

# Study and Analysis of Risk Management Strategies in Construction Projects of Various Cities in Tamilnadu

Madhan kumar.P<sup>1</sup>, Soundararajan.M<sup>2</sup>

<sup>1</sup>PG student, Construction Engineering and Management, Sona College of Technology, Tamilnadu, India

<sup>2</sup>Assistant professor, Construction Engineering and Management, Sona College of Technology, Tamilnadu, India

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**Abstract** - Risk management is the process of identifying the risks in the construction projects and analyzing the risk factors and identified the better solution for avoiding the risks in projects. This paper identifies the major risk factors in construction projects in Tamilnadu. The literatures are collected based on risk management in construction projects. The identification of risk factors is based on the literature review. From the major risk factors the questionnaire are prepared and it should be a scaling measurement. The prepared questionnaires are distributed to the companies. The data are collected from the respondents and it should be in fair manner. The collected data are analyzed to by using spss software for ordering the major risk factors in construction projects. The recommendations are provided the respondents to reduce the risk factors by the improvement of risk management policies in construction projects.

**Key Words:** Risk assessment, spss, management

## 1. INTRODUCTION

The construction industry is dynamic in nature due to the development of new technologies. Nowadays, construction projects are very difficult to complete the projects in a specified time. The project team facing unprecedented changes. The analysis of risk factors affecting project performance are considered to be a means to improve the effectiveness of project. Construction Performance is mainly associated with factors like time, cost, quality, etc... There are many risk factors that obstruct performance of construction cause delay in construction or failure in construction. There are genuine reasons like closures, modification of drawings and changes of the design. In construction projects the performance was affected by poor guidance, lack of management, inapt participants; poor relation and coordination; lack of motivation, political and financial issues. Factors like shortage of labours, placing of not well trained supervisors, improper design of building and site location cause major risk factors in construction projects, lack and breakdown of equipment plays a very important part in construction delays. The major problem construction industry is facing are the delays and the level of impact these delays effect the projects to be delivered in a specified time, with minimum price level but also the quality of product is much more. It is very rare to see that a construction projects is completed on time.

## 2. OBJECTIVE

- To identify key risk factors that affects the building construction projects.
- To assess the risk factors by various strategies.
- To manage the risk and improve the productivity (Time & Cost) in construction projects.

## 3. METHODOLOGY



## 4. LITERATURE REVIEW

### 1) Project Risk Management in Hong kong -L Y Shen

The author states that the effectiveness of risk management can be investigated through questionnaire survey. The 8 major delay risks are identified and they are filled by respondents. From that the top risk delay is identified by the author using highest total weight score. The risk management action can be divided into two types (Preventive and Remedial actions). In preventive action 7 methods and in remedial action 6 methods are adopted. In my point of view, further more criteria could have been taken into consideration to identify the risk.

2) Risk Management Strategies in Construction Companies In India - Danish Ali Alvin Harison

In the author's point of view, risk management is the integral part of a construction company in order to avoid or reduce accidents and mishaps. Questionnaires are prepared by the author and 6 major companies are selected and compared based on their risk management criteria. From this the author concluded the urgent required to improve working condition of the construction site.

3) Risk Management Perspective On The Project Lifecycle - Stephen C Ward, Chris B Chapman

The author implies that the various stages that are involved in the construction process is one of the major cause for risk in construction. The Project lifecycle is commonly described in 4 phases (Concept, Planning, Execution, and Termination) without proper Project-Management knowledge and practice the risks that are involved in the above project phases couldn't be identified and reduced. As an effective way to identify and reduce risk in construction latest software like SPSS, PRIMAVERA can be adopted.

4) Risk Management: Identifying Key Risks In Construction Project - Divya Gupta Manoj Sharma Dr. Ashutosh Shankar Trivedi

The author states that in order to reduce risk in construction, studies and assessments of past risks have to be made. Here, the author implemented Data Analysis Method to analyse the construction risk. Hence it is clearly noted that the effective way to identify and reduce risk, manual risk analysis method has to be adopted.

5) Risk Management in Construction Projects - Mubin M. Shaikh

The author implies that a dynamic and ergonomically strong environment leads to an effective risk management construction site. Construction risks leads to unnecessary time delay which affects the overall construction project. Risks and uncertainties inherent in the construction industry are more than other industries. The process of planning, executing and maintaining all project activities is complex and time consuming. The infrastructural development and user-friendly working environment enables reduction in the risk factors in construction. The industry is vulnerable to various technical, socio-political and business risks.

**4.1 Summary of literature**

From the literature study, I can understand the major risk factors that affect the construction projects. The usage of software is very less in the construction projects. The manual identification of risk factors implement in

majority of projects. Due to this time consumption is increased and also difficult to identify the risk factors.

In this project the software is used for analysing of risk factors. The major risk factors are identified by using literature review and experts knowledge. The remedial actions are recommended to reduce the construction projects risk.

**5. IDENTIFIED FACTORS**

- 1) Cost factors
- 2) Time factors
- 3) Environmental factors
- 4) Quality factors
- 5) Health and Safety factors
- 6) Transport factors
- 7) Owner factors

**6. COLLECTION OF DATA**

The questionnaires will be distributed and collected from the experts and other project manager. The five scale measurement is used to rate the questionnaire factors based as we have given in questionnaires. The questionnaires were distributed to contractors, owners and consultants.

S.NO.	QUESTIONNAIRES FOR RISKS INVOLVED IN CONSTRUCTION PROJECTS	RANKING FROM 1 TO 5					TOTAL
		Scale value min=1, max=5					
A	COST RELATED FACTORS	1	2	3	4	5	
1	Does the cost of overtime affect the construction project	2	5	8	13	2	30
2	Will the fluctuation in finance of project affect the construction	0	4	14	9	3	30
3	Does the contractor pay worker wages in due time	1	2	14	8	5	30
4	Will the design affect the cost of project	1	4	7	9	9	30
5	Is there any difficulty in material cost	2	5	6	11	6	30
B	TIME RELATED FACTORS						
6	Will the improper supervision cause delay	3	5	9	8	5	30
7	Does change in design during construction influence delay	4	3	8	12	3	30
8	Does late supply of material affect the project duration	3	4	9	9	5	30
9	Will the change of subcontractor influence the project period	3	4	13	6	4	30
10	Does the late approval of working drawing may affect the project period	1	8	7	9	5	30
C	ENVIRONMENTAL RELATED FACTORS						
11	Does the weather condition affect the construction projects	0	4	9	12	5	30
12	Will the undetailed weather information hamper the project	2	8	8	8	4	30
13	Will the environment factor affect the construction cost	3	4	10	8	5	30
14	Does the political instability influence the construction project	2	9	11	6	2	30
15	Can the misunderstanding of construction workers affect the project profitability	3	5	12	7	3	30
16	Does the social environment such that language barrier affect the construction workability	5	5	9	9	2	30
D	QUALITY RELATED FACTORS						
17	Does the low quality material affect the construction process	3	7	5	7	8	30

18	Will the lack of management in site affect the construction quality	3	6	9	9	3	30
19	Will the change in procurement of equipment and material influence the quality of construction	0	6	11	11	2	30
<b>E HEALTH AND SAFETY RELATED FACTORS</b>							
20	Will the lack of personal protective equipment impact the construction project	0	2	7	12	9	30
21	Does unmanaged camp in site influence risk	2	5	7	11	5	30
22	Does the workers under age or over age influence in construction projects	0	3	12	8	7	30
<b>F TRANSPORT RELATED FACTORS</b>							
23	Will the fluctuation in fuel price affect the construction project?	0	6	8	10	6	30
24	Does the un maintained vehicle influence risk in construction projects	1	3	11	12	3	30
<b>G OWNER RELATED FACTORS</b>							
25	Will the top management commitment affect the construction productivity	2	5	12	11	0	30
26	Can the delay in decision increase the construction cost	1	4	12	10	3	30
27	Does the financial issue in the project causes construction delay	1	4	10	7	8	30
28	Will the change in requirement of owner affect the construction productivity	3	4	8	12	3	30
29	Does the legal issues affect the construction projects	1	2	10	7	10	30
30	Will the lack of responsible persons affect the construction projects	1	5	7	10	7	30

Fig-1: Collection of Data

7. ANALYSIS OF DATA

SPSS (Statistical Package for Social Science) is a software used for statistical analysis. It is also used by market researchers, health researchers, survey companies, government, education researchers, market organization, data miners and others. In this project means and standard deviations are calculated and it can compared with the relative importance index to identify the major risk factors in the construction projects.

Table-1: Relative Important Index

RISK FACTORS	RII
COST RELATED FACTORS	0.6907
TIME RELATED FACTORS	0.6489
ENVIRONMENTAL RELATED FACTORS	0.6300
QUALITY RELATED FACTORS	0.6480
HEALTH AND SAFETY RELATED FACTORS	0.7311
TRANSPORT RELATED FACTORS	0.6967
OWNER RELATED FACTORS	0.6856

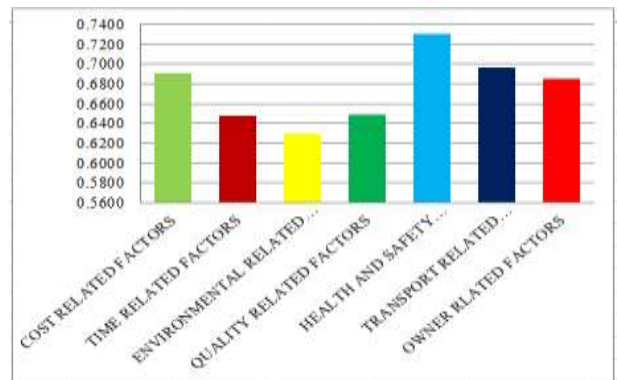


Chart-1: Bar Chart of RII

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
COST_OVERTIME	30	1	5	3.27	.909
FLUCTUATION_COST	30	2	5	3.37	.718
WAGES_INDUETIME	30	1	5	3.43	.871
DESIGN	30	2	5	3.70	.962
MATERIAL_COST	30	1	5	3.50	1.260
IMPROPER_SUPERVISIO	30	1	5	3.40	1.003
CHANGE_DESIGN	30	1	5	3.35	1.049
LATE_SUPPLY	30	2	5	3.43	.855
CHANGE_SUBCONTRACT	30	1	5	3.10	.895
LATE_APPROVAL	30	2	5	3.27	.907
WEATHER_CONDITION	30	2	5	3.80	.825
UNDETAILED_WEATHER	30	1	5	3.10	1.165
ENVIRONMENT_FACTOR	30	1	5	3.30	1.022
POLITICAL_UNSTABILITY	30	1	5	2.87	.973
MISUNDERSTANDING	30	1	5	3.07	1.172
LANGUAGE_BARRIER	30	1	5	2.93	1.202
LOW_QUALITY_MATERIAL	30	1	5	3.23	1.194
LACK_OF_MANAGEMENT	30	1	5	3.07	1.081
CHANGE_PROCURMEN	30	2	5	3.40	.894
PERSONAL_PROTECTIVE	30	2	5	3.83	1.020
UNMANAGED_CAMP	30	1	5	3.40	.998
WORKERS_AGE	30	2	5	3.80	.855
FUEL_PRICE	30	2	5	3.67	1.028
UNMAINTAIN_VEHICLE	30	1	5	3.57	.971
COMMITMENT	30	1	5	3.13	1.196
DECISION_DELAY	30	2	5	3.47	.776
FINANCIAL_ISSUE	30	1	5	3.83	1.137
OWNER_REQUIREMENT	30	1	5	3.27	1.172
LEGAL_ISSUES	30	1	5	3.70	1.088
RESPONSIBLE_PERSONS	30	1	5	3.07	1.081

Fig- 2: Mean Value

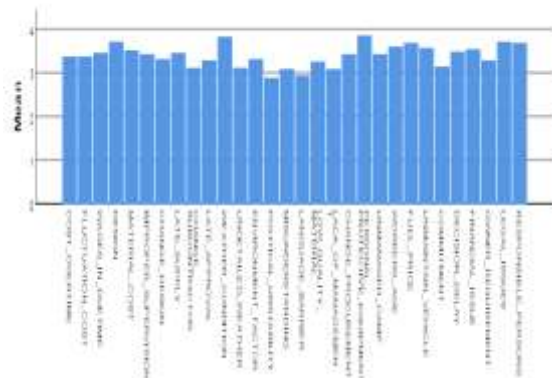
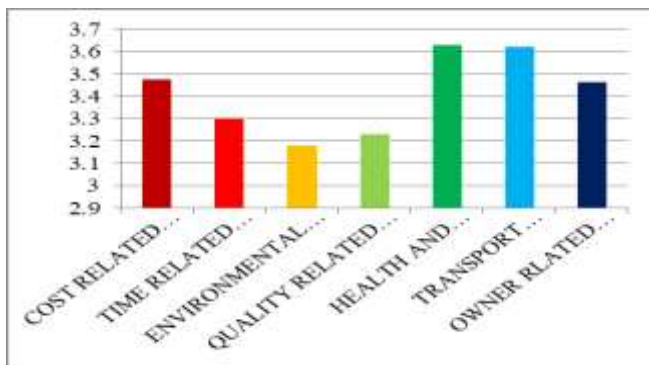


Chart- 2: Bar Chart for Mean Value

**Table-2:** Average Mean Value

FACTORS	MEAN
COST RELATED FACTORS	3.474
TIME RELATED FACTORS	3.300
ENVIRONMENTAL RELATED FACTORS	3.178
QUALITY RELATED FACTORS	3.230
HEALTH AND SAFETY RELATED FACTORS	3.627
TRANSPORT RELATED FACTORS	3.620
OWNER RELATED FACTORS	3.462



**Chart-3:** Bar Chart for average mean value

## 8. RESULT AND DISCUSSION

The study aims to identifying the major factors that cause risk in the construction projects in various cities. The 7 major factors are identified: cost, time, environment, quality, health and safety, transport and owner (financial) through literature review and industrial personals. From the collected data RII(Relative Importance Index) and Mean values are calculated through Excel and SPSS software. From the calculated RII values the factors are ranked Health and Safety(0.7311), Transport(0.6967), Cost(0.6907), Owner(0.6856), Time(0.6489), Quality(0.6480), Environment(0.6300). From the average mean value the factors are ranked Health and safety(3.627), Transport(3.620), Cost(3.474), Owner(3.462), Time(3.300), Quality(3.230), Environment(3.178). From above, indicates that safety measures like personal protective equipment's are compulsorily provided to the labours and the vehicles are clearly maintained and also the cost over flow is the major issue in the construction site and it can be reduced by proper cash flow and reports for every products. In future study the factors can be identified for railway construction works and also for multi-storey buildings.

## REFERENCES

- [1] L Y Shen, "Project risk management in Hong Kong" International Journal of Project Management, vol.15, No.2, pp.101-105, 1997.
- [2] Danish Ali, Alvin Harison, "Risk Management Strategies in Construction Companies in India" International Journal for Innovative Research in Science & Technology, vol.2, No.10, pp.6-8. 2016.
- [3] Stephen C Ward, Chris B Chapman, "Risk Management perspective on the project lifecycle" International Journal of project Management, vol.13, No.3, pp.145-149, 1995.
- [4] Divya Gupta, Manoj Sharma, Dr. Ashutosh Shankar Trivedi, "Risk Management: Identifying Key Risks in Construction Projects" International Journal of Civil and Structural Engineering Research, vol.4, No.1, pp.9-15, 2016.
- [5] Mubin M. Shaikh, "Risk Management in Construction Projects" International Journal of Current Engineering and Scientific Research, vol.2, No.2, pp.150-155, 2015.
- [6] Patel Kishan, Dr. Rajiv Bhatt, Prof. J. J. Bhavsar, "A Study of Risk Factors Affecting Building Construction Projects" International Journal of Engineering Research & Technology, vol.3, No.12, pp.831-835, 2014.
- [7] Dr. Nadeem ehsan, Mehmood Alam, Ebtisam Mirza, Azam Ishaque, "Risk Management in Construction Industry" IEEE, vol.9, No.10, pp.16-21, 2010.
- [8] Paul L. Bannerman "Risk and Risk Management in Software Projects: A reassessment" The Journal of System and Software, vol.3, No.1, pp.2118-2133, 2008.
- [9] D. Berkeley, P.C. Humphreys, R. D. Thomas, "Project risk action management" Construction Management and Economics, vol.9, No.1, pp.3-17, 1991.
- [10] Tsung Chieh Tsai, Min Lan Yang, "Risk Assessment of Design -Bid-Build and Design- Build Building Projects" Journal of Operation Research Society of Japan, vol.53, No.1, pp.20-39, 2010.
- [11] Thomas E Uher, A Ray Toakley, "Risk management in the conceptual phase of a project" International Journal of Project Management, vol.17, No.3, pp.161-169, 1999.
- [12] Paul Elkington, Clive Smallman, "Managing project risks: A case study from the utilities sector" International Journal of Project Management, vol.20, No.1, pp.49-57, 2002.
- [13] Scott Baker, David Ponniah, Simon Smith, "Risk response techniques employed currently for major projects" Construction Management and Economics, vol.17, No.2, pp.205-213, 1999.
- [14] He Zhi, "Risk management for overseas construction projects" International Journal of Project Management, vol.13, No.4, pp.231-237, 1995.
- [15] Wenzhe Tang, Maoshan Qiang, Colin F. Duffield, Davin M. Young, Youmei Lu "Risk Management in the Chinese Construction Industry" Journal of Construction Engineering and Management, vol.133, No.12, pp.944-956, 2007.

- [16] Tzvi Raz, Aaron J. Shenhar, Dov Dvir, "Risk management, Project success, and technological uncertainty" R&D Management, vol.32, No.2, pp.101-109, 2002.
- [17] Mulholland, J. Christian, "Risk Assessment in Construction Schedules" Journal of Construction Engineering and Management, vol.125, No.1, pp.8-15, 1999.
- [18] Hans Petter Krane, Asbjorn Rolstadas, Nils O. E. Olsson, "Categorizing Risks in seven large projects- Which risks do the projects focus on?" Project Management Journal, vol.41, No.1, pp.81-86, 2010.
- [19] Alfredo del cano, M. Pilar de la Cruz "Integrated Methodology for Project Risk Management" Journal of Construction Engineering and Management, vol.128, No.6, pp.473-485, 2002.
- [20] Divya Gupta, Manoj Sharma, Dr. Ashutosh Shankar Trivedi, "Risk Management in Construction Projects of Developing Countries" International Journal of Engineering Research and Application, vol.5, No.11, pp.154-156, 2015.