



Article Title: Study on Analysis of Risk in Construction Management

Study on Analysis of Risk in Construction Management

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ABSTRACT

There is an several kind of risk occurrence due to increasing of construction projects which leads to excessive effects in time and cost basis. It is based on identification, evaluation and management of risk in construction project. Finally, we provide the suggestion to avoid risk and how to rectify the following risk occurrence. That's why we collected the data in Gantt chart from construction officials and also to receive the information about construction project by questionnaire. From that we analyses the risk by using software like primavera. The data collection is based on two suspects as government and private organization. Apart from that, we referred number of journals which gave some ideas to manage the risk and provide the solution to avoid risk during construction work and also provide kind of solutions for construction risk sector. Risk assessment is a tool to identify those risks in a project and manage it accordingly with proper treatment. Risk assessment is defined in this study as a technique that aims to identify and estimate risks to personnel and property impacted upon by a project. The aim of this project report is to make aware of risk that occur during construction work and give some reasonable solution in construction project with procedures. A brief discussion on application of risk management, hence, somewhat better outcome, avoid risk and value of constructor and client were studied

1 Introduction

1.1 General

Construction projects are initiated in complex and dynamic environments resulting in circumstances of high uncertainty and risk, which are compounded by demanding time constraints. Traditional project management that relies on reactive measures to manage project crises is often ineffective to prevent project failure. Knowing the risks that can potentially cause harm to a project but without a mechanism to prioritize their risks, project management would also face difficulties in allocating adequate resources to prevent the occurrence or mitigate the consequence of project failure.

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. The data collection for the risk allocation is done from contractors and according to the response rate, the allocation is decided. In controlling the risks, major risk is treated by preparing the risk action schedule, moderate risks by specifying the



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control measures and minor risk can be accepted. In this project, the qualitative analysis of all types of risks except financial and economical risks in the construction projects is done by 'Risk factor and priority model'. The research seeks to develop a risk management framework which the investors/ developers/ contractors can adopt when contracting the construction work.

1.2 Project Risk Management

Risk management in a project encompasses identifying influencing factors that could potentially negatively impact a project's cost schedule or quality baselines. Quantifying the associated potential impact of the identified risk and implementing measures to manage and mitigate the potential impact.

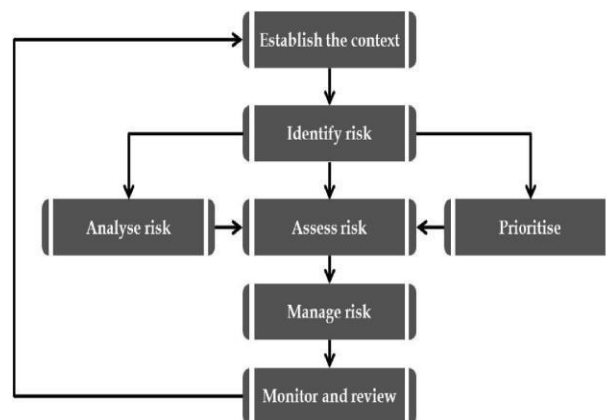


Figure 1: *The process of risk management*

The riskier the activity is, the costlier the consequences if the wrong decision is made. Businesses would like to quantify risk for many reasons. Knowing how much risk is involved will help decide if costly measures to reduce the level of risk are justifiable. It can also help to decide if sharing the risk with an insurance company is justified. Some risks, such as natural disasters, are virtually unavoidable and affect many people. All choices in life involve risk. Risks cannot be totally avoided, but the choice can be made so that risk is minimized. The risk management process begins with the initial identification of the relevant and potential risks associated with the construction project.

1.3 Risk Identification

The identification of risk is the process which aims at exploring all possibilities to locate the risk sources and risk events and reducing the overlooking any potential risk. The process which involves the analyzing project to determine the source of risk and other possible events. The risk identification is mainly accumulate in basis of few risk factors.



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- **Risk Assessment**

Risk assessment is defined in this study as a technique that aims to identify and estimate risks to personnel and property impacted upon by a project. Traditional risk assessment for construction has been synonymous with probabilistic analysis. Such approaches require events to be mutually exclusive, exhaustive, and conditionally independent. However, construction involves many variables, and it is often difficult to determine causality, dependence and correlations. As a result, subjective analytical methods that rely on historical information and the experiences of individuals and companies have been used to assess the impact of construction risk and uncertainty.

- **Risk Monitoring**

Construction risk monitoring is an accurate and positive deviation of checking the quality, quantity of material used, accuracy and progress of construction project. Risk monitoring will give you a clear view of your projects progress, allow you to identify problem before and as they arise. The risk monitoring is mainly concern with quality control, health, safety, costing, materials, construction environment.

- **Risk Control**

Controlling risk is the process of implementing and updating risk response plan. Risk control aim at implementing the risk response plan by tracking identified risk, monitoring residual risk, identifying new risk and documenting from projection.

a) Make time decision.

b) Adjust plan, keep all information about possible risk.

1. **Avoid the risk.** Not all risks can be avoided, but changes in the scope of work or selective project bidding can help to eliminate certain risk. For example, you may want to avoid bidding on multi-storey projects if you want to prevent the risk of workers falling from heights.

2. **Transfer the risk.** This is the process of transferring the liability or responsibility of a risk to an external party. For example, most contractors enroll in workers 'compensation insurance to cover the costs of workers who are injured or become sick due to their work. General Contractors can also transfer some risk to their suppliers and Subcontractors.

3. **Mitigate the risk.** Create plans or processes that eliminate the risk from the equation on your projects. For example, if you want to mitigate the risk of unwanted foot traffic entering your project site, then you may want to implement a construction site access control system in conjunction with a secure site perimeter.

4. **Accept the risk.** Some risks are simply unavoidable in construction or may need to be embraced to stay on schedule or to prevent additional risk to workers. For example, extreme weather conditions could



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Mean that work must be halted for a day or two on a project site to prevent any risk to worker safety. This could lead to delays on the project but may be deemed acceptable in exchange for the risk reduction to worker safety.

1.4 Need for Study

- Identify the major impacts and the role of major risks in construction works.
- Construction projects involve great deal of time and capital, so effective construction project risk management skills are required if the projects are to be completed within the Established timeline to meet cost limitations and quality requirements.
- Risk is inherent everywhere especially in construction projects. The activity that are present in the construction industries could result in fatal injuries, financial disasters, disruption and delayed operation.

1.5 Objective

Mostly risks are inherent in construction industry. Risk cannot be ignored but it can be managed.

- Identify the different types of risks that may occur in the construction industry and to quantify the relation between the risk in construction project
- Assess the risks by getting the responses from project managers of various sizes of firms and find out the likelihood of occurrence of risk elements and the degree of impact or the level of loss if the risk occurs
- Analyze the risks by RFA and prepare risk profiles
- Allocate the risks or find out the owners of the different types of risks
- Evaluate the risks and suggest the risk control measures

2 Literature Review

2.1 General

An extensive review of international project risk assessment and management was conducted during the initial phase of the research effort. Previous research suggests that construction activity is particularly subject to more risks than other business activities because of its complexity; a construction project usually requires a multitude of people with different skills and interests and the coordination of a wide range of disparate, yet interrelated, activities. Such complexity is further compounded by the unique features of a project and many other external uncertainties. And also, in general, there is an absence of literature that has focused on the practices, results or development of risk assessment and management techniques for Indian construction projects

N.B.Chaphalkar and C.A.Shelar (2011) told that consequences and likelihoods can be rated



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in terms of potential impact and occurrences respectively on a five point descriptive scale, by converting these values to numerical measure, the combined risk measure or risk factors can be calculated using an equation (in terms of the percentage values of impact and occurrence).

M. Merritt (2004). Risk is defined as the possibility that an undesired risk is always outcome or the absence of desired outcome disrupts your project. Possibility is an important word in this definition, because risk is always connected with uncertainty. Risk management is a set of techniques for controlling the uncertainty in a project. An uncertainty could be reflected in project expense growth, schedule slippage, lack of quality in the deliverables, or deliverables that fall short in some other way, such as being too expensive. Apart from project management, risk management is often associated with the insurance industry. In fact, risk management is sometimes a synonym for insurance. This connection provides some valuable insights about project risk management.

N. Hamzah (2011) Delay can be defined as time overrun or extension of time to complete the project. Construction delay is something that cannot be avoided especially in government agencies in Malaysia. Therefore delay is situation when the actual progress of a construction project is slower than the planned schedule or late completion of the projects. The causes of delay are taken from the past literature review. There are two main types of delay: excusable delay and non-excusable delay. The literature reviews are summarized and the delay framework is constructed based on the literature review summary in context of public higher learning institution.

Al-Bahar and Crandall (2002) has defined risk identification as “the process of systematically and continuously identifying, categorizing and assessing the initial significance of risks associated with a construction project”.

V. Carr, JHM Tah (2001) have described the various sources of construction risks as internal and external. The internal sources include the client, consultants, design, cost & construction project management, contractors, subcontractors and suppliers. The external sources include unforeseen circumstances, government/ statutory/ political controls, environmental constraints, health & safety issues and socio-cultural issues.

Padiyar et al (2004) have specified that the essence of risk is characterized by three factors, first the event which is a possible occurrence which could affect the achievement; second is the likelihood which is the chance or probability of the risk event occurring within the time period and third factor includes the impact of the event in terms of financial value of the effect of the risk event.

A. Enshassi & S. Mohamed (2004) have specified that the criterion for a risk to be appropriated to a particular category (owner, contractor, shared, insurance or ignored) was that it should get at least 60% response rate to achieve the main stream of the rates. Those that failed to get such response rate in favour of any category were listed as undecided.

A. Ismail and his associates (2008) aimed to identify some of the core issues in construction management environment which are mentioned above as approach to integrated project



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management system for construction industry. A common problem in project risk management processes is the need to determine the relative significance of different sources of risk in order to guide subsequent risk management effort and ensure it remains cost-effective.

R. C. WALKE (2012) Combining in itself the potential for employment and providing critical infrastructure for practically any economic activity, construction industry plays a decisive role in healthy development of any nation. Not only large but even small construction projects have an abundance of risks and need effective Risk Management. Intuition, expert skills and judgment always influences decision making process in Risk Management. A set of tools is needed which shall enable Risk Management to be used effectively in practice in construction industry. In this paper, a model for Risk Quantification has been proposed for construction projects, using score model and EV analysis approach.

Shankar Neeraj, Balasubramanian. M (2015) – “ASSESSMENT OF RISK IN CONSTRUCTION INDUSTRY”

Construction projects are initiated in complex and dynamic environments resulting in circumstances of high uncertainty and risk, which are compounded by demanding time constraints. 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. Thus risk assessment need arises. Risk assessment is a tool to identify those risks in a project and manage it accordingly with proper treatment.

Berenger Y. Renault and Justus N. Agumba (2016) – “A review of risk management process in construction projects of developing countries” This paper explains that the construction industry is well known as a highly risk prone industry owing to the complexity of its activities and dynamic project environments generating an atmosphere of risks that must be taken into consideration in the decision process. For this reason, we have developed this treatise to elucidate the fundamentals of risk management through a concise new proposal of literature review for risk management in construction. Our explanation of this is venture is that over the years, this area has been acknowledged as a crucial process in the business institutions and the most discussed subject among experts and researchers in the construction sector.

3 Literature Summary

From the Literature reviews mentioned above we came across through various papers which explains about the risk management in construction industries. Risk assessment is the process of systematically and continuously identifying, categorizing and assessing the initial significance of risks associated with a construction project. Not only large but even small construction projects have an abundance of risks and need effective Risk Management. highly risk prone industry owing to the complexity of its activities and dynamic project environments generating an atmosphere of risks that must be taken into consideration in the decision process. Thus risk assessment need arises. Risk assessment is a tool to identify those risks in



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a project and manage it accordingly with proper treatment.

4 Flow Chart

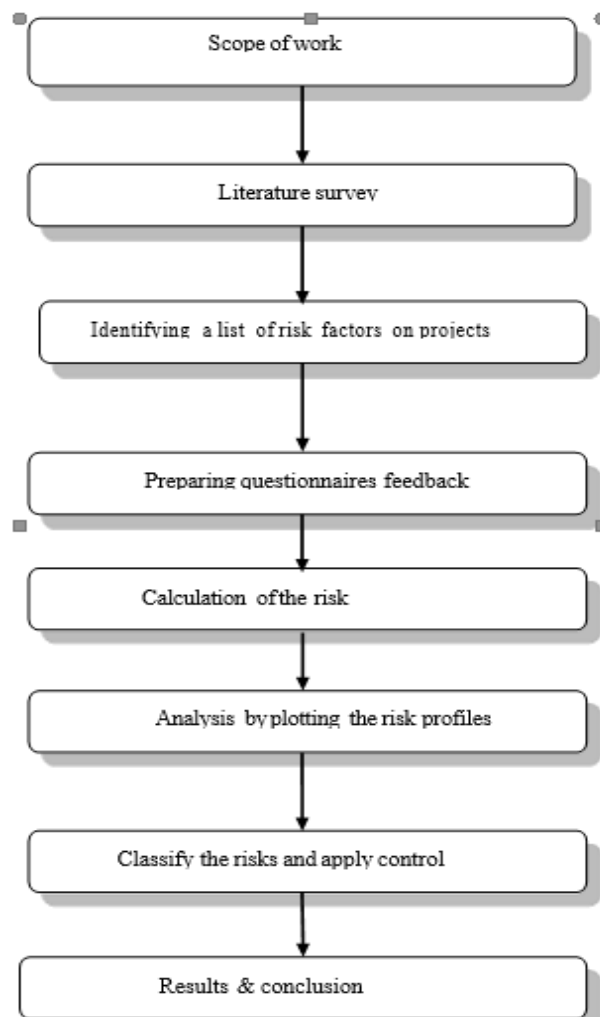


Figure 3: Methodology

4.1 General

- Study of literature Management capabilities
- Preparation of Questionnaire
- Site visit to major construction projectsites
- Questionnaire survey and personnel interviews with in- charges and managers and collection of data from site
- Analyzing the Questionnaire
- Qualitative analysis of data obtained from site and to identify the risk profiles
- Remedial measures to be suggested and the present data tape-recorded for future



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reference

- Conclusions, recommendations and suggestions for future study

4.2 Method of Surveying

The general methodology of this study relies largely on the survey questionnaire which will be collected from the local building contractors of different sizes by mail or by personnel meeting. A thorough literature review was initially conducted to identify the risk factors that affect the performance of construction industry as a whole.

4.3 Questionnaire Survey

On the basis of a questionnaire survey of general contractors and project management practices, the construction industry's perception of risk associated with its activities and the extent to which the industry uses risk analysis and management techniques. It concludes 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, judgment 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. The methodology of the study relies largely on a questionnaire survey mailed or given by hand to the local contractors of different sizes. Impacts towards the building construction project. The questionnaire was designed into three sections: section A; section B; and section C.

4.3.1 Section A: Demographic

Section A solicited demographic about the company profile, respondent's profile, project details and general knowledge about risk.

4.3.2 Section B: Identification of Level and Impact of Risk

This section was to obtain the information on factors that contribute to the risks in building construction projects from the perspective of contractors. There were nine categories with hundred and twenty six factors of risks constructed into structured questions. Respondents were asked to review and indicate the likelihood of these risks as rare, unlikely, possible, likely or almost certain and the level of impact on each risk that would result in risk.

4.3.3 Section C: Develop and Implement Risk control

This section was designed to focus on identifying, assessing and implementing measures to control risks. The respondents were asked to tick the risk treatments based on the scale below:
Avoid risk = by not proceeding with the aspect that may suffer the risk event
Reduce likelihood = where the project or its environment is changed to reduce the probability of a risk occurring.



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Reduce impact = where action is taken to minimize the impact of a risk if

It occurs. Treatment includes contingency planning that should address significant risk areas where preventive action is either unavailable or the cost of prevention is prohibitive.

Risk transfer = where the responsibility for a risk is transferred to another party such as a supplier or insurer.

Acceptance & retention = risks that are currently acceptable and do not require treatment, but will be kept under review **Risk Analysis**

Evaluate Probability and Impact into Five levels: Very Low, Low, Medium, and High, Very High.

PROBABILITY RANK	DESCRIPTION
Very High	Greater than 70 %probability of occurring
High	51 to 70 % probabilityof occurring
Medium	31 to 50% probabilityof occurring
Low	11 to 30% probabilityof occurring
Very Low	Less than 10% probability of occurring

4.3.4 Calculation of the RiskFactors

The combined risk measure or the risk factor can be calculated (with probability concept) using the formula,

$$RF= P+C-(P*C)$$

Where;

RF= Risk factor (The term which indicatethe risk measure) P= % value of occurrence (0 to 1)
C= % value of impact (0 to 1)

$$P=0.25-(0.2*(2-\text{occurrence mean value}))C=0.25-(0.2*(2-\text{impact mean value}))$$

5 Conclusion & FutureScope

With globalization of market, projectare becoming larger in size and complex in nature. The stability of modern project is thus, constantly subjected to certain sensitive and volatile environment, external as well as internal. Risk management must installed in the project,



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change to gain the goal of avoiding risk and how to manage the risk on further construction. We consider two suspect as government and private organization from which collection of data could be carried out. The construction work in private sector has been over with some risk factors, while in government project, due to lack of operational cost, the project was deviated from actual date of completion. So that, we have listed out causes for deviation and after being analysis, we suggested solution to avoid risk. As far as India is concerned risk management is still a new word in the construction sector and this should be changed as soon as possible. Currently the government has proposed a risk rating system will help the developers to develop projects at a faster pace by taking quick decisions. This will encourage more response from developers and investors for public – private partnerships projects. It could make the bidding projects more competitive. The system will enable bankers to make quick for lending finances, which could lead to the financial closure of the project at a faster pace.

6 Future Scope

- To understand the background of organization and its risk.
- Evaluate the risk management activities being undertaken so far.
- Develop the structure for risk management initiatives and control to follow.
- To avoid the risk if possible.

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