

# STUDY ON OPTIMIZATION OF TIME, COST AND QUALITY IN CONSTRUCTION PROJECTS

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*Abstract:* Time cost and quality are the three major competitive objects of every construction industry. The aim of the project control is to ensure the projects finish on time, within budget and achieving the best quality. It is always a complex and challenging task for a contractor, to choose a correct bid which satisfies the time, cost and quality requirements of a project. This paper work is carried out on studying significant factors affecting time, cost and quality in Indian construction projects. A valid questionnaire for the survey was

developed based on factors affecting time, cost and quality identified from literature review. Questionnaire survey is to be conducted among the site engineers, owners and contractors in various companies. The ranking of factors will be done by using SPSS. Using that data's the major factors that affecting the time, cost and quality have to be identified. From the results suitable suggestions was given to the companies for optimizing time, cost and quality in their construction project.

## 1. INTRODUCTION

Time, cost, and quality are three major competitive objectives of every construction industry. The aim of project control is to ensure the projects finish on time, within budget and achieving best quality. Time, with its associated costs, is vitally important for each participant in the construction process including the owner, engineers and contractors. There is a constant rise in the use of innovative contract methods which provide incentives for maximizing quality. It is always a complex and challenging task

for a contractor, to choose a correct bid which satisfies the time, cost and quality requirements of a project.

## TIME CONSIDERATIONS

Timely completion of a construction project is frequently seen as a major criterion of project success by clients, contractors and consultants alike. For many clients early completion may be the overriding priority. Speedy construction on site often requires accelerated working and/or shift or overtime payments, more intense management presence, and the use of dependable subcontractors and

suppliers, all of which add to the cost of the project. Time management is important in construction because it organizes the allotted time set for the completion of the task for the purpose of meeting or even beating the deadline.

### **COST CONSIDERATIONS**

Cost is a critical factor in most building projects and some clients will seek a low price. Cost management is an approach used to realize decisions made for planning, controlling and developing competitive strategies and it is noteworthy to say that making balance between this factor and other dimensions of competition such as quality and time is required to apply management on it aiming to help maximize the profits and value creation of the organization in current activities and future. Efficiency means the ability to convert input to the output with the lowest cost.

### **QUALITY CONSIDERATIONS**

Quality in its simplest form can be defined as „meeting the customer expectations“, or „compliance with customer specification“. Developing a quality system is the first step towards improving quality in construction industry. The construction industry in India has been struggling with quality issues for many years. To the client, quality may be defined as one of the

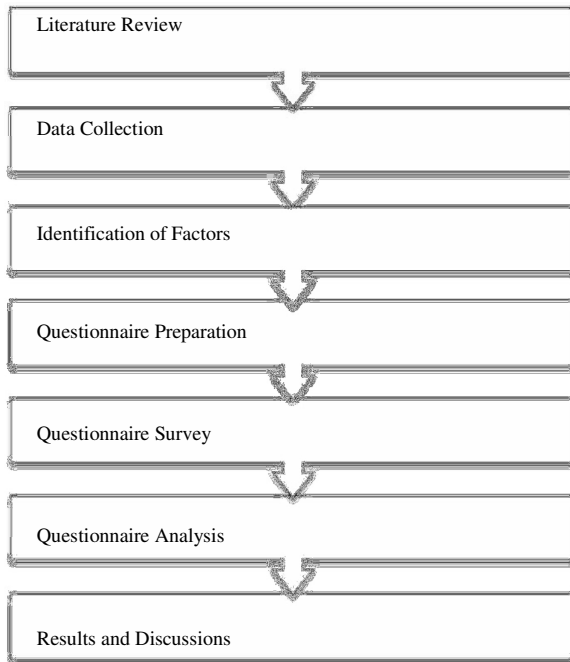
components that contributes to “value for money”. The goal is customer satisfaction. A project may be completed on time and within budget, but unless it achieves the specified quality or performance criteria. Customers often appreciated higher quality work and would pay a premium for good quality. As a result, improved quality control became a competitive advantage.

### **II.OBJECTIVES OF THE STUDY**

The objectives of the project are,

- ✓ To identify various factors affecting the time, cost and quality of construction projects and to rank them by degree of importance.
- ✓ To suggest ways to optimize the time, cost and quality in construction projects

### III METHODOLOGY



### IV FACTORS IDENTIFICATION

#### TIME RELATED FACTORS

Project Conditions  
Management conditions  
Environmental Conditions  
Equipments and materials conditions

#### COST RELATED FACTORS

Market requirements  
Technological requirements  
Resources requirements  
Contractor related factors

#### QUALITY RELATED FACTORS

Contractor related factors  
Consultant related factors  
Equipment related factors

Technology related factors

### V QUESTIONNAIRE PREPARATION

A questionnaire was designed based on the objectives of the study, which affects the time, cost and quality of construction projects. A questionnaire survey was developed to get the opinion and understanding from the experienced respondents regarding the time, cost and quality problem in construction projects.

#### QUESTIONNAIRE OUTLINE

The questionnaires are all classified into 2 sections:

- SECTION A: Company and respondent profile
- SECTION B:
  - Time related factors in construction project
  - Cost related factors in construction project
  - Quality related factors in construction project

Based on the literatures and factors considered, a Questionnaire was designed as a measurement tool to control time, cost and quality in construction. The sixty factors were adapted to measure time, cost and quality in construction project.

Also the respondents were asked to rate their level of argument according to 5 point

scale (Likerts scale) according to level of contributing

1. = Strongly Disagree
2. = Disagree
3. = Moderate
4. = Agree
5. =Strongly agree.

## QUESTIONNAIRE SURVEY

NO. OF QUESTIONNAIRES DISTRIBUTED	NO. OF RESPONSES RECEIVED
115	100

## DATA ANALYSIS

In this study, primary data is obtained using structured questionnaires. The collected data is to be analyzed using SPSS.

## RELIABILITY ANALYSIS

Prior to data analysis is, the reliability of data

Parameters	Cronbach's Alpha	N of Items
Time related factors	.709	20
Cost related factors	.820	20
Quality related factors	.741	20

was assessed using Cronbach's Coefficient Alpha Method, which is commonly used as an estimate of the reliability of data. The

Cronbach's alpha obtained for respondents' data is given in Table

The value must be in the range of 0.6 to 1.0 if the data has to be reliable. Hence the data's values are reliable.

## VI RESULTS AND DISCUSSIONS

The analysis shows that in most of the Indian construction firm's time, cost and quality affected by many factors. Ranking of factors affecting time, cost and quality were identified and discussed below.

## RANKING OF FACTORS

Factors are analyzed by using SPSS software and they are ranked based on mean value and suggestions are given in order to improve the quality and to finish the project on time within the budget.

All factors are ranked according to degree of importance and top five factors affecting time, cost and quality are discussed below. Recommendations are give to rectify factors affecting time cost and quality of the construction project. In this research, a total number of 100 questionnaires were administered and retrieved.

## TIME RELATED FACTORS

From the analysis, Delay in progress payments by the owner and is ranked 1<sup>st</sup> with the mean value of 3.96, since it score highest response from the survey conducted in timerelated factors. Slow decision making

from owner is ranked 2<sup>nd</sup> with the mean value of 3.86. Risk and uncertainty associated with project and Severe weather conditions on the job site is ranked 3<sup>rd</sup> with the mean value of 3.76. Poor planning and scheduling of the project is ranked 4<sup>th</sup> with the mean value of 3.60.

### **COST RELATED FACTORS**

From the analysis, frequent change in design is ranked 1<sup>st</sup> with the mean value of 3.96. Resource wastage on site during construction is ranked 2<sup>nd</sup> with the mean value of 3.88. Mistakes and rework during construction is ranked 3<sup>rd</sup> with mean value of 3.84. Instability of market condition is ranked 4<sup>th</sup> with the mean value of 3.60. Demand of equipments and materials is ranked 5<sup>th</sup> with mean value of 3.58.

### **QUALITY RELATED FACTORS**

From the analysis, too many change orders in the work is ranked 1<sup>st</sup> with the mean value of 3.84. Contractor's poor site management and supervision is ranked 2<sup>nd</sup> with the mean value of 3.76. Poor quality of equipments and raw materials is ranked 3<sup>rd</sup> with the mean value of 3.72. Lack of coordination b/w designers & contractors and Lack of technical and professional expertise to perform task are ranked 4<sup>th</sup> with the mean value of 3.68.

## **VII CONCLUSION**

A questionnaire-based survey was conducted from owners, site engineers and contractors from various companies through direct survey. From survey 92 responses were collected and analyzed by using SPSS software. Based on the results the factors are ranked by degree of importance.

Slow decision making from owner, delay in progress payments by the owner, risk and uncertainty associated with project, Poor planning and scheduling of the project, severe weather conditions on the job site are the major factors which affecting the time of construction project.

Frequent change in design, resource wastage on site during construction, mistakes and rework during construction, Instability of market conditions, demand of equipments and materials are the major factors which affecting the cost of construction project.

Too many change orders in the work, contractor's poor site management and supervision, poor quality of equipments and raw materials, lack of coordination between designers and contractors, lack of technical and professional expertise to perform task are the major factors which affecting the quality of construction project. In continuation of my project, more responses have to be obtained in future and the survey results are to be analyzed. More data can be obtained which will help to know more about the factors affecting time, cost and

quality. It will facilitate the improvements in optimization of time, cost and quality in construction projects.

## RECOMMENDATIONS

The following recommendations are deducted from this study to complete the project on time, within budget and achieving best quality;

- The payment by owner should be made in time for completion of project intime.
- Early identification of risk at the beginning of a project is considered essential for project time control to be effective.
- Weather is the most uncontrollable factor among the other variables considered. Temperature and humidity affect productivity of workers.
- Perform a pre-construction planning of project task and resources needs. Proper scheduling is the key to utilizing project resources, if it not, the project cost will increase.Frequent change in design leads to additional cost and time consumption. This problem arose from inadequate project planning and management of the design process.

## REFERENCES

Adenuga and Olumide Afolarin (2013) 'Factors Affecting Quality in the Delivery of Public Housing Projects in Lagos State, Nigeria', International Journal of Engineering and Technology, Vol. 3, No. 3, pp. 332-344.

Adnan E.,Mohamed S and Abushaban S (2009) 'Factors Affecting the Performance of Construction Projects in the Gaza Strip', Journal of Civil Engineering and Management, Vol.15, No. 3, pp. 269-280.

Adnan Enshassi, Sherif Mohamed and Saleh Abushaban. (2009) 'Factors affecting the performance of construction projects in the Gaza strip', Journal of Civil Engineering and Management, Vol.15 No.3 pp.269-280.







