

Identifying the Factors Affecting Quality of Residential Construction Project in Surat

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Abstract— This research is intended to offer customers, mission managers, designers, and contractors with the necessary statistics had to higher manage the nice of residential creation tasks in Surat. Numerous papers, reviews, the findings of a studies look at, has been undertaken to determine the underlying elements affecting fine of building production initiatives. The elements affecting residential construction satisfactory have been categorised into 8 most important elements and 46 sub-factors. The notion of practitioners i.e. representative, architect, engineer & contractor could be obtained via this questionnaire. The sub-factors that have an effect on the first-rate of building construction initiatives and their relative importance can be recognized and utilized in identifying the principle elements the use of the relative importance index (RII) approach. Later the preventive / corrective measures may be evolved for minimizing the outcomes took place by means of the principle issue affecting satisfactory. After mixed analysis of normal survey end result it was found that layout, web page format and location personnel, economic troubles, system and generation uses, cloth and equipment, Contractor and Subcontractor, challenge and surroundings, exertions are maximum essential least essential among all factors.

Key words: Factors, Residential Construction, Project, Quality, Survey

I. INTRODUCTION

Construction industry plays an important role in the development of any country. Development of construction industry depends on the quality of construction projects. Quality has become one of the essential elements in recent years due to conceptual changes in the construction industry. Quality of design, material used and workmanships affects the future operating, maintenance and rehabilitation costs of infrastructure. Quality is one of the critical 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. A construction project in its life span goes through different phases. The main phases of a project can be described as conceptual planning, feasibility study, design, procurement, construction, acceptance, operation and maintenance. The need for achieving quality of the finished product in the construction projects is very important. Construction projects are an extremely complex process, involving a wide range. There are plenty of factors affecting the quality of construction such as design, materials, machinery, topography, geology, hydrology, meteorology, construction technology, and methods of operation, technical measures, and management systems and so on.

II. REVIEW OF LITERATURE

John E. Shively (Year-1990) this study is carried out to identify the specific actions that firms take to ensure quality in their organizations. From the study it is identified that the firms taking more care in the following areas for assuring the quality are, Goals and Objectives, Organizational Structure, Public Relations Practices, Office Environment and Technical Sources, professional and technical staff, Professional Development and Employee Advancement. David Arditi., & H. Murat Gunaydin (Year-1998) these human beings carried out a look at to become aware of the elements that have an effect on method first-rate. regularly occurring elements that have an effect on manner first-class are, control dedication to non-stop quality development, management leadership in promoting high system nice, satisfactory education of all employees, efficient teamwork to sell high-quality issues on the company stage, and powerful cooperation between parties taking element within the project. Industry unique elements are, Drawings and specifications which might be steady, designers and contractors which might be decided on on advantage, communication practices between the parties which can be effective and Inspection of quality on the construction site. Abdol R. Chiniand Hector E. Valdez (2003), the principle objective of this paper is to decide whether or not ISO 9000 is an applicable tool for construction agencies in the america. ISO 9000, the collection of nice control standards issued with the aid of the global employer for Standardization, is being utilized by agencies involved in production all over the global. A survey changed into dispensed to U.S. creation companies to decide their motivations for certification, the applicability of the standards internal construction corporations, and the limitations that restriction the attractiveness of ISO 9000 in U.S. construction firms. K.N. Jha., & K.C. Iyer. (Year-2006), this paper identified the factors affecting the quality performance in construction projects and helps to suggest possible remedial measures for improving the quality. Questionnaire survey was carried out and the data's are collecting from large construction industry. From the take a look at the essential achievement elements obtained were: mission manager's competence; top management's help; tracking and comments by undertaking members; interplay amongst assignment individuals; and owners' competence. The factors that adversely affected the fine performances of projects were: struggle among undertaking members; adverse socio-financial surroundings; harsh climatic circumstance; PM's lack of know-how & lack of expertise; faulty challenge conceptualization; and competitive competition at some stage in tendering. Adnan Enshassi., Sherif Mohamed., & Saleh Abushaban (Year-2009) the objective of this paper is to perceive the elements

affecting the overall performance of nearby production initiatives; and their relative significance. The most essential factors agreed by using the proprietors, experts, and contractors as the main factors affecting the overall performance of creation projects have been: fabric charges, availability of assets as planned through project length, common delay due to closures main to substances shortage, availability of employees with a high revel in and qualifications, exceptional of equipment and uncooked materials in undertaking and management abilities for challenge managers.

III. OBJECTIVES OF THE STUDY

The objectives are as follows

- 1) To investigate the adoption and implementation of QMS in construction industry.
- 2) To identify major factors affecting the quality of construction particularly in execution phase.
- 3) To rank these factors by their degree of importance.

IV. RESEARCH METHODOLOGY

A. Importance of Study

The other production industries are setting up the exceptional management gadget but in production enterprise we cannot set up even first-class management machine. The cause behind is each construction project is precise and pleasant is ever changing component i.e. excellent changes time to time and vicinity to area. However there are many common sports in creation task like concrete paintings, block work, plastering, and so on. Those commonplace works are laid low with a few most important factors like excellent of fabric, first-class of manpower, creation detailing, concrete paintings. This observe is intended to discover main elements affecting pleasant in construction and creating excellent recognition at low stage creation agencies. Excellent management at every level of venture lifestyles cycle is crucial but the satisfactory management at the development level contributes substantially on final nice final results of production initiatives. Certain factors are more critical to a projects fulfillment than others. Those elements are known as crucial assignment achievement factors. On this look at, the factors affecting the first-rate overall performance of creation tasks were studied. This is a key component for any employer transferring closer to attaining excellent practice in order to overcome the first-class performance hassle within the production initiatives.

V. METHODOLOGY

The methodology of the study is shown in Fig. a thorough literature review was conducted to identify the factors that affect quality as recognized by researchers and practitioners in this field.

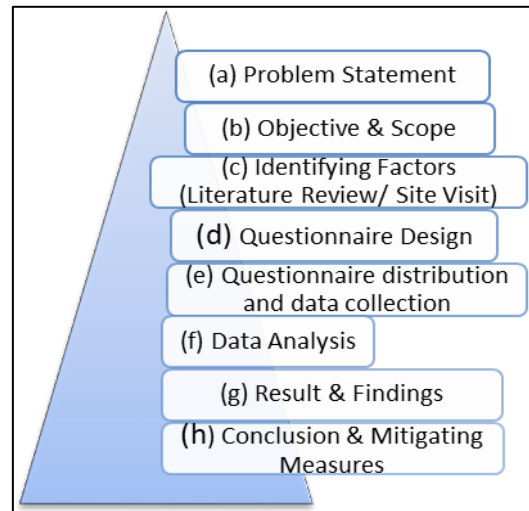


Fig. 1: Research Methodology

Methodology involves interaction with various personnel's involved in construction work. Based on the interaction and the literature review factors affecting the quality of construction are identified. The life-cycle phase of building projects consists of pre-construction, construction and post construction phase. Questionnaire is mainly focused on the construction phase of project because the quality of construction is mainly hampered in execution phase. Appropriate questionnaire was designed based on the interaction with personnel's involved in construction and literature reviewed.

The questionnaire was administered to the group of respondents namely representatives of Private Firms and Government organizations. The survey was conducted at various sites so as to collect data required for assessment of factors affecting the quality of construction. The population for the study comprises of professionals in consulting, contracting, housing development firms and representatives of Government organization who have been involved in the management and execution of public projects where quality assurance practices are of paramount effect within the study area. The population was determined by selecting respondents at random. Further the collected data was analyzed so as to rank those factors as per their degree of importance. Relative Importance Index method (RII) was used to rank these factors as per their degree of impotence. The data was divided into two groups namely responses from Private Firm and responses from Government Organization. By using RII method the major factors that affect the quality were ranked accordingly. Ranking was done in three groups namely responses of Private Firms, responses of Government Organization and Combined Response of both the group of respondents.

Factors Affecting Quality Management in Construction Industry

No Main Factor	Sub-factors
1. Project & Environment	<ul style="list-style-type: none"> - Period of the project - Planning and detailing the different stages of changes in the project - People are responsible for the quality and end results of the project - Stability of Political environment - Environmental risk plays an important role

	<ul style="list-style-type: none"> - Impact on society and environment
2. Design	<ul style="list-style-type: none"> - Completeness and consistency of design documents - Drawings are prepared in full details - Conformance to codes and standards - Changes in design affects construction - Constructability of the design - Systematic design and management of process
3. Material & Equipment	<ul style="list-style-type: none"> - Availability of good quality construction materials - Site quality inspection of materials - Material specification - Availability of equipment - Good utilization of equipment - Equipment maintenance
4.Labor	<ul style="list-style-type: none"> - Using labor with high experience - Using motivation system - Training courses for labor - Income level and wages of labor - Labors work less than 8hours per day - Lack of communication
5. Site staff & Site layout	<ul style="list-style-type: none"> - Site layout is large - Site layout is organized well - Site layout has storage areas for materials - Cooperation between Supervision and Contractor's staff - Skill and experience of Supervision staff &contractor staff - Meetings occur frequently in site - Proper communication between client and contractor
6.Systems & Technology Uses	<ul style="list-style-type: none"> - Software and computer applications - Implement quality control and assurance system - Systematic measurement of quality and non-quality cost - Systematic assessment of the process - Improvement of processes using innovative technique - Planning and Control Technique
7.Financial Issues	<ul style="list-style-type: none"> - Amount of contractor's cash flow - Non-delay of interim payments - Financial problems arise during construction - Allocation of financial resources to meet the actual budgeted cost
8. Contractor & Subcontractor	<ul style="list-style-type: none"> - Inappropriate method of contractor selecting - Planning and managing human resources - High cooperation between subcontractors and general contractor - Using a system to evaluate Subcontractors performance - Good and fair subcontract conditions - Reduced Subcontractor responsibility

Table 1: Factors Affecting Quality Management in Construction Industry

A. *Relative Importance Index Technique*

The Relative significance Index technique is used to decide the relative significance of the various factors. The aim of such analyses is to partition defined variance among more than one predictors to better recognize the position played by way of each predictor in a regression equation. The six-point scale ranged from 0 (not vital) to five (extraordinarily vital) have been adopted and transformed to relative importance indices. The RII was used to rank (R) the various factors which have an effect on the high-quality of creation. These rankings made it possible to move-compare the relative importance of the factors as perceived by way of the 2 companies of respondent's i.e. private firm and authorities

organization. Each character elements RII perceived via all respondents should be used to assess the overall and typical rankings a good way to give a universal image of the elements affecting the nice of construction enterprise.

The RII was computed as follow

$$RII = \Sigma W / A * N$$

Where,

RII - Relative Importance Index,

W = weighting given to each factor by the respondents (ranging from 0 to 5)

A = highest weight (i.e. 5)

N = total number of respondents

Sr. No.	Respondent	Nos. of Questionnaire
1	Consultant	50

2	Architect	50
3	Contractor	50
4	Engineer	50

Table 2: Respondent Details (Random Sampling)

VI. RESULT & ANALYSIS

Rank	Main Factors	RII
1	Systematic design and management of process	0.857
2	Skill and experience of Supervision staff & contractor	0.795
3	Financial problems arise during construction	0.763
4	Systematic measurement of quality and non-quality cost	0.758
5	Availability of good quality construction materials	0.733
6	Site quality inspection of materials	0.729
7	Inappropriate method of contractor selecting	0.721
8	Using labor with high experience	0.715
9	Using motivation system	0.708
10.	Training courses for labor	0.702

Table 3: Top 10 factors as per Engineer point of view

Rank	Main Factors	RII
1	Drawings are prepared in full details	0.893
2	Conformance to codes and standards	0.802
3	Availability of good quality construction materials	0.782
4	Site layout is organized well	0.756
5	Financial problems arise during construction	0.741
6	Improvement of processes using innovative technique	0.739
7	Inappropriate method of contractor selecting	0.731
8	Planning and Control Technique	0.716
9	Availability of equipment	0.711
10.	Systematic design and management of process	0.702

Table 4: Top 10 factors as per Consultant point of view

Rank	Main Factors	RII
1	Conformance to codes and standards	0.839
2	Site layout has storage areas for materials	0.809
3	Financial problems arise during construction	0.795
4	Systematic assessment of the process	0.783
5	Site quality inspection of materials	0.761
6	Using a system to evaluate Subcontractors performance	0.752
7	Stability of Political environment	0.749
8	Planning and managing human resources	0.733
9	Using labor with high experience	0.722
10.	Income level and wages of labor	0.704

Table 5: Top 10 factors as per Architect point of view

Rank	Main Factors	RII
1	Constructability of the design	0.886
2	Cooperation between Supervision and Contractor's staff	0.798
3	Amount of contractor's cash flow	0.776
4	Improvement of processes using innovative technique	0.770
5	Good utilization of equipment	0.763
6	Reduced Subcontractor responsibility	0.754
7	Stability of Political environment	0.749
8	Planning and detailing the different stages of changes in the project	0.733
9	Using motivation system	0.729
10.	Lack of communication	0.711

Table 6: Top 10 factors as per Contractor point of view

Rank	Main Factors	RII
1	Design	0.8329
2	Site layout and Site staff	0.7862
3	Financial Issues	0.7837
4	System and Technology Uses	0.7833
5	Material and Equipment	0.7731
6	Contractor and Subcontractor	0.7617
7	Project and Environment	0.7558
8	Labor	0.7277

Table 7: Overall main factors as per respondents of view

For overall main factors as per respondents of view Design, Site layout and site staff, financial issues. The design professional must be knowledgeable about the provisions of codes and standards before starting the design process because the building codes directly control the minimum standards of many components of a building project and are responsible for much of the finished product quality. Education and training courses employees not only possess the adequate knowledge and skills to perform their jobs but also to possess specific values, knowledge and skills associated with quality issues and activities. Thus lack of training will result into poor quality construction. This is another important factor of construction and in every type of work where contractor had to plan for financial payment to eliminate the risk because it might affect the project and its quality.

VII. CONCLUSION

This study shows that among the 8 main factors and 47 sub-factors. Project & environment, Design, Material & Equipment, Labor, Site layout & Site staff, System & Technology uses, financial issues, Contractor & sub-contractor are the main factors influencing quality. The analysis of results showed that these 5 main factors consider in relative importance index (RII). Improvements in the aspect of the residential construction related to these factors should make it possible progressively to improve quality in Surat. The results showed that there is an obvious need for extensive study on how to improve quality on residential construction project. The present study is an essential first step towards highlighting the major issues that need attention to improve the quality of residential construction projects in Surat. More efforts are still needed to investigate ways to

formulate management systems to handle each factor individually.

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