

## International Journal of Innovative Research in Science, Engineering and Technology

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# Mechanism of Risk Assessment and Management in Construction Projects

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**ABSTRACT:** Construction of Residential projects are initiated in complex and dynamic problems resulting in circumstances of high uncertainty and risk, which are compounded by demanding time and cost constraints. The general methodology is to study relies largely on the survey questionnaire which will be collect from the various Residential project construction contractors and project manager of different sizes by mail or personnel meeting. The questionnaire prepared for the survey was formulated by seeing the relevant literatures in the area of construction management. This research seeks to identify the risk factors that affect the performance of Residential projects as a whole and analyze by using appropriate tools and technique and to develop a risk management framework. Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project. Project risk management includes the processes concerned with identifying, analyzing, and responding to project risk. It includes maximizing the results of positive events and minimizing the consequences of adverse events. Project risk management includes the processes concerned with identifying, analyzing, and responding to project risk. It includes maximizing the results of positive events and minimizing the consequences of adverse events.

**KEYWORDS:** Risk Management, Construction Management, Risk Factors, Risk Assessment Techniques, Construction Projects

## I. INTRODUCTION

Managing risk is an integral part of good management, and fundamental to achieving good business and project outcomes and the effective procurement of goods and services. Risk management provides a structured way of assessing and dealing with future uncertainty. Suppose take the example of real estate the real estate and construction industry has changed significantly over the past several years. It is an industry driven primarily by private investors; the presence of securitized real estate has increased considerably. Real estate is vulnerable to the numerous other business risks that often represent greater exposures than those that are traditionally insurable. For example, there are regulatory and legislative risks, professional, contractual, competitive and human resource/cultural risks, reputational, strategic, customer, operational, political, legal, financial, and technological risks.

### SCOPE AND OBJECTIVE:

1. To identify the various risk factors in construction of Residential projects.
2. To analyze the sources of risk factors arising in the Residential projects.
3. The pilot studies were conducted from various reputed companies.
4. Using the pilot study the questionnaire is prepared.
5. The survey will be conducted to the construction industries through questionnaire.
6. The result will be analyzed from the questionnaire.
7. The risk will be solved using the software like SPSS.
8. The result and discussion about the risk factors solving in the construction projects.

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## II. LITERATURE SURVEY

In Covelo and Manpower's (1985) article, and according to Grier (1981), the first signs of risk management go back as far as 3200 BC in the Tigris-Euphrates valley with a group of people called the Asipu. One of their functions was to act as risk consultants. Their procedure would be to identify the important dimensions of the problem, propose alternative actions, and collect data on the likely outcomes.

### 1. Li Bing and Robert L. K. Tiong (1999):

Based on their study categorized the riskfactors and their mitigating measures, the most effective risk mitigating measures were categorized into eight groups. Those are partner selection, agreement, employment, control, subcontracting, engineering contract, good relationship, and renegotiation. They proposed a risk management model incorporating measures. Three cases of international construction JVs were analyzed from the perspectives of the execution of these measures.

### 2. Shen L Y (1997) :

Identified the most serious project delay risks and the effectiveactions for managing these risks. Practitioners' risk management actions and their effectiveness have been investigated through a questionnaire survey. It revealed that methods where practitioners' experience and subjective judgment are used are the most effective and important risk management action, and that methods using quantitative analytical techniques have been rarely used due to limited understanding and experience. The findings also suggest a need to promote the application and awareness of various analytical techniques for risk management in a proper context in the Hong Kong construction industry.

### 3. Akintola S Akintoye and Malcolm J MacLeod (1997) :

Studied the constructionindustry's perception of risk associated with its activities and the extent to which the industry uses risk analysis and management techniques with the help of a questionnaire survey of general contractors and project managers. The authors concluded that risk management is essential to construction activities in minimizing losses and enhancing profitability. Construction risk is generally perceived as events that influence project objectives of cost, time and quality.

Risk analysis and management in construction depend mainly on intuition, judgement and experience. Formal risk analysis and management techniques are rarely used due to a lack of knowledge and to doubts on the suitability of these techniques for construction industry activities.

### 4. DaudNasir et al (2003):

Developed a method to assist in the determination of thelower and upper activity duration values for schedule risk analysis by program evaluation and review technique analysis or Monte Carlo simulation. Probabilities for various combinations of parents for each risk variable were obtained through an expert interview survey and incorporated into the model. Finally, sensitivity analysis was performed. The model was tested using 17 case studies.

### 5. ArtemAleshin (2001):

Studied the problem of risk management of internationaland joint venture projects with foreign co-operation in Russia. The author identified classified and assessed risks inherent to joint venture projects in Russia and practical recommendation for risk management.

### 6. Alfredo del Can et.al (2002):

Presented a generic project risk managementprocess that has been particularized for construction projects from the point of view of the owner and the consultant who may be assisting the owner. First, the authors explains a complete or generic project risk management process to be undertaken by organizations with the highest level of risk management maturity in the largest and most complexconstruction projects. After that, factors influencing possible simplifications of

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the generic process are identified, and simplifications are proposed for some cases. Then the application to a real project is summarized. As a final validation, a Delphi analysis has been developed to assess the project risk management methodology explained here, and the results are presented. The appropriate contracting method and the contract documents for any construction project depend on the nature of the project, but an appropriate contracting method coupled with clear and equitable contract documents do not by themselves ensure project success where people work together in the face of uncertainty and complexity with diverse interests and conflicting agendas. The attitudes of the contracting parties and the co-operative relationships among the project participants are important for successful project delivery. These are examined in the light of transaction cost economics and relational contracting (RC) principles. It is found that RC may well be a useful route towards reduced transaction costs, while also fostering co-operative relationships and better teamwork that in turn facilitate joint risk management (JRM). The usefulness of the latter is reinforced by relevant observations from a recent Hong Kong-based survey, followed by a case study in Mainland China.

## 7. Darrin and Mervyn K Lewis (2002):

Analyzed the principles involved, onpractical experience of evaluating projects to form a framework for assessing the risk, with a help of waste water treatment facility in Scotland as a case study which is a typical PPP project.

## 8. Hyun-Ho C.H.N Cho and J. W. Seo (2004):

Presented a risk assessment methodology for underground construction projects. A formalized procedure and associated tools were developed to assess and manage the risks involved in underground construction. The suggested risk assessment procedure is composed of four steps of identifying, analyzing, evaluating, and managing the risks inherent in construction projects. The main tool of the proposed risk assessment methodology is the risk analysis software. The risk analysis software is built upon an uncertainty model based on fuzzy concept. Other tools developed in this study include the survey sheets for collecting risk-related information and the detail check sheets for risk identification and analysis. They finally discussed a detailed case study of the developed risk assessment methodology performed for a subway construction project in Korea.

## 9. El-Diraby.T. A and Gill S.M (2006):

Developed taxonomy for relevant concepts in the domain of privatized-infrastructure finance. The taxonomy is an attempt to create information interoperability between the construction and financial industries. The taxonomy models the concepts of privatized-infrastructure finance into six main domains: processes, products, projects, actors, resources and technical topics (technical details and basic concepts). The taxonomy was designed to be consistent with Open Financial Exchange (OFX). It was developed through the analysis of 10 case studies and involvement in project development and interaction with industry experts. The taxonomy was validated through interviews with domain experts, and through the analysis of two independent case studies. A prototypical semantic web-based portal for communicating project risks was developed to in order to illustrate the use of the taxonomy.

## III. PROPOSED SYSTEM APPROACH

In proposed system approach the Project Risk Management includes the processes concerned with identifying, analyzing, and responding to project risk. It includes maximizing the results of positive events and minimizing the consequences of adverse events. Figure III.1 provides an overview of the following major processes:

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## PROPOSED SYSTEM ARCHITECTURE



Figure III.1 Risk Management

### Explanation

The processes shown in figure III.1 interact with each other and with the processes in the other knowledge areas as well. Risk response development is sometimes called response planning or risk mitigation. Risk response development and risk response control are sometimes treated as a single process, and the combined process may be called risk management. Each process may involve effort from one or more individuals or groups of individuals based on the needs of the project. Each process generally occurs at least once in every project phase. Risk identification and risk quantification are sometimes treated as a single process, and the combined process may be **VI.2 LEGAL RISK**

Legal risk is low in India, but if the contract legal problem arises then settlement dispute takes time & money. Ranking of legal risks are given in the table. **VI.2.** and the corresponding pie chart is shown in figure **VI.2.**

Table VI.2 Ranking of Legal risk

Sub risks		Mean
1.	Improper verification of contract documents	3.83
2.	Breach of contract by project partner	2.91
3.	Lack arbitration clause in agreement	2.13
4.	Lack of enforcement of legal judgment	1.26
5.	Uncertainty and unfairness of court justice	1.04

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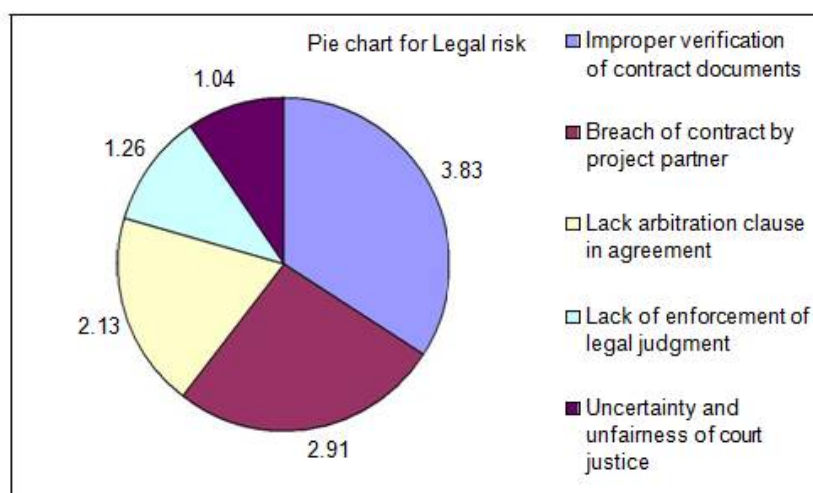


Figure VI.2 Pie chart for Legal risks

## VI.3 MANAGEMENT RISKS

To compare with other industries the construction sector suffers a chronic shortage of workers, though unworkable workers are available in large amount from different part of the country. Employment services company Ma Foi estimates a 20 per cent shortfall in the supply of civil engineers needed by the construction industry. In some companies the problem of frequent design changes occurs due to owners wish, initial design errors, faulty construction etc. To overcome these design problems, the design should revise properly and use of design specialist could solve the problem. People shortage in the construction industry stems from civil engineers abandoning construction in favors of higher-paying IT industry jobs all these years. Insufficient manpower may slow down infrastructure projects as companies may phase them longer than necessary. Ranking of management risks are given in the table. VI.3. and the corresponding bar chart are shown in figureVI.3.

Table VI.3 Ranking of Management risks

Sub risks		Mean
1.	Shortage of skilful workers	4.58
2.	Materials shortage	2.94
3.	Unknown site conditions	2.83
4.	Design changes	2.74
5.	Site distance from urban area	2.6
6.	Errors in design drawings	2.53
7.	Poor quality of procured materials	2.39
8.	Wastage of materials by workers	2.3

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9.	Technical risk	2.15
10.	High degree of difficulty in construction	2.07
11.	Stiff environmental regulations	1.93
12.	Incompetence of transportation facilities	1.84
13.	Shortage in supply of water	1.78
14.	Equipment failure	1.77
15.	Architect Vs Structural Engineer dispute	1.73
16.	Surplus materials handling	1.71
17.	Following government standards and codes	1.7
18.	Accidents on site	1.57
19.	Shortage in supply fuel	1.43
20.	Theft of materials at site	1.2
21.	Industrial disputes	0.89
22.	Obsolescence of building equipment	0.85
23.	Shortage in supply electricity	0.77

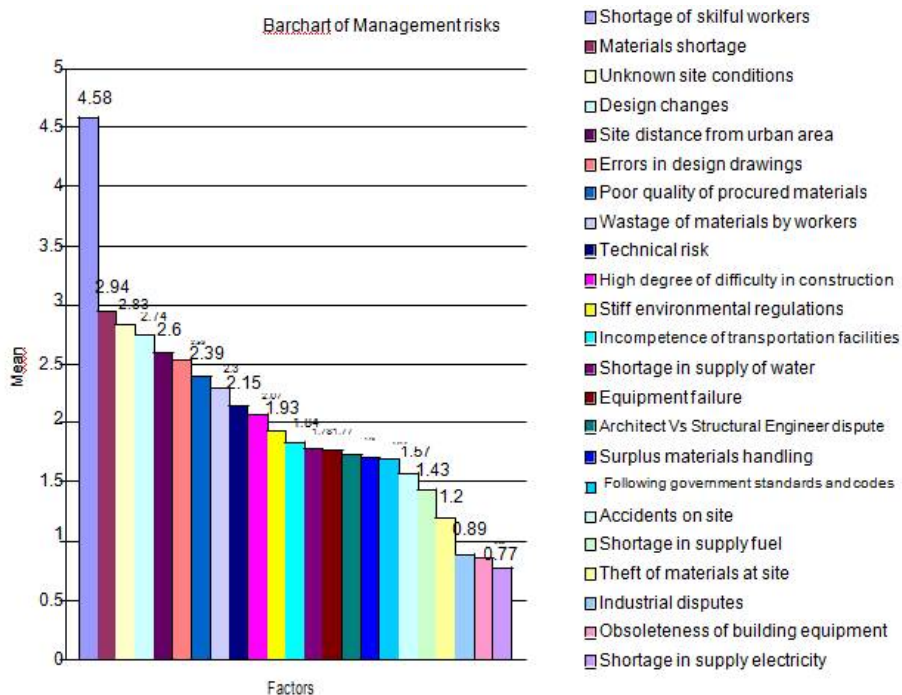


Figure VI.3 Bar chart for Management risks



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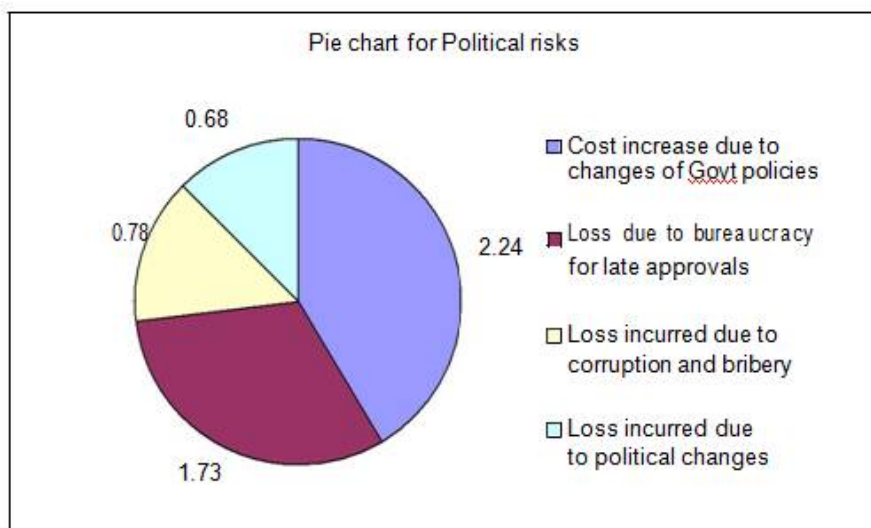
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## VI.4 POLITICAL RISK

This is always present but varies different states to states. But as far Tamilnadu is concerned there is no substantial political risk since, though the party of the government changes the policy of the government has not been changed but has improved very much. But as in common approval for the new projects is present, which causes delays and even financial loss for the companies. Ranking of political risks are given in the table. **VI.4** and the pie chart is shown in figure **VI.4**.

**Table VI.4 Ranking of Political risk**

Sub risks		Mean
1.	Cost increase due to changes of Govt policies	2.24
2.	Loss due to bureaucracy for late approvals	1.73
3.	Loss incurred due to corruption and bribery	0.78
4.	Loss incurred due to political changes	0.68



**Figure VI.4 Pie chart for Political risks**

## VII.CONCLUSION

In India the big companies are accepting that there are few environmental effects because of their project, but says that it is a global phenomena and it cannot be nullified. Project risk management is an integral part of the process which aims at identifying the potential risks associated with a project and responding to those risks. It includes activities which aim to maximize the consequences associated with positive events and to minimize the impact of negative events. In case study, the overall cost of the project incurred due to the risk in project such as project completion risk, regulatory and administrative risk, delay in construction project risk and financial risk. To minimize the negative effects of risks, appoint risk analyst for better results so that less time will be require for completion of the project in

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project cost. Also minimize the threat of risk by risk insuring company. In case study, the resultant risk matrix and resultant risk profile for the projects should be prepared by the project manager by considering the present situations of the project for cost-benefit ratio. Otherwise cost and time will affects on the total project cost. The loss of workers is the major risk faced by all the companies. because; the workers are migrating between companies very often because of their high demand in the market. And also huge vacuum is created by the workers who move to Middle East countries where they are offered very high packages when compared to India. Sub-contractor related risks are also high, since most of the sub contractors are not able to meet the standards of the main contractor and the client due their size of work. Thus from the above points the management risk has been found to be the critical risk from this survey if you go to the government rule then you will face the very low risk, but the implementation of court directive is not proper; this was the complaint seen from this survey.

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