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# Interpretation of Risk Factors in Building Construction Projects

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**Abstract:** Construction comes area unit initiated in advanced and dynamic environments leading to circumstances of high uncertainty and risk, that area unit combined by hard to please time constraints. Construction industry has modified considerably over the past many years. It is Associate in Nursing business driven primarily by non-public investors; the presence of securitized realty has increased significantly. It is susceptible to the many technical & business risks that always represent larger exposures than those who area unit ancient. Thus risk assessment need arises. Risk assessment may be a tool to spot those risks during a project and manage it consequently with correct treatment. Risk assessment is outlined during this study as a method that aims to spot and estimate risks to personnel and property compact upon by a project. The general methodology of this study depends mostly on the survey form that was collected from the native building contractors of various sizes by mail or by personnel meeting. A thorough literature review is initio conducted to spot the danger factors that have an effect on the performance of industry as an entire. The survey form is intended to probe the cross-sectional behavioral pattern of construction risks industry. The form ready for the pilot survey was developed by seeing the relevant literatures within the space of construction risk management. This analysis seeks to spot and assess the risks and to develop a risk management framework that the investors/ developers/ contractors will adopt once getting construction add India.

**Keywords:** Risk, Risk assessment, Types of risk, Construction industry, Relative importance index

## I. INTRODUCTION

This study is mainly concerned with the assessment of risk in construction, where manager need to know how much risk is involved in an activity to decide how to go about it. Estimates of levels of risk square measure supported the probability of an occasion occurring and also the significance of the results of such an occasion. It is important to assess risk; a precise estimate of risk may not be required.

It would be extremely time consuming in practice, and usually a lack of data makes it impossible. Risk management may be a technique that is employed in several alternative industries from, IT related to business, automobile, pharmaceutical industry, to the construction sector. Risks and uncertainties inherent within the housing industry square measure over the other industries. Many industries became a lot of proactive regarding mistreatment risk management techniques in project. However, with relevance the development trade, the same is not used commonly.

Risk is an integral component of any project. Risk is gift altogether comes no matter their size or sector. No project is totally free from risks. If risks aren't properly analyses and techniques aren't trained to influence them, the project is likely to lead to failures. Risk is gift altogether the activities during a project; it's solely the number that varies from one activity to a different. Evaluating and analyzing the risks of a project and attending to manage them square measure the foremost vital steps ought to be wiped out the project definition stage. Risk evaluation and analysis were ignored. The current study is concentrated on ideas of risk management and can cowl the connected literature on the subject, development of a survey form and suggestions associated with risk management practices in construction industry of India.

## II. OBJECTIVES AND NEED OF STUDY

The aim of this study is to risks in the assessment of building Construction Project, so that these projects can be successfully implemented In order to achieve it, the following objectives have been identified:

- A. To identify the risk in building construction projects.
- B. To propose a Guideline for risk mitigation in construction projects.

### III. METHODOLOGY

Field survey is done to study the prevalent environment in the building construction industry. The objective of doing field survey is to get the opinion of field personnel with relation to numerous styles of risks related to building industry. The form is intended to capture the chance level of the danger prevalence and degree of impact or the extent of loss if the danger happens. Survey was carried out among the various project participants. For the purpose of survey, leading builders, real estate developers, project managers, contractors and senior engineers in various construction organizations both in government as well as private sector were approached. The questionnaire consists of two parts. Part one is 'Demographics', which gives personal detail of the respondent. Part two is questionnaire related to risk analysis. Relative Importance Index (RII) techniques were used in analysis paper

### IV. DATA ANALYSIS

S.N	INTERVIEW NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total	Mean(m)	SD(s)	C.O.V =(s/m)
1	Inadequate site investigation	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.24	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.64	0.8	6.72	0.3952941	0.22	0.556548
2	Incomplete design	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.64	0.64	0.64	0.64	0.48	7.36	0.4329412	0.06	0.138587
3	Appropriateness of specifications	0.36	0.36	0.36	0.64	0.36	0.48	0.64	0.24	0.64	0.36	0.48	0.36	0.36	0.36	0.64	0.36	0.36	7.36	0.4329412	0	0
4	Uncertainty over the source and availability of materials	0.36	0.36	0.36	0.36	0.36	0.48	0.36	0.36	0.36	0.36	0.48	0.64	0.64	0.64	0.64	0.48	0.36	7.32	0.4305882	0	0
5	Design changes	0.48	0.64	0.36	0.36	0.48	0.36	0.64	0.64	0.64	0.64	0.48	0.64	0.64	0.64	0.64	0.64	0.64	9.28	0.5458824	0.08	0.146552
6	Equipment failure	0.36	0.16	0.36	0.64	0.24	0.36	0.36	0.24	0.64	0.64	0.24	0.36	0.64	0.36	0.64	0.64	0.64	7.52	0.4423529	0.14	0.316489
7	Availability of sufficient transportation facilities of specifications	0.8	0.64	0.64	0.64	0.48	0.64	0.64	0.64	0.64	0.64	0.48	0.64	0.48	0.64	0.64	0.64	0.64	9.92	0.5835294	0.08	0.137097
8	Availability of resources- particularly construction equipment spare parts, fuel and labor	0.64	0.64	0.36	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.24	0.64	0.36	0.64	0.36	0.64	0.64	9	0.5294118	0	0
9	Uncertain productivity of resources	0.36	0.64	0.36	0.64	0.64	0.48	0.64	0.48	0.36	0.36	0.48	0.64	0.36	0.64	0.64	0.64	0.64	9	0.5294118	0.14	0.264444
10	Industrial relation problems	0.36	0.36	0.64	0.48	0.36	0.24	0.64	0.48	0.36	0.36	0.48	0.64	0.36	0.64	0.64	0.36	0.64	8.04	0.4729412	0.14	0.29602
11	Change of top management	0.64	0.64	0.64	0.8	0.64	0.24	0.64	0.48	0.64	0.64	0.48	0.36	0.36	0.64	0.64	0.64	0.64	9.76	0.5741176	0	0
12	No past experience in similar project	0.64	0.64	0.36	1	0.64	0.64	0.64	0.8	0.64	0.64	0.48	0.64	0.64	1	1	0.64	0.64	11.68	0.6870588	0	0
13	Short tender time	0.36	0.36	0.36	0.64	0.36	0.48	0.36	0.48	0.64	0.36	0.64	0.64	0.36	0.64	0.64	0.36	0.64	8.28	0.4870588	0.14	0.28744
14	Availability of	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.48	0.36	0.36	0.36	0.36	0.64	0.36	0.36	0.36	0.36	6.52	0.383529	0	0

	Commodity/ Resource	6	6		6	6	6	6	8		6	6	6	4	6	6	6	6		4		
15	Inflation	0.3 6	0.3 6	0.36	0.3 6	0.3 6	0.3 6	0.3 6	0.3 6	0.36	0.3 6	0.3 6	0.3 6	0.4 8	0.3 6	0.3 6	0.3 6	0.3 6	6.24	0.367058 8	0	0
16	Problem during execution of construction work	0.3 6	0.3 6	0.16	0.6 4	0.3 6	0.3 6	0.3 6	0.3 6	0.64	0.6 4	0.6 4	0.6 4	0.6 4	0.3 6	0.3 6	0.6 4	0.3 6	7.88	0.463529 4	0	0
17	Nature of Human Behaviour	0.1 6	0.3 6	0.36	0.3 6	0.2 4	0.2 4	0.3 6	0.3 6	0.36	0.3 6	0.3 6	0.3 6	0.6 4	0.3 6	0.3 6	0.3 6	0.3 6	5.96	0.350588 2	0.1	0.2852 35
18	Due to delay of work	0.1 6	0.6 4	0.64	0.3 6	0.3 6	0.2 4	0.6 4	0.6 4	0.64	0.6 4	0.6 4	0.6 4	0.4 8	0.6 4	0.6 4	0.6 4	0.6 4	9.28	0.545882 4	0.24	0.4396 55
19	Local Taxes	0.3 6	0.6 4	0.64	0.3 6	0.4 8	0.4 8	0.6 4	0.6 4	0.64	0.6 4	0.3 6	0.6 4	0.3 6	0.3 6	0.3 6	0.3 6	0.3 6	8.32	0.489411 8	0	0
20	Inadequate Cash Flow	0.6 4	0.6 4	0.36	0.6 4	0.4 8	0.6 4	0.6 4	0.6 4	0.64	0.6 4	0.6 4	0.6 4	0.3 6	0.6 4	0.6 4	0.6 4	0.6 4	10.1 6	0.597647 1	0	0
21	Inflation, Availability of foreign currency & Exchange Rate change	0.6 4	0.3 6	0.64	0.6 4	0.4 8	0.6 4	0.6 4	0.3 6	0.64	0.3 6	0.6 4	0.3 6	0.4 8	0.3 6	0.3 6	0.6 4	0.3 6	8.6	0.505882 4	0.14	0.2767 44
22	Constraints on the availability and employment of expatriate staff	0.6 4	0.3 6	0.64	0.3 6	0.4 8	0.4 8	0.6 4	0.3 6	0.64	0.6 4	0.4 8	0.3 6	0.4 8	0.6 4	0.3 6	0.6 4	0.4 8	8.68	0.510588 2	0.08	0.1566 82
23	Customs and import restrictions and procedures	0.3 6	0.3 6	0.64	0.3 6	0.4 8	0.4 8	0.3 6	0.3 6	0.64	0.4 8	0.4 8	0.3 6	0.4 8	0.6 4	0.3 6	0.3 6	0.6 4	7.84	0.461176 5	0.14	0.3035 71
24	Difficulties in disposing of plant and equipment	0.3 6	0.3 6	0.36	0.6 4	0.4 8	0.2 4	0.3 6	0.6 4	0.36	0.6 4	0.3 2	0.4 8	0.4 8	0.3 6	0.6 4	0.3 6	0.3 6	7.44	0.437647 1	0	0
25	Insistence on use of local firms and agents	0.3 6	0.3 6	0.36	0.6 4	0.4 8	0.2 4	0.3 6	0.3 6	0.36	0.6 4	0.4 8	0.3 6	0.6 4	0.3 6	0.6 4	0.6 4	0.6 4	7.92	0.465882 4	0.14	0.3005 05
26	Resettlement and rehabilitation of people	0.6 4	0.6 4	0.64	0.6 4	0.6 6	0.4 8	0.6 4	0.6 4	0.36	0.8	0.8	0.6 4	0.6 4	0.6 4	0.3 6	0.3 6	0.6 4	10.1 6	0.597647 1	0	0
27	Problems due to adjacent or nearby projects	0.6 4	0.6 4	0.64	0.6 4	0.8	0.8	0.4 8	0.6 4	0.64	0.8	0.8	0.6 4	0.4 8	0.6 4	0.6 4	0.6 4	0.6 4	11.2	0.658823 5	0	0
28	Local people support for the project	0.3 6	0.3 6	0.36	0.6 4	0.4 8	0.4 8	0.3 6	0.3 6	0.64	0.8	0.4 8	0.6 4	0.6 4	0.3 6	0.3 6	0.3 6	0.3 6	8.04	0.472941 2	0	0

For data analysis various researchers used RII (Relative Importance Index) to determine the relative importance of the various risk factor. To assess the relative significance among risks, previous literatures study suggests establishing a risk significance index by calculating a significance score for each risk. For calculating the significance score, multiply the probability of occurrence by the degree of impact. The significance score for each risk assessed by each respondent can be obtained through the model

$$S_j^i = \alpha_j^i \beta_j^i$$

Where  $s_j^i$  = significance score assessed by respondent j for risk i;  $\alpha_j^i$  occurrence of risk i, assessed by respondent j; &  $\beta_j^i$  = degree of impact of risk i, assessed by respondent j. By averaging scores from all the responses, it is possible to get an average significance score for each risk, and this average score is called the risk index score and is used for ranking the risks. The model for the calculation of risk index score can be defined as:

$$RS^i = \frac{\sum_{j=1}^T s_j^i}{T}$$

Where  $RS^i$  = index score for risk i;  $s_j^i$  = significance score assessed by responding j for risk i and T = total number of responses. To calculate  $s_j^i$  the five point scales for  $\alpha$  and  $\beta$ , this will be converted into numerical (Likert scale) scales as shown in Table 4.1.

Tables 4.1: Numerical conversion for the rating attributes

$\alpha, \beta$	
Rating Attributes	Numerical Conversion
0	0.0
1	0.2
2	0.4
3	0.6
4	0.8
5	1.0

After obtaining index score for each risk factor, standard deviation and coefficient of variation of each risk factor is also determined. Subsequently, ranking of risk factors is done based on Index score.

## V. RESULT AND DISCUSSION

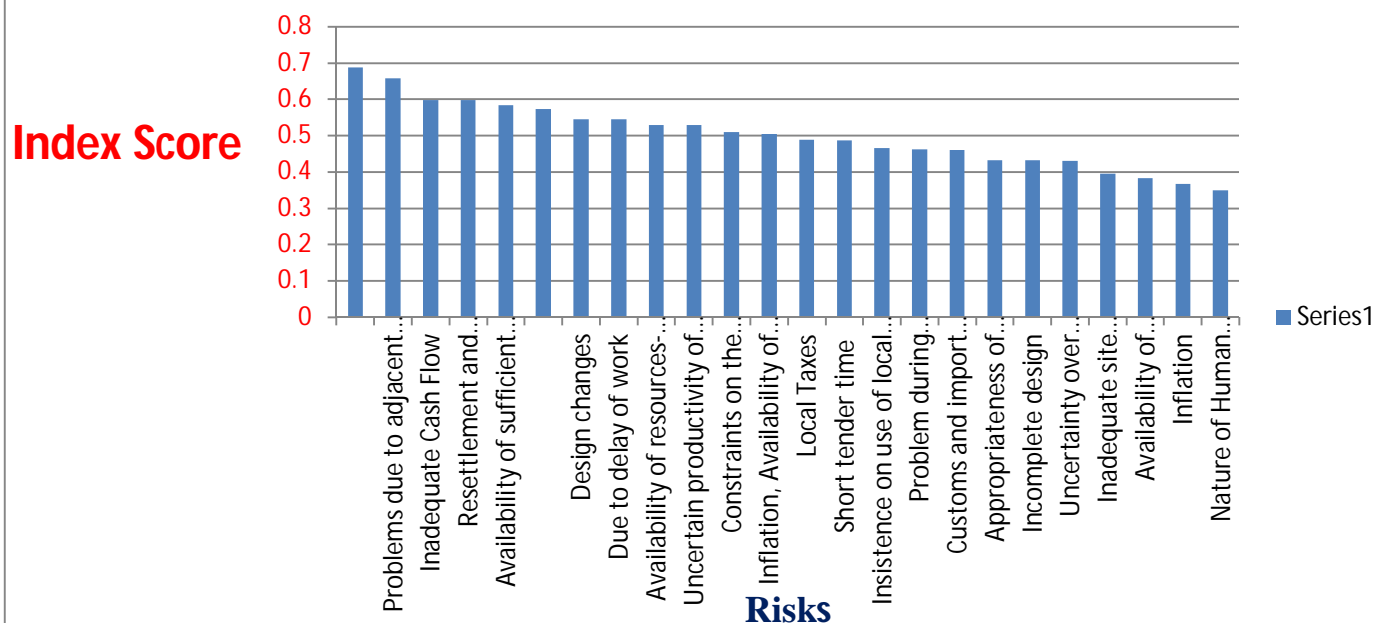
### A. Analysis of Data

Seventeen respondents have filled up the questionnaire. Subsequently for analysis of responses following steps are followed:

- 1) Responses were converted into numerical values based on their rating attributes.
- 2) After that mean of numerical values of all twenty eight responses is determined
- 3) Then, Standard deviation and coefficient of variation for each risk factor is determined
- 4) Afterwards, Index Score for each risk is calculated by using RI Method.

Table 5.3 Ranking of Risk

S.No	Risks	Index Score	Rank order
1	No past experience in similar project	0.687	1
2	Problems due to adjacent or nearby projects	0.658	2
3	Inadequate Cash Flow	0.597	3
4	Resettlement and rehabilitation of people	0.597	3
5	Availability of sufficient transportation facilities of specifications	0.583	4
6	Change of top management	0.574	5
7	Design changes	0.545	6
8	Due to delay of work	0.545	6
9	Availability of resources-particularly construction equipment spare parts, fuel and labor	0.529	7
10	Uncertain productivity of resources	0.529	7
11	Constraints on the availability and employment of expatriate staff	0.51	8
12	Inflation, Availability of foreign currency & Exchange Rate change	0.505	9
13	Local Taxes	0.489	10
14	Short tender time	0.487	11
15	Insistence on use of local firms and agents	0.465	12
16	Problem during execution of construction work	0.463	13
17	Customs and import restrictions and procedures	0.461	14
18	Appropriateness of specifications	0.432	15
19	Incomplete design	0.432	15
20	Uncertainty over the source and availability of materials	0.43	16
21	Inadequate site investigation	0.395	17
22	Availability of Commodity/ Resource	0.383	18
23	Inflation	0.367	19



## VI. CONCLUSION

Present study outlines the major causes of factor for residential construction projects in Indian context. Based on literature study and from interview of experts, twenty three risks were identified. Further methodology is recommended to figure out essential causes from accessible ones by Relative importance. Survey questionnaire is prepared based on these techniques. It is required to carry out further study for risk assessment and mitigation especially for large building construction projects based on a survey at national level, so as to frame elaborated recommendations for professionals within the building housing industry.

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