

ANALYSIS TOP CRUCIAL FACTORS OF CONTRACT CLAUSES AND QUALITY IN CONSTRUCTION PROJECTS USING RII METHOD

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Abstract— The construction industry facing the problem of quality issues which are affecting the overall success of project. Firstly, in order to control the quality issues it is necessary to analyze the crucial reasons of various factors of quality issues by knowing the opinions from the persons that have been involved in construction industry. The main purpose of this study is to identify the crucial factors of contract clause which are affecting quality in construction projects might prove to be beneficial to stakeholders of construction industry thus by providing best remedies of those crucial factors. The remedies will help in controlling quality to some extent ultimately contributing to success of project. In this research work a questionnaire based approach has been adopted. The Scope of this research work is limited to residential and commercial construction projects. This research work focus on most crucial factors of contract clauses and quality. RII method is opted to analyze the data. Total 240 Questionnaire distributed among the stockholders like Contractor, Engineers. Total 145 responses have received. So response rate is 60.41%. From this investigation, 38 out of top 10 crucial factors for contract clauses and 17 out of top 7 crucial factors for quality issues.

Index Terms— Contract Clauses, Construction projects, Customer satisfaction, Quality issues, RII method.

I. INTRODUCTION

The contract clauses are varied from a country to country and even from city to city, because of economic, social, and competitive situations of the area and the government rules and regulations. In addition, the clauses may vary from one type of construction to another, for example, the cause of highway construction is not the same for residential construction.

Contract clause is a specific provision or section within a written contract. Each clause in a contract addresses a specific aspect related to the overall subject matter of the agreement. Contract clauses are aimed at clearly defining the duties, rights and privileges that each party has under the contract terms.

The contract clauses are very important in construction industry so if any contract of government project is advertised, then they contain various contract clauses. All those contract clauses are taken seriously and are implemented during the execution of work. The implementation of these contract clauses, the project can completed in the given budget & time.

Quality in construction is defined as 'meeting or exceeding the requirement of client/owners.' Quality in construction is related to; satisfying the specification mentioned in the contract & completes the project in time. Quality is one of the important aspects of all projects. Quality performance is the key to measure level of success of construction projects. Quality in construction and projects are two face of a coin so they cannot exist without each other.

Quality in construction is nothing but customer's satisfaction within specified budget. Quality is involved in every construction stages from project start to finish. Construction projects and quality are inseparable parts of each other. The modern construction world requires construction companies to guaranty the quality of their product to their clients. The quality is a key function in all infrastructure development environments like cost and time. It becomes one of the vital factors in any construction project.

In construction projects lack of quality results in delays, cost overrun and unsafe structure. Cost is vital and important in any project. Cost reduction through eliminating wastages, excess consumption, rejection, substandard, rework has to be achieved in all functional areas. Performance characteristics are the term which correlated and measured in terms of number of characteristics that contribute to an overall performance which satisfies customer's requirements.

II. OBJECTIVE OF STUDY

- ✚ To identify **Contract Clauses** affect Quality of construction project.
- ✚ To identify various critical factors affecting **Quality Issues** to compete the project.
- ✚ To investigate and analyze top crucial factors of Contract Clauses and Quality Issues using **RII** method.

III. LITERATURE REVIEW

According to K. S. Shobana and D. Ambika^[15], better quality performance makes the construction project more successful. Quality is an essential component for customer satisfaction. Quality is a very essential to achieve finish product in the construction projects. In construction projects, quality performance is considered as vital for client satisfaction. This research has revealed several factors that have adverse effect on quality. Finding out of these factors will help to improve the quality.

C. William Ibbs and David B. Ashley^[6] have successfully demonstrated the importance of thoughtful and meticulous contract preparation to achieve improved project performance. Owners and contractors alike will benefit by taking a more discerning approach to the contractual arrangements of their projects. Although the analysis has already provided many suggestions for contract improvement, it is important to note that nine specific clauses were consistently identified as being most troublesome and as having a statistically significant impact (at least to the 80% level) on project performance.

The study carried out by K. S. Shobana and D. Ambika^[14], revealed the significant factors affecting quality are occurrence of meeting, environmental risks, working hours, material delay, and labour shortage, coordination, checking inventory level, resource delay, coordination and safety precautions. Majorly it can be categorized under labour and material related factors. In construction, labours and materials are to be focused in order to improve productivity which greatly increases quality. Environmental risks cannot be predicted in construction but the works can be preplanned according to the present climatic conditions.

K. N. Jha & K. C. Iyer^[13], this paper identified the quality performance factors affecting in construction projects and suggest the possible remedial measures for improving the quality. Questionnaire survey was carried out and the data's are collecting from large construction industry. From the study the critical success factors obtained were: Project manager's competence; top management support and their competence; interaction between project participants; owners' competence; and monitoring and feedback by project participants are the factors having positive contributions to achieving the desired quality level, while factors such as conflict among project participants; hostile socio-economic and climatic condition; ignorance and lack of knowledge; some project specific factors; and aggressive competition at the tender stage are found to adversely affect the quality performances of projects.

Teena Joy^[18] carried out a questionnaire based survey which was used to find out the attitude of contractors and consultants towards factors affecting quality of construction project. 50 questionnaires were distributed and 30 were returned, 15 from contractor's and 15 from consultants. The respondents were asked to indicate their opinion about the quality factors as very important, important and low important. The results show that the most important factor agreed by the contractors and consultants are: Conformance to codes and standards, Materials, Labours, Financial problems. In construction projects, quality performance is considered as vital for client satisfaction. Finding out of these factors will help to improve the quality. Quality training and meetings that is necessary for performing an improvement.

IV. RESEARCH METHODOLOGY

The research methodology contains included a literature review search followed by the interviews and through books, conference proceedings, internet and international project management journals.

The methodology which is applies in this research to achieve the research objectives. Basically, this research work includes six different phases.

1. Identification of the objectives.
2. Review of literatures.
3. Identify factors of the contract clauses and quality issues in construction projects.
4. Data that has to be collect and framework has to be established.
5. Analysis of collected data. Data analysis was done by RII method to rank the contract clauses & quality issues.
6. Conclusion and Recommendation.

V. QUESTIONNAIRE DESIGN

The questionnaire is divided into two parts namely as Part I Contract clauses & Part II Quality Issues. RII method is adopted for data analysis. Finding out the relative important index (RII) for which the four-point scale ranged from 1 (less important) to 4 (extremely important) is adopted.

The formula to calculate RII given below:

$$RII = \frac{\sum W}{AN} \quad \dots (1)$$

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.

VI. DATA COLLECTION

The designed questionnaire is surveyed among 240 engineers out of whom 145 responses were received. Therefore the response rate is 60.41%.

Table 3 Percentage of Questionnaires Distributed & Questionnaire Received

Sr. No.	Respondent	Questionnaires Distributed	Questionnaires Received	% of Response	% of Respondent
1	Contractors	100	58	58	48
2	Engineers	140	87	62.14	52
3	Total	240	145	60.41	100

VII. DATA ANALYSIS & RESULTS

A) Contract Clauses

Table 4 Overall Ranking by RII Method

Contract Clauses	RII	Rank
Contract agreement	0.934	1
Inspection of work	0.916	2
Responsibilities of contractor for correctness of work	0.888	3
Execution of work	0.834	4
Test of quality of work	0.814	5
Labour laws and regulations	0.778	6
Safety code	0.772	7

Schedule of rates	0.752	8
Settlement of disputes	0.738	9
Schedule of quantities and extra items	0.731	10
Scope of work	0.721	11
Interpretation of tender document	0.714	12
Special risks	0.712	13
Extension of time	0.672	14
Power of engineer-in-charge to give further instruction	0.671	15
Ownership	0.645	16
Contractor’s subordinate staff and their conduct	0.640	17
Procedure for measurement of work in progress	0.638	18
Health & sanitary arrangements for workers	0.629	19
Location of site and accessibility	0.617	20
Contractor’s responsibility with the other contractor and agencies	0.617	21
Accidents	0.617	22
Materials procured with assistance of the owner	0.607	23
Completion certificate	0.605	24
Time for completion	0.598	25
Star/basic rate	0.593	26
Materials obtained from dismantling	0.588	27
Discrepancies between instructions	0.572	28
Price adjustment	0.567	29
Testing and inspection charges	0.562	30
Subletting of work	0.559	31
Terms of payment	0.559	32
Work in monsoon	0.550	33
Action when no specification is issued	0.538	34
Patents and Royalties	0.534	35
Action and compensation in case of bad workmanship	0.526	36
Lien or claim	0.457	37
Abnormal rates	0.448	38

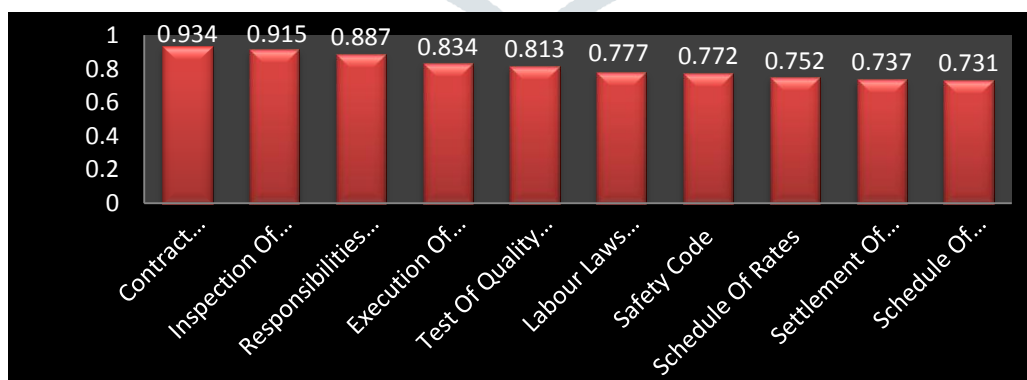


Fig. 1 Top 10 Crucial Factors of Contract Clauses

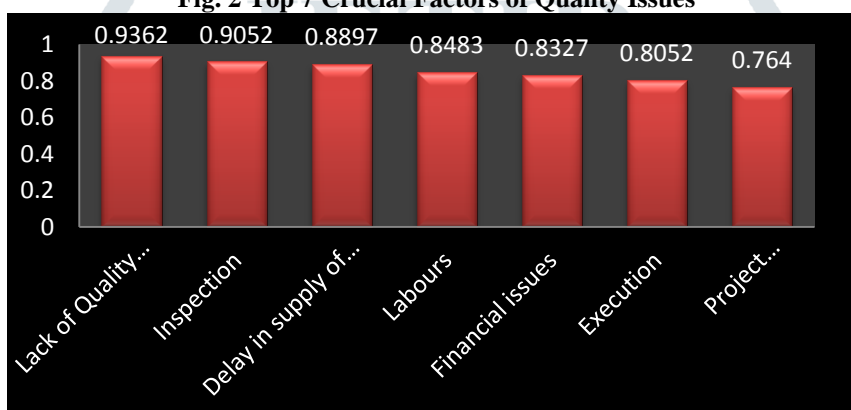
B) Quality Issues

Table 5 Overall Ranking by RII Method

Quality Issues	RII	Rank
Lack of quality plans	0.936	1
Inspection	0.905	2

Delay in supply of materials	0.890	3
Labours	0.848	4
Financial issues	0.833	5
Execution	0.805	6
Project manager's ignorance and lack of knowledge	0.764	7
Coordination among workers	0.753	8
Lack of quality control techniques	0.714	9
Standards & experience	0.686	10
Proper equipment management	0.674	11
Interaction & communication	0.647	12
Contract documents	0.641	13
Improper inventory management	0.603	14
Quality engineer's involvement	0.572	15
Latest techniques are adopted in construction	0.545	16
Commitment of all project participants	0.545	17

Fig. 2 Top 7 Crucial Factors of Quality Issues



VIII. CONCLUSION

This study focused on critical factors of contract clauses affecting quality of work in construction projects for South Gujarat Region of India.

- In this research work Total 38 factors of contract clauses & 17 factors of quality issues were identified through literature study & experts opinion.
- In the relative ranking of Contract clauses and Quality issues we found that Top 10 most crucial factors of contract clauses are; Contract agreement, Inspection of work, Responsibility of contractor for correctness of work, Execution of work, Test of quality of work, Labour laws & regulations, Safety codes, Schedule of rates, Settlement of disputes and Schedule of quantities & extra items.
- Top 7 most crucial factors of quality issues are; Lack of quality plans, Inspection, Delay in supply of materials, Labours, Financial issues, Execution and Project manager's ignorance and lack of knowledge.

From the investigation we can able to say that contract clauses directly influence on quality of construction work so we need to pay special attention on various clauses which are severely influence on quality of work.

IX. RECOMMENDATION

The following recommendations are made based on the results and discussions of the study.

- In contract agreement clearly specify to maintain Quality by enforcing strict supervision of work commencing at any construction site which determines the customer satisfaction.
- Proper Quality implementation plan should be implemented and proper Inspection of work should be done to avoid mistakes at the construction site.
- Contract clauses should be drafted in such a way that ambiguity terms should not confuse the contractor to understand the interpretation and clauses.
- This study suggest to pay special attention on quality from document stage to project completion stage so as per the guidelines work progress should be done in appropriate manner.

X. ACKNOWLEDGEMENT

I would like to take this opportunity to express my profound debt of gratitude towards Dr. Neeraj. D. Sharma, (Principal & HOD of civil engineering department, S. N. Patel Institute of Technology & Research Centre, UmraKh, Gujarat, India). Mr. Vyom B. Pathak and Ms. Neetu B. Yadav, for their valuable guidance, helpful comments and cooperation with kind and encouraging attitude at all the stages of the work.

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