. Sci. 2(12).