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Study of Quality Management System in Construction Industry of Pakistan

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ABSTRACT

The construction industry of Pakistan has been endeavoring for quality since long time. The absence of quality related regulatory body and the non-availability of local quality standards could not give a clear direction to local construction industry. An exploratory approach was adopted by studying the available literature to create a quality management framework for building projects and based on these a questionnaire was prepared, which was administered to project engineers, managers, supervising consultants and contractors. The important quality factor for the construction inputs and processes were included in the survey, which was also supported with the interviews of the selected major stakeholders. Quality check lists were developed in consultation with the field staff and actual projects were analyzed. The results showed that there an increasing awareness among the major stakeholders but the tools and techniques used for quality control are not reliable and consistent. There is a need to further standardize the procedures and processes as well the inputs for the construction industry of Pakistan t adopt the Total Quality Management in true spirits

KEYWORDS: quality management, technical, systems, Pakistan, construction industry, material, stakeholder.

1. INTRODUCTION

In general, quality can be defined as meeting or exceeding the requirements whether, legal, aesthetic or functional of a project, product or service. In construction industry, the definition of quality can be relatively difficult, but it can be defined as meeting the requirements of the designer, constructor and regulatory agencies as well as the owner. For public sector construction projects, the expectations of the community and end users have prime importance.

The quality management started from very marginal function of quality inspection to quality assurance and quality control, thereby making the quality of products and services be more important in the last many decades. However the Total Quality Management (TQM) emerged as new and integrated philosophy in Japan manufacturing industry in early 50's. TQM is based on the principles of Continuous Quality Improvement (CQI), importance of the customer satisfaction, preventive measures rather than rejection and Employee Involvement (EI) in all the process [1].

The implementation of TQM principles, require broad based changes in the cultures, processes, procedures, strategic priorities and plans as well as organizational operations [2]. This is often a big challenge for all the stakeholders and require a detailed strategy for "Change Management" . This becomes even more challenging in the construction industry, where the traditional labor and construction techniques are more dominant. Sommerville & Robertson [3], identified some of the elements impeding implementation of TQM in to construction industry, which include mainly the following:

i. Construction inputs are diversified in nature and the customized solution of construction has to come from material and processes having different specification and standards. Hence the satisfaction of end user is relatively difficult.

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ii. The dedication to TQM processes and philosophy, would require some minimum time to get the benefits and returns as these are not possible in short term. In present recession in the construction market, no one will be ready to experiment, the TQM.

2. Total Quality Management and Construction Industry:

The basic philosophy of TQM evolved from manufacturing industry and it was applied selectively to construction industry depending on the region, type of projects etc. Various studies have revealed that application of TQM procedures to small sized construction projects is relatively difficult [3,4]. The implementation of various TQM tools such as project management, partnership, Quality Assurance Plan (QAP), Quality Function Deployment (QFD), Jobsite Quality Planning (JQP) to construction industry demonstrated mixed results [5]. Hoonakker faced the same situations during study of construction industry in Netherlands regarding implementation of theTQM principles to construction projects. Most of the construction firms adopt only those innovative solutions and techniques, which have proved successful in other projects [6], hence the innovative use of TQM principles in construction industry has been very limited.

The TQM has been adopted by various major construction companies in the world as per their requirements and priorities for cost reduction, improved productivity and better health & safety environment for construction projects. Kuprenas& Kenney [7] and Kuprenas, Soriano, &Ramhorst, [8] observed that the overall motivation for implementing TQM remained essentially the same over a period of three years. The methods and effectiveness of implementing TQM, however, did vary substantially between companies over the three years. Some firms completely abandoned their TQM implementations while others achieved award-winning results. Most of the construction companies focus on cost reduction rather than quality control and quality improvement.

The implementation of Total Quality Management (TQM) which is defined as “a set of concepts which can be extended to the whole organization, which permits producing products and/or services which satisfy customer demands at the lowest cost possible, and trying to make all the staff within the company feel satisfied with their work” has beenemployed by many construction organizations as an initiative to solve their quality problems [9]. TQM philosophy throughout all projects can help an organization to improve its productivity, performance, and both customer and employee satisfactions by eliminating or reducing poor quality. In order to achieve this goal, it is essential to diminish costs related to not doing things correctly the first time. This is only possible if these costs are identified and evaluated or put in other words, if quality costs are measured and analyzed [10]. Construction firms, therefore, need to understand the TQM Critical Success Factors (CSFs) for the successful implementation of TQM.

Implementation of TQM can bring a lot of improvements in the construction industry. Though the number of studies supporting this argument is limited yet the benefits can be in the form of economic returns, fast and speedy project completion, higher profitability, enhanced customer satisfaction, better quality of end products etc [11].

The following facts must be considered before applying any quality improvement program to construction industry.

i. Almost all construction projects are single. They are single-order, single-manufacture products.
ii. Unlike other industries, which typically have a fixed site through similar conditions for production, each construction production site constantly shows different circumstances.
iii. The life-cycle of a construction project is much longer than the life-cycle of most manufactured products.
iv. There is no vibrant and proactive appraisal system to measure construction excellence thus, construction projects quality is usually evaluated subjectively.
v. Construction projects are a single order design project, the owner usually have direct impact the production.

vi. The participants in the construction project owner, designer, general contractor, subcontractor, material provider, etc. Differ for each project in terms of their knowledge, skills and attitudes.

Several models have been presented for cost of quality. However, the most significant models can be classified into the following groups [12].

i. Opportunity or intangible cost models
ii. Process cost models:
iii. ABC models: Value added + non-value added
iv. Crosby's model
v. P-A-F models:

Further details about the models can be obtained from above reference.

3. **Construction industry of Pakistan and Total Quality Management:**

The construction industry of Pakistan is characterized by low productivity as its contribution to the GDP is merely 4%, whereas it employs more than 7% labor force. The cost overrun, poor quality and time delays are the three major challenges faced by the construction industry, which often leads to litigations and conflicts at the projects. The construction industry in Pakistan requires, a cultural and behavioral shift in the mind-set of all participants including top and senior level management and project staff. The basic philosophy of the TQM focuses on the involvement of all major stakeholders in the quality control and quality assurance process. Unfortunately, the construction industry of Pakistan has not adopted the TQM philosophy into their routine operations. The high boom of construction industry in the early twenty first century, led to shortage of skilled man power at one hand and competing for resources on the other hand. This required to apply the TQM in major projects, mainly to save the resources and costs. Hence Continuous Quality Improvement (CQI) became an important consideration in major projects in Pakistan during this stage. However in general for medium and small projects, the application of TQM remained a remote possibility.

The quality management in construction projects in Pakistan is not given prime importance. In most of the construction projects, there are no dedicated staff for quality assurance and quality control, which renders the quality as the most neglected priority in the construction industry. The typical contractors at construction projects are more focused over cost saving but they are least aware of the cost of poor quality, they have to pay at construction sites, in case of imperfect and substandard works. Through awareness about TQM among the contractors, we can make them realize the benefits of quality management and TQM. In this work, research was undertaken to assess the existing tools and techniques adopted by the construction industry in Pakistan for the quality management.

4. RESEARCH OBJECTIVES AND RESEARCH METHODOLOGY:

The main aim of the research was to assess the present tools and techniques employed by the construction industry of Pakistan for the quality management and recommend further improvement for the same.

To assess the critical factors for the quality management in constructing industry and its implementation at construction projects, the following three tools were used for data collection:

4.1 **Questionnaire Survey**: The questionnaire was divided into two parts, Parts-A gives the information of respondents and his familiarity with construction projects, role and responsibilities and experience etc. The part-B of the questionnaire comprises 130 factors for quality assurance and quality control in projects under some major heads of input factors, internal environment and external environment. For contractors and project executing firms, the list of contractors who executed projects of various magnitude in Pakistan at different places was used and 20 contractors were randomly selected from the list of these contractors.

Similarly 10 consultants were randomly selected from the list of Architectural Planning and Engineering design consultants. Out of total 50 questionnaires sent to the various stakeholders in the study , 30 responses were received back.

4.2 **Interview*:*** The questionnaire survey was followed by interviews with the project staff and representatives of the consultants.

4.3 **Case Study*:*** To check the implementation of various quality assurance and quality control tools, a real site was visited at Islamabad Pakistan.

5. Observations:

5.1 Results of questionnaire survey:

i. Based on the results of questionnaire survey, almost 60% of the respondents think that customer satisfaction is regarded as the basic perception for quality.
ii. The firms mostly follow the Pakistan Engineering Council Code of ethics.
iii. The order of priority for various important factors in planning is cost, quality, time, scope and safety. Hence quality is the next most important factor after cost in planning in construction projects.
iv. Most of the firms believe that project quality plan is as important quality control input, followed by checklists, quality metrics, organizational assets.
v. The firms mostly think that implementation of TQM will mainly improve the project design and cost estimation.

5.1 Interview with construction supervision staff and contractors:

1. During interaction with construction supervisory staff and contractors regarding quality, it has been observed that contractors give only average importance to important issues related to TQM such as quality in the organization, employee training and organizational culture. The general trend of the contractors is to associate quality with cost and they argue that better quality would mean more investment in the project. They are least awarded of the cost of non-conformance and non-quality.
2. The organizational existing practices for quality control are given more importance and the TQM is exercised to the extent of cost estimation and warranty claims etc. In addition the interviews conducted with higher officials and project staff believes that quality has prime importance but they rarely practice, TQM practices as they believe that additional cost of the quality is not given in the approved cost of project.
3. The quality control and quality assurance tools adopted at construction sites are mostly arbitrary. Formal QC/QA tools are rarely employed. The contract of the construction projects in public sector seldom have focus on the implementation on TQM and the specification followed are mostly redundant and outdated in most cases.
4. Lack of awareness has been observed as the major impediment to the quality in the construction industry. The level of information available with the contractors and project staff

5.2 Case study of construction projects at Allama Iqbal Open University*:*

During visits to the projects of Allama Iqbal Open University Islamabad Pakistan, the following observations have been made:

i. There is general awareness and sensitivity amongst the project staff and contractors regarding importance of the quality in the projects and the culture developed at project sites is quality focused. But in most of the cases the knowledge of the supervisory staff about QC/QA is based on traditional practice.
ii. The knowledge of the staff about TQM was found insufficient. The application of modern

quality control tools and techniques is rare at the construction projects.

iii. The organization has established a material testing lab, however its use in the projetcs is not up to the mark. The Project Directorate has started testing of input like cement, aggregates, bricks etc at the lab, but the support from the site staff in this context is not sufficient. The dedicated staff for the laboratory is also not sufficient to undertake the task of material testing.

iv. Overall, commitment of the staff to the quality in construction project at AIOU, has been observed, but there is a need to implement the modern TQM tools andtechniques. To this end, training of the staff is required at all levels.

6. Conclusions

i. The knowledge and awareness of the major stakeholders of construction industry related to TQM was found insufficient. They most of the times follow the traditional quality control techniques.

ii. The adherence to quality in construction projects by the contractors is limited to the contractual obligations and unfortunately, most of the projects' contracts don't oblige the contractor to follow the TQM tools and techniques.

iii. The contractors are least awarded about the cost of poor quality and hence they are most of the time relate quality to additional cost. Hence quality is exercised to the extent of cost estimation and warranties etc.

iv. There is no organized system employed by the project staff for deployment of TQM tools and techniques in medium and small projects.

v. The quality control is mostly based on inspection of the work completed by the supervisory staff, which often lead to rejection of imperfect works. The basic philosophy of the TQM i.e. " rejections" is not followed in true spirit. This leads to wastage of time and resources.

vi. There is no mandatory provision in the construction contracts for strict compliance to the TQM standards, tools and techniques.

7. Recommendations

i. The construction project contracts needs to be revisited. The specification part of the contracts and special conditions regarding quality control needs to be reviewed and modern TQM tools and techniques may be incorporated in such documents.

ii. The Pakistan Engineering Council (PEC), being the major organization to develop the bidding documents for the projects in Pakistan need to revise the specification of civil work items for construction project. The Pakistan Institute of Contract and Cost (PICC) which is defunct now, may be revitalized under senior and experienced people.

iii. Awareness and capacity building workshops on TQM for construction projects may be held under the Continuous Professional Development (CPD) program of PEC. The renewal and up-gradation of the contractors may also be linked with the participation of the core engineering staff of the contractors in such workshops and seminars.

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