A DETAILED REPORT ON QUALITY CONTROL MANAGEMENT IN CONSTRUCTION INDUSTRY

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Abstract - *Construction industry plays an important role in the development of any country. The development of construction industry depends on the quality of construction projects. Quality is one of the critical factors in the success of construction projects. Improvement in the quality of construction projects is linked with quality management in the project life cycle. Although quality management at every stage of project life cycle is important but the quality management at the execution (construction) stage contributes significantly on final quality outcome of construction projects. This project mainly focuses the importance and factors that affects the quality management in the execution (construction) phase. The project also includes visiting of some construction companies and conducts the questionnaire survey, then analyse the difficulties (major factors) and the cost variance due to quality defect in quality management and suggests some proactive measures for the improvement of quality in the execution phase of construction projects.*

Key Words: *Quality control, quality control management, factors affecting quality of construction, coloumn work quality*

1.INTRODUCTION

Quality control is a tool to ensure the quality of product met the required standard. Quality control management is a process of taking precautions regarding quality issues. It is necessary to focus how to implement the quality control management on construction industry. Various factors like climatic condition, limitation of labor productivity, financial constraints are influencing in maintaining quality in construction industry since it is vast area to concentrate. Therefore, a systematic frame work for execution of each activities involved in a construction event is required.

In fact construction industry plays very important role in our nation's economic growth which provides 21% employment in India. Infrastructure and other development projects use a considerable portion of the budget each year. India's construction industry has facing many quality difficulties in these days. Improper buildings occur when quality outcomes don't meet the specific requirements As a result; further investments are needed for fault removal and preservation operations.

The value of finished product is based on their quality. So it became a very popular topic in recent years as a result of industry conceptual changes. Quality and quality systems are topics that are gaining traction around the world. In any industry, a product should be manufactured to a certain standard that provides customer satisfaction and value for money. The importance of achieving high quality finished products in building construction cannot be compensated. Because of the high cost of construction, it is necessary to ensure the finished product's quality. Quality is essential for long-term success and customer satisfaction.

First, a brief survey of the literature on quality management in the construction business is reported in this work. Second, the issue of defining quality in the building industry is considered. The difficulty of defining quality with data from my studies on quality in the construction sector is illustrated and discussed with various contractors. Third, issues with quality management implementation in the construction business are considered. A questionnaire for a quality survey using those data is prepared. Fourth, based on the poll, the most important element determining construction quality can be identified. Fifth, the established significant factor has an impact on the organization's time, cost, and reputation. Finally, the study's findings reveal the cost and time associated with poor quality. Then, at the end of the research, provide some recommendations to the organization.

2.0 OBJECTIVES OF STUDY

The focus of QMS is on prevention rather than correction.

The goal is to have a system that is error-free, accident-free, and waste-free at all times. The project's goal is to get things correctly the first time, reducing waste and rework.

The major goal of this work is to raise quality awareness among construction companies, particularly small businesses. Because the literature and data demonstrate that small-scale construction industries are not well-versed in quality management systems (Quality Management System). When the Quality Management System is applied, we can easily reduce material waste, cost overruns, and time waste, among other things...

The following are the specific goals and objectives of this research project:

1. To determine the possible way to implement the quality control management on small scale construction industry

2. To ensure the quality as per required standards

3. To find out the factors affecting quality of construction by identifying with the help of questionnaire survey.

4. To check the awareness of people about the quality of construction activity.

5. To raise quality awareness among low-level construction companies.

2.1 SCOPE OF STUDY

Quality is a crucial function in construction organizations in the current construction market. This project will assist future projects in lowering construction defects, reducing rework, and improving safety. Maintaining quality management fosters a high-performing team environment and a culture of continuous development, allowing for the pursuit of a zero-rework environment.

- ➢ To increase the quality of their products;
- ➢ To reduce rework; to meet customer needs;
- ➢ To improve the company's image;
- ➢ To have a low rework cost; and
- ➢ To have a zero rework environment.

3.0 LITERATURE REVIEW

Sahil Sanjeev Salvi and Samiksha Shridhar Kerkar (2020) made a study on quality assurance and quality control for project effectiveness in construction and management. This study is based on Indian construction industry. Main purpose of this study is to create ISO quality standard awareness to contractors. About 15 contractors were participated in the survey. After the survey, comparison was made on the contractor quality process into ISO standards. The quality process include inspection and test status, inspection and testing, control if non-conformance product and handling, storage and prevention. It was explained that attention on design control, internal auditing, training, statistical techniques should be paid for the better quality organization. From the result it was concluded that Plan-do-check-act (PDCA) cycle method is very useful for developing quality.

Further, it is stated that top management commitment and method of implementation is very important.

Gopi and his associates (2019) carried out a work on role of quality circles and total quality management practices in an Indian public sector industry. It addressed the issue of applying TQM in the construction industry and presented some features of the Japanese construction industry that could be implemented in the Indian field. Detailed questionnaire were prepared based on structured interviews happened. The interviews with the management representatives of two contractors working in Indian were conducted. Each interview has been followed by a site visit to one of the contractors' sites. The questionnaire consists of three sections. The first section covers questions intended to reveal the corporate profiles of the firms. The second section includes the perceptions of firms about TQM implementation. The third section consists of general questions covering the experience and obstacles facing the Indian construction industry to effectively imply the quality policies. By analysing the data excluded from the interviews and site visits, one new model has been derived to appropriate the implementation of TQM in the Indian construction industry. The Japanese contractor has been successful in adopting TQM practices in his domestic and international operations while the Indian contractor appears to lack commitment and perseverance in his overall quality policy. Indian construction companies can only benefit if the government reviews its policies toward quality and supports the construction segments by grants, tax relief, tariff protection, and market sharing agreements.

Ganaraj (2019) conducted a study on total quality management in construction. This study focuses on quality cost in the construction industry. This is very important study because everyone concentrates on profit. Main purpose of this study is to provide the awareness and practice of quality cost in construction. This study based on Malaysian construction industry. This study employed the questionnaire survey method. The questionnaire form was divided into 4 sections and comprised of 21 questions. The values came from questionnaire survey is analyzed by chi-square tests. Chi-square test is one of the statistical analysis techniques. This research based on ISO9001:2000 QMS. The main findings from the survey are poor of knowledge on quality cost among the project management team and relatively low of practice on quality cost approach in the construction industry. Based on the study it is concluded that there is a need to develop systematic and well-structured training modules for quality cost.

Sepani Senaratne and Thushangi Jayarathna (2012) focus on quality planning process of construction contractors. Main purpose of this research is to increase the quality planning process in Sri Lanka construction industry. There were three organizations selected for

survey. Pilot studies were carried out. Five key people (project manager, quality assurance manager, HR manager, two general managers) were interviewed. Using the information obtained from interview the questionnaires were formed and measured with three major contractors. They conclude that lake of quality culture is main barrier for obtains the quality construction. From this research it is understood that questionnaire were framed with the guidance of construction management practitioners.

3.1 DESIGN OF QUESTIONNAIRE

A form was designed to review a lot regarding the standard management practices within the industry and ways that to enhance quality in construction works. The questionnaires were ready with reference of literature reviews and field persons like contractors, engineers, project managers and advisor. As a result of field individuals square measure alright realizes, what square measure all the factors touching the standard majorly.

Questionnaires square measure chiefly targeted on the execution half significantly structure. As a result of the standard of construction is majorly misplace in execution half. Questionnaire chiefly divided into 5 main classes. These square measure column work, beam work, slab work, brick or block work and plastering work.

This project work focuses major factors like concreting work (concrete quality, running of concrete, compaction, curing, etc.), man power, material quality, instrumentality quality, detailing, etc.

3.2 COMPANY IDENTIFICATION

Companies for questionnaire survey are mainly classified in to 3 types   according to their cost. They are high level, middle level, and low level companies.

•High level companies their project cost is more than 100 crore

•Middle level companies project cost ranges from 5 to 100 crore and

•Low level company's project cost less than 5 crore

The high level companies are located in Chennai, Bangalore areas and The middle and low level companies are located in Coimbatore, tiruppur, erode areas.

Totally 31 respondents were duly completed the Questionnaire survey. From those 31respondents companies, 7 companies were high level companies, 13 were medium level companies, and 11 were low level companies.

Questionnaire survey was planned for 43 respondents. But some of the respondents are not willing to tell their quality of execution and quality defects so questionnaire survey completed with 31 respondents response.

4.0 RESULTS ANALYSIS AND FINDINGS

From the analysis of data the following results were obtained(for all level companies):

Column work factors- All level companies			
FACTORS	YES (%)	NO (%)	SOMETIMES (%)
Column marking	17.9	74.4	7.7
Insufficient reinforcement	16.1	74.2	9.7
Poor design	9.7	77.4	12.9
Shuttering work	64.5	16.1	19.4
Cover block	48.4	35.5	16.1
Manpower	54.8	29.0	16.1
Quality of material	12.9	77.4	9.7
Quality of concrete	33.3	59.0	7.7
Compaction	16.1	80.6	3.2
Curing	19.4	74.2	6.5
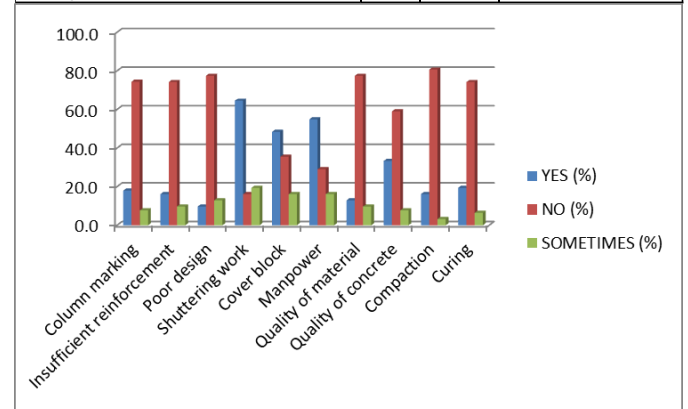
Beam work factors- All level companies			
FACTORS	YES (%)	NO (%)	SOMETIMES (%)
Insufficient reinforcement	12.9	87.1	0.0
Shuttering work	54.8	16.1	29.0
Cover block	41.9	35.5	22.6
Manpower	32.3	35.5	32.3
Quality of material	25.8	67.7	6.5
Quality of concrete	22.6	71.0	6.5
Compaction	9.68	74.19	16.13
Curing	9.68	80.65	9.68
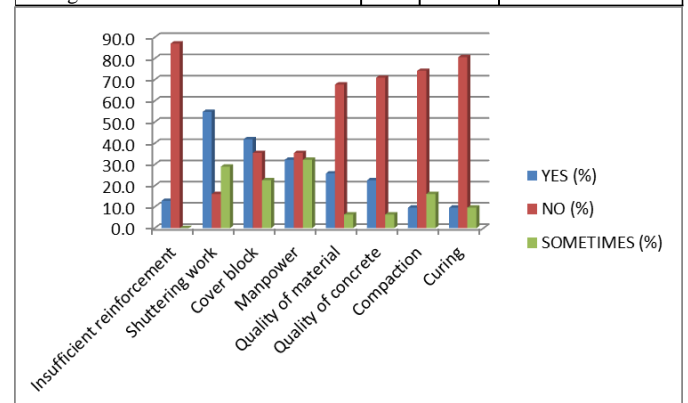
Slab work factors- All level companies

FACTORS	YES (%)	NO (%)	SOMETIMES (%)
Insufficient reinforcement	3.23	90.32	6.45
Shuttering work	35.48	45.16	19.35
Cover block	48.39	32.26	19.35
Electrical lining	9.68	54.84	35.48
Manpower	29.03	38.71	32.26
Quality of material	6.45	83.87	9.68
Quality of concrete	35.48	41.94	22.58
Compaction	16.13	74.19	9.68
Curing	22.58	67.74	9.68
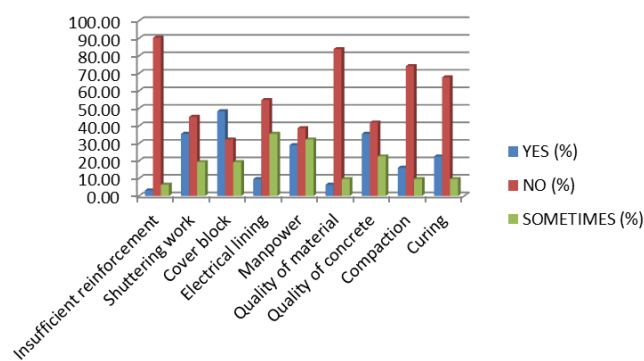
Brick work factors- All level companies

FACTORS	YES (%)	NO (%)	SOMETIMES (%)
Drawing study	16.13	70.97	12.90
Right angle marking	9.68	83.87	6.45
Starter course laying	19.35	70.97	9.68
Proportion of mortar mix	80.65	16.13	3.23
Quality of brick	22.58	41.94	35.48
Wetting the brick	16.13	70.97	12.90
Manpower	25.81	41.94	32.26
Pointing of joints	12.90	74.19	12.90
Curing	19.35	67.74	12.90
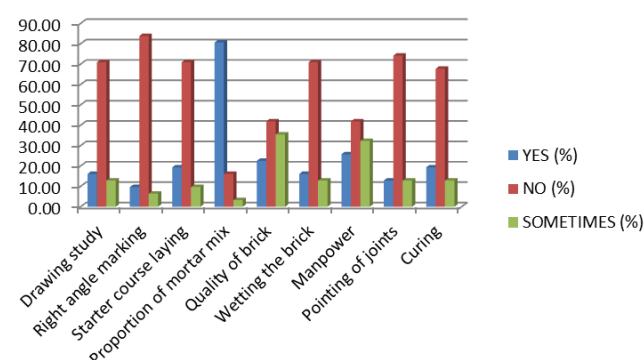
Plastering (Wall) work factors- All level companies

CATEGORY	YES (%)	NO (%)	SOMETIMES (%)
Button marking	22.58	61.29	16.13
Proportion of mortar mix	77.42	16.13	6.45
Man power	45.16	35.48	19.35
Curing	9.68	83.87	6.45
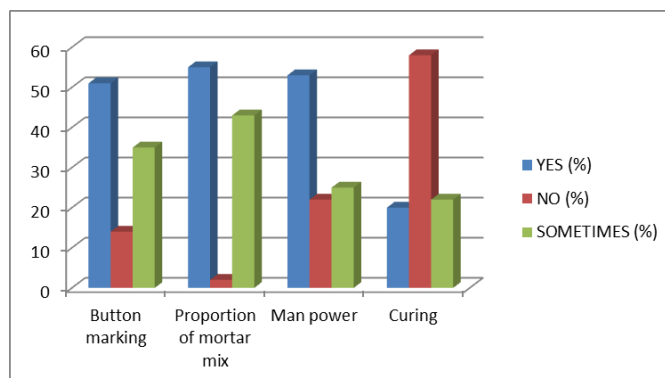
Plastering (Ceiling) work factors- All level companies

CATEGORY	YES (%)	NO (%)	SOMETIMES (%)
Hacking	16.13	80.65	3.23
Button marking	9.68	58.06	32.26
Thickness of plastering	35.48	35.48	29.03
Proportion of mortar mix	67.74	12.90	19.35
Manpower	41.94	35.48	22.58
Curing	19.35	70.97	9.68
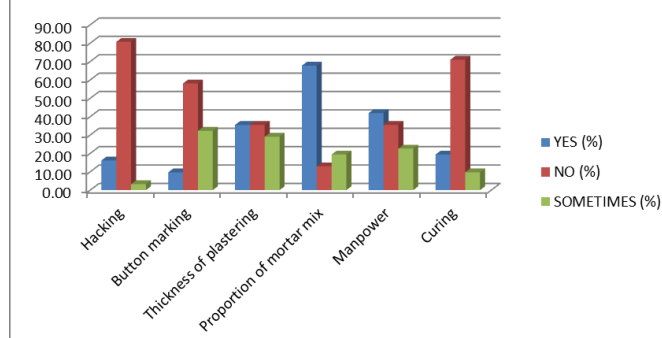
4.1 RESEARCH FINDINGS

THE FOLLOWING ANALYSED MAJOR FACTORS GREATLYAFFECT THE QUALITY OF CONSTRUCTION:

COLOUMN WORK:

➢ Shuttering work
➢ Cover block
➢ Manpower

BRICK WORK:

➢ Proportion of mortar mix
➢ Quality of brick

PLASTERING WORK:

➢ Proportion of mortar mix and man power

5.0 CONCLUSION AND RECOMMENDATION

Thereby with our questionnaire survey we can conclude that we can categorise the companies into low level, medium level and high level companies (based on project value).Among this high level companies are solely maintaining the quality aspects ,whether medium level companies even having knowledge of quality control but they are not maintaining that because of cost for quality

control. But as the out of the list the low level companies are not aware of quality our quality control measures.

There by we need concentrate on the factors that affecting the quality control system in medium and low level companies.

Those factors are cost behind the quality control in medium level companies and lack of awareness of quality control in low low level companies

By making the awareness programs about quality control and its need, we can attain our goal in low level companies. Making cost effective quality control methods can make medium level companies to do so.

And also providing a inspection authority and proper check list before the work will be enhance our quality control standards.

Those checklists are also provided in our study for each and every stage and type of work.

By doing these measures we can enhance the customer's satisfaction and company's reputation

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