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Quality Management Practice of Construction phase in Residential Building:A Case Study of A Vadodara City

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Abstract — *During from the last few years, Construction sector played a very important role in the development of country. The development of construction industry is basically depend upon the quality of construction projects. Quality is one of the critical factors in the success of construction projects. Project life cycle of the quality management can improve the quality of construction projects. This study mainly focuses on the importance quality management and factors that affects the quality management in the construction phase. The study also includes visiting of some construction sites and made questionnaires related to the quality of the construction, then conducts the questionnaire survey, and then analyse the difficulties or the major factors which affect at the site of the Vadodara city. The cost variance due to quality defect in quality management and give some proactive measures for the improvement of quality in the phase of construction project. The paper includes the outcome of the research methodology decided by authors based on interview of project participants and analysis of scrutinized interview data.*

Keywords- *Construction project management, Project management cycle, Quality management*

I. INTRODUCTION

Quality is one of the main factors in the success of construction projects. Quality of construction projects, as well as project success, can be regarded as the fulfillment of expectations (i.e. the satisfaction) of the project participants. Quality, cost and time have been recognized as the main factors concerning the client. The author emphasize more attention towards quality. The quality in the construction industry is linked with client's satisfaction and the implementation of a quality management system is a key tool in consistently and reliably managing the goal of client satisfaction. Quality management system (QMS) could be implemented either at the organization level or at the project level itself.

Taylor et al. [12] concluded that senior manager's involvement, understanding and customer focus are essential antecedents of construction project success. On construction related research, Low et al. [10] commented that top management commitment is one of the elements that would reflect QM performance measures in construction firms. Chin et al. [7] found that top management commitment is the most critical factor for the successful implementation of ISO 9000. Hakim et al. [2] Quality management system (QMS) is defined as "all activities of the overall management function that determine the quality policy, objectives and responsibilities, and implement them by means such as quality planning, quality control, quality assurance and quality improvement within the quality system".

The paper includes five-point scale based questionnaire survey for study of QMS at construction projects. It includes questions based on quality control tools and quality measures used on construction sites

II. LITERATURE REVIEW

2.1. Quality Defined in Construction

With regard to any examination of quality issues in the construction industry, there are commonly three main terms that require objective definition and discussion. They are - what is actually meant by 'quality', 'quality management system (QMS)', and what constitutes a 'total quality management (TQM)'philosophy.

There is no precise or single definition of „quality", and although many of the pioneers of the quality movement and gurus, such as Deming, Juran, Crosby, Feigenbaum, Taguchi and others, had their own individual definitions of „quality", ISO DIS 9000:2000 generally defines „quality" as "the degree to which a set of inherent characteristics fulfill requirements" [13]. This means that in the construction industry, quality appears to be achieved whenever the needs of all those entities and individuals involved in projects or production or provision of services, such as consultants, constructors, project customers, and other related stakeholders, are fulfilled. Indeed, understanding the main concepts of quality is essential for a construction company in implementing a „quality management system" as a strategic management tool to gain benefits from the successful implementation of a quality system.

Yasamis et al. [14] refers to the definition of quality of performance as encompassing the reliability of the original product and/or service as well as the competence, integrity and promptness of staff and support services. For

owners to receive more value for their investment definitions of quality in construction need to be expanded to include the performance of the company as a whole and the client satisfaction derived from that performance. There is a shift in business thinking from compliance mode to performance mode. While contractors are striving to improve their overall performance, the control and monitoring mechanisms that clients practice on contractors and their work should also be reengineered.

Arditi and Gunaydin [4] say that while the evolution of quality control in the construction industry is parallel to that of the manufacturing industry, many dissimilar characteristics distinguish the two industries. The following differences, some of them significant, must be considered when applying a quality program to construction.

- Almost all construction projects are unique. They are single-order, single-production products.
- Unlike other industries, which usually have a fixed site with similar conditions for production, each construction production site always displays different conditions.
- The life-cycle of a construction project is much longer than the life-cycle of most manufactured products.
- There is no clear and uniform standard in evaluating overall construction quality as there is in manufactured items and materials; thus, construction projects usually are evaluated subjectively.
- Since construction projects are a single-order design project, the owner usually directly influences the production.

. The participants in the construction project--owner, designer, general contractor, subcontractor, material

Quality Management System (QMS) have many applications in the construction industry. QMS could be implemented either at the company level or at the project level. From the perspective of a construction company, quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customer's satisfaction that would bring long term competitiveness and business survival for the companies.

III. RESEARCH METHODOLOGY

The methodology for the work consists of only construction phase. In the first step the questionnaires have been prepared by author considering quality aspects of construction project. There are 11 parts of the questionnaires have been prepared by author for work. This paper describes the rating aspects based on the RII (Relative Importance Index) method. In second step the interviews of participants of construction project have been conducted by the author. The brief details of respondents and their experience are shown in "Table 3.1". The third step includes analysis based on views of respondents. Total 67 questionnaires were distributed to different respondents in Vadodara city.

Table: 3.1 Total Percentage of questionnaire distributed and responses received

Sr. No.	Respondents	Experience in years
1	Builder	12-15
2	Contractor	10-12
3	Site engineer	10-12
4	Architect	15-20

IV. DATA COLLECTION &ANALYSIS

4.1. RII method

Data were gathered through a survey & analysed by using technique: Relative Importance Index (RII)

The Relative Importance Index (RII) will be used to rank (R) the different quality. These rankings make it possible to cross- compare the relative importance of the factors as perceived by the four groups of respondents (i.e. Architect, Contractors, Builder/Developer and Structural Engineer).

$$RII = \frac{\sum W}{AN}$$

Where,

W = Weighting given to each factor by the respondents (ranging from 1 to 4),
A = Highest weight (i.e. 4 in this case),
N = Total Number of respondents

Table:3.2 Total Percentage of questionnaire distributed and responses received

Sr. No.	Respondents	Experience in years	Questionnaire Distributed	Questionnaire Received	% of Responses
1	Builder	12-15	17	14	77.78%
2	Contractor	10-12	18	16	94.12%
3	Site engineer	10-12	17	15	88.24%
4	Architect	15-20	15	11	73.33%
	Total		67	56	84%

The "Table 3.2" shows the information about the respondents from various participants of the construction projects such as builder, contractor, site engineer, architect of the construction project and their experiences. The various optional points for each questions are provided. The respondents has to rate these points on four-point rating scale. The scale description is as 4= Strong, 3= Moderate, 2= Less, 1= Very less".

Based on the ranking, the top 10 most important causes of construction delays as perceived by all respondents are following:

Table: 3.3 Top Ten Ranking by RII Method

Rank	**Quality Event**	**RII**
1	The placing of reinforcement affects the quality.	0.90
2	The vibration is affects the quality.	0.88
3	Types of footing affect the quality.	0.87
4	The mortar proportion affects the quality.	0.86
5	The brick joint affects the quality.	0.83
6	The proportion of material used affects the quality.	0.82
6	Without curing the wall plastering affects the quality.	0.82
7	Placing of frame of doors and windows affects the quality.	0.78
7	The before time removal of formwork affects the quality.	0.78
8	The concrete ratio in foundation affects the quality.	0.77
8	The study of drawing affects the quality.	0.77
9	The spacing of the reinforcement affects the quality.	0.76
9	The lime plaster affects the quality.	0.76
10	The concrete proportion affects the design.	0.75
10	The type of soil affects the quality of footing.	0.75
10	Proper compaction affects the quality.	0.75

The analysis includes calculation of percentagewise waitage of the aspects of construction project given in questions by the respondents. Based on the above method the findings of study are mentioned in the discussion section.

V. CONCLUSIONS

Based on the study reported in paper the following are the conclusions:

- The 80% respondents very strongly believe check lists and ranked the top event is from reinforcement part and footing part.
- The 60% respondents very strongly believe check lists and ranked designing part and concreting part.
- The 90% respondents very strongly prefer customer satisfaction and 80% client satisfaction are the most important aspect for maintaining QMS at construction projects.

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