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Risk Assessment Framework of Project Management in Surat City for High-Rise Building

Chandrakantkumar Jagubhai Bhoya¹, Ms Neetu B Yadav²

¹ME Scholar, ²Assistant Professor, Civil Engineering Department, SNPIT & RC Umrakh, Gujarat, India

Abstract: *This paper gives information about identification of construction project risk factors and perceptions of Indian construction professional i.e., clients, contractors, engineers, site engineers, architect and project managers on the importance of different construction project risk. Risk management for high rise building construction projects has been recognised as a very important management process in the project. Now most research has focused on some aspects of construction risk management using a systematic. Construction projects are different different types of risk identification. This report discusses factors that affect risk management for high rise building construction project. 39 factors are identified from various literatures, which affect high rise construction projects. The objectives of this research have been achieved through literature review, data collection, analysis the risk associated in a construction project from questionnaire survey among contractors, engineers, site engineers and architects is analysed using RII (Relative Important Index) method. The focus of this study is to understand risk management is, understand the process of risk management for high-rise building construction project and depth of knowledge on the use of risk management for high rise building construction projects.*

Keywords: Risk, Risk Management (RM), High-Rise Building Construction, Risk Assessment (RA), Relative Important Index (RII).

I. INTRODUCTION

High rise building construction projects are very major part of construction industry which has an important role for growth of the Nation. High-rise buildings have always been a key construction development over the years in keeping pace with the increasing demand of human population. The risk factors in high-rise building construction projects are very high. Hence risk involved in high-rise building structures also plays a major role in construction industry. Construction project objectives are always unique and built once. Risk are arising from different different sources. Risk all the time occurs at high rise building construction projects and frequently leads to time or cost overruns of construction projects.

Risk management can be defined as the systematic process of has been divided into risk classification, risk identification, risk analysis, risk response, (where risk response has been further divided into risk actions, i.e. risk avoidance, risk transfer, risk mitigation, risk share, risk acceptance.) and risk control. Most of the high Rise building in India is in the Mumbai and Delhi.

II. OBJECTIVES

- A. To identify key risk factors in the construction of high rise building.
- B. To assess the risk factors involved.
- C. To study these factors using RII (Relative Importance Index) method.

III. RESEARCH METHODOLOGY

The work included a literature search and interviews. The literature review was conducted through book, internet and journals. As the outcome of this, 33 risk factors for high rise building construction projects were identified. These factors were categorized in eleven main groups such as: design, physical, logistics, legal, environmental, management, cultural, financial, construction and policies. The questionnaire is divided into two main parts. Part I deals with general information for respondents such as contractors, site engineers, engineer, educational exports, answering questions related to their experience in the construction industry and requesting their opinions about factors affecting risk management construction project. Part II contains the list of identified factors affecting risk management for high rise building construction projects. The data were analyzed by the RII method.

A. Relative Importance Index (RII) Method

Based on the data analysis will be made to find out the most suitable methodology that can be applied for factors affecting risk management for high rise building construction projects. The collected data were analyzed through the statistical techniques i.e. Relative Importance Index (RII): Relative Importance Index method helps to determine the relative importance of the various factors affecting risk management in construction process. The five point scale ranging from 5 (very important) to 1 (not important) and it is transformed to relative importance indices (RII) for each factor as follows:

$$RII = \frac{5n_1 + 4n_2 + 3n_3 + 2n_4 + n_5}{5(n_1 + n_2 + n_3 + n_4 + n_5)}$$

Where, n_1, n_2, n_3, n_4 and n_5 = the number of respondents,

n_1 = number of respondents who answered "Very high"

n_2 = number of respondents who answered "High"

n_3 = number of respondents who answered "Medium"

n_4 = number of respondents who answered "Low"

n_5 = number of respondents who answered "Very low"

Each individual factor's RII perceived by all respondents should be used to assess the general and overall rankings in order to give an overall picture of the risk management for high rise building construction projects.

IV. COLLECTION OF DATA

Questionnaire was designed based on the factors affecting risk management for high rise construction project identified from the literature review. The main purpose of the questionnaire was to identify the likelihood of occurrence and impact of each risk factors associated with the risk management construction building project. Subsequently, Pilot survey was carried out to validate the questionnaire. Validated questionnaire and expert survey was carried out to collect the primary data. The data will be collected from various registered Civil engineers, consultants, contractors, site engineers and architect. Total 33 numbers of factors are identified by literature study. The questionnaire were distributed to various stakeholders by informing them regarding the purpose of the research and asking them about their willingness to participate in the research. The civil engineers, contractors, site engineers, architect and consultant showed once the initial willingness. A questionnaire was given to them. Total 115 questionnaires were distributed to different respondents in Surat District. This study received 83 responses. The responses of them were taken for this analysis.

Table 1
Distribution of Respondents

STAKEHOLDERS	TOTAL
Engineer	42
Site engineer	15
Contractor	17
Architect	9
TOTAL	83

V. DATA ANALYSIS

A. Data Analysis by RII (Relative Importance Index) method

Data were gathered through a survey & analyzed by using Relative Importance Index (RII) Technique. RII technique: The procedure used in analyzing the results was aimed at establishing the relative importance of the various factor affect risk management for high rise construction project responsible for project failure/Risk by giving rank to the factor by RII technique. The questionnaire gave each respondent an opportunity to identify the factor that was likely to risks by giving the response "very important, important etc." The primary data collected from the first part of the questionnaire was analyzed from the perspective of Contractor, Engineer, Site Engineer, Architects. The total 83 number of respondents comprises of 17 Contractors, 42 Engineer, 15 site engineers and 9 Architect who participated in this field survey. The responses of them were taken for this analysis.

Table 2
Ranking of Overall Response by RII Method for Risk Factors

SR.NO	FACTORS	RII	RANK
A	DESIGN		
A1	Defective Design	0.479	10
A2	Awarding the Design to Inexperience Designer	0.333	19
A3	Inaccurate Quantities	0.263	30
A4	Design Changes	0.311	22
B	PHYSICAL		
B1	Occurrence of Accidents Because of Poor Safety Procedures	0.342	17
B2	Supplies of Defective Materials	0.294	23
B3	Security of Material And Equipment	0.261	32
B4	Varied Labour And Equipment Productivity	0.280	25
C	LOGISTICS		
C1	Improper Site Investigation	0.341	18
C2	High Competition in Bids	0.544	5
C3	Poor Communications Between the Site and Head Offices	0.559	4
D	LEGAL		
D1	Ambiguity of Work Legislations	0.272	27
D2	Difficulty to Get Permits	0.271	28
D3	Disputes Among the Parties of Contract	0.235	33
E	ENVIRONMENTAL		
E1	Adverse Weather Conditions	0.262	31
E2	Difficulty to Access the Site	0.480	9
E3	Natural Calamities (Floods, Earthquakes, Fire, etc.)	0.586	3
F	MANAGEMENT		
F1	Poor Communication Between Involved Parties	0.537	6
F2	Improper Planning	0.508	7
F3	Changes in Management Ways	0.274	26
F4	Information Unavailability	0.264	29
F5	Material Management	0.504	8
F6	Equipment Management	0.312	21
G	CULTURAL		
G1	Religion	0.325	20
H	FINANCIAL		
H1	Delayed Payments on Contract	0.664	2
H2	Unmanaged Cash Flow	0.356	15
H3	Inflation	0.445	11
H4	Financial Failure of the Contractor	0.727	1
I	CONSTRUCTION		
I1	Gaps Between the Implementation and the Specifications.	0.360	13
I2	Actual Quantities Differ from the Contract Quantities	0.350	16
I3	Lower Work Quality in Presence of Time Constraints	0.356	14
I4	Undocumented Change Work Orders	0.292	24
J	POLICIES		
J1	New Governmental Acts or Legislations	0.437	12

VI. CONCLUSIONS

This research is intended to identify the risk factors affecting in high-rise building construction projects. This study investigates all possible risk factors affecting in high-rise building construction projects through a structured questionnaire distributed in Surat city of Gujarat. The survey results are subjected to analysis, and the ranking of factors is calculated using the RII (Relative Important Index) Method.

Following top 10 risk factor find out RII method.

- A. Financial failure of the contractor with a RII value 0.727
- B. Delayed payments on contract with a RII value 0.664
- C. Natural calamities (floods, earthquakes, fire, etc.) with a RII value 0.586
- D. Poor communications between the site and head offices with a RII value 0.559
- E. High competition in bids with a RII value 0.544
- F. Poor communication between Involved parties with a RII value 0.537
- G. Improper planning with a RII value 0.508
- H. Material management with a RII value 0.504
- I. Difficulty to access the site with a RII value 0.480
- J. Defective design with a RII value 0.479

From this study, it is observed that there are some common factors affecting in high-rise construction projects thus factors identified using Relative Important Index (RII). The highest impact is ranked as 0.727 for “Financial failure of the contractor” at present situation and lowest impact is ranked as 0.479 for “Defective design” using RII method.

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