Risk Factors Affecting Building Construction Projects In India

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ABSTRACT

Construction Projects are performed in a complex environment that is categorized by risk and uncertainty. The projects fail to achieve their primary objectives due to the absence of an effective risk management system. The status quo of managing risk in construction projects in India is futile. An effective risk management system consists of identification of risks, assessment (qualitative and quantitative), response to critical risk and then controls the risk bymonitoring. This paper addresses the various risks affecting theconstruction projects in India.

KEYWORDS

Construction Projects; Risk; Risk Management system; Identified risks.

INTRODUCTION

Risk management is widely recognized as one of the most critical procedures and capability areas in the field of project management.The construction industry unlike other industries is more affected by risks. If these risks are not taken into account then there is a maximum likelihood of cost overruns, time delays and low quality, resulting in poor project performances. In India, like other developing countries less importance is given to this aspect of project management**.**Risks are critical to a project as every critical activity is associated with a risk. Mismanagement is one of the various sources of risk. Risk mitigation depends a lot on the co-ordination of work between different people on the project. So naturally, less the number of people working on a project, less is the chance of the risk taking place. Nowadays, almost all of the big scale projects are sublet to sub-contractors, and therefore risk assessment and mitigation has become more and more difficult.The risk management strategies are used less in construction sector due to lack of awareness and knowledge among the participants of the projects.

SIGNIFICANCE OF THE STUDY

The need for this study is to understand the importance of risk management because its execution is very less in the construction industry compared to other industries due to lack of knowledge. The track record of the construction industry is very poor in terms of coping up with risks in projects.

OBJECTIVES OF STUDY

⟩ To understand the importance of risk management inconstruction sector and to understand the various stages involved in risk management process.

⟩ To identify significant risks involved in construction projects.

METHODOLOGY

In this paper various literatures such as journal articles and textbook have been referred to get background information and necessary data to achieve the goals of this paper. The objective is to generate a comprehensive list of risks based on those events that might create, enhance, prevent, degrade, accelerate or delay the achievement of objectives. Comprehensive identification is done because a risk that is not identified at this stage will not be included in further analysis.A discussion was made with project engineers and site supervisors working for the construction industry to identify and assess, the risk factors relating to construction industry.

RISK MANAGEMENT

Risk management is a process which identifies the project risks, analyze them, and determine the actions to avert the threats on any project.The risk management process involves the systematic application of management policies, processes and procedures to the tasks of establishing the context, identifying, analyzing, assessing, treating, monitoring and communicating risks.

RISK MANAGEMENT PROCESS

Risk Management Cycle(RMC) is presented in Figure 1.From Figure 1,the risk management cycle includes the following main steps: Risk planning; Risk identification; Risk assessment (qualitative and quantitative); Risk analysis; Risk response; Risk monitoring; and reporting the risk management process.

Fig 1: Risk Management Cycle (RMC)

A. Risk Identification

The organization should identify sources of risk, areas of impacts, events and potential consequences. The basic aim of this step is to generate a comprehensive list of risks based on those events that might create, enhance, prevent, degrade, accelerate or delay the achievement of objectives. Some of the risk identification methods are:

1.   Brainstorming:

This is one of the most popular and usefultechnique for risk identification. The persons who are associated with project will gather at one place and there must be a coordinator who is briefing about various aspects with the participants and then after note down the factors. Before closing it the coordinatorreview the factors and eliminate the unnecessary ones.

2.   Delphi Technique:

This technique is similar to brainstorming but the participants in this do not know each other and they are not at the same place. They will identify the factors without consulting other participants. The coordinator like in brainstorming sums up the identified factors.

3.   Interview/Expert Opinion:

Experts or personnel with sufficient experience in a project can be a great help in avoiding/solving similar problems over and over again. All the participants in the project can be interviewed for the identification of factors affecting risk.

4.   Checklists:

These are simple but very useful predetermined lists of factors that are possible for the project. This lists contains the risks identified in projects undertaken in the past and the responses to those risks provides a head start in risk identification.

B. Risk Assessment/Analysis

Risk analysis is the next stage in the risk management process where collected data about the potential risk are analyzed. In the analysis of the identified risk, two categories of methods – qualitative and quantitative have been developed. The qualitative methods are based on descriptive scale from high to low level. The quantitative methods are used to determine the probability and impacts of the risks identified and are based on numeric estimations. Companies generally use a qualitative approach since it is more convenient to describe the risks than to quantify them.

1.   Quantitative methods

Quantitative methods need a lot of work for the analysis to be performed. The effort should be weighed against the benefits and outcomes from the chosen method, for example smaller projects may sometimes require only identification and taking action on the identified risks, while larger projects require more in depth analysis. The quantitative methods estimate the impact of a risk in a project. Most suitable tools for quantitative methods are the following.

a)   Monte Carlo simulation

The Monte Carlo method is based on statistics which are used in a simulation to assess the risks. The simulation is used for forecasting, estimations and risk analysis by generating different scenarios. Information collected for the simulation is, for instance, historical data from previous projects. The data represent variables of schedule and costs for each small activityin a project, and may contain pessimistic, most likelyand optimistic scenarios. Data are mixed and one of them is picked each time the simulation is done. The chosen unit is an outcome which is recorded and will be put back. The simulation is then redone a number of times and all outcomes are recorded. After completing the simulations required number of times, the average is drawn from all of the outcomes, which will constitute the forecast for the risk. The result of Monte Carlo method is a probability of a risk to occur, often expressed in a percentage.

b)   Sensitivity analysis

Sensitivity analysis is done to establish the risk events which have the greatest impact or value.Those events are later weighed against the objectives of the project. The higher the level of uncertainty aspecific risk has the more sensitive it is concerning the objectives, which means that the risk events which are the most critical to the project are the most sensitive and appropriate action needs to be taken. The result from the analysis can be presented in a spider diagram. One disadvantage with this analysis is that the variables are considered separately, which means that there is no connection between them.

c)   Diagramming technique

Diagramming technique or Decision tress is mainlyused when certain risks have an exceptionally high impact on the two main project objectives: time and cost. There are two types of decisions trees; called Fault tree analysis (FTA) and Event tree analysis (ETA).The FTA method of analysis is used to determine the probability of the risk and is used to identify risks that can contribute or cause a failure of one event. The purpose is to find the underlying causes to this event. It is usually drawn up as a sketch of a tree. The branches are the causes to the problem, and the starting point of the tree is the problem itself. Each branch has its own sequence of events and possible outcomes. The problem could depend on some causes that are interrelated with each other, or simply random causes. Fault tree analysis (FTA) and a similar analysis called event tree analysis (ETA), are simple method which can be used as a structured model to identify causes and effects of a

single event, but present different approaches. As mentioned above, ETA is very similar to the FTA, but what differentiates the methods is the outcome. ETA is also drawn as a tree but in an opposite approach than the FTA. Failure generally does not have its roots in a single cause. It is rather described as chain of causes and consequences in a sequence which can end up in major damage for the project.

2) Qualitative methods

Qualitative methods for risk assessment are based on descriptive scales, and are used for describing the likelihood and impact of a risk. These relatively simple techniques apply when quick assessment is required insmall and medium size projects. Moreover, thismethod is often used in case of inadequate, limited or unavailable numerical data as well as limited resources of time and money. The main aim is to prioritize potential threats in order to identify those of greatest impact on theproject, and by focusing on those threats, improve the projects overall performance.

There are mainly four qualitative methods for risk assessment. They are:

a)   Risk probability and impact assessment

By applying the method called risk probability and impact assessment, the likelihood of a specific risk to occur is evaluated. Furthermore, risk impact on projects objectives is assessed regarding its positive effects for opportunities, as well as negative effects which result from threats. For the purpose of this assessment, probability and impact should be defined and tailored to a particular project. This means that clear definitions of scale should be drawn up and its scope depends on the project's nature, criteria and objectives. The exemplary range of probability from 'very unlikely' to 'almost certain', however, corresponding numerical assessment is admissible. The impact scale varies from 'very low' to 'very high'. Risk impact assessment investigates the potential effect on a project objective such as time, cost, scope, or quality. Risk probability assessment investigates the likelihood of each specific risk to occur. The level of probability for each risk and its impact on each objective is evaluated during an interview or meeting.

b)   Probability/impact risk rating matrix

Probability and impact were assessed are used as basis for quantitative analysis and risk response. The method computes the priority score as the average of the probability and impact. The range of priority score, the rating and color are assigned to indicate the importance of each risk.

c)   Risk categorization and Risk Urgency Assessment

Two methods mentioned are not as commonly used as probability and impact. Risk categorization is a way of systematizing project threats according to e.g. their sources, in order to identify areas of the project that are most exposed to those risks. Tools which can be used in this method are work break down structure (WBS) or risk breakdown structure (RBS), and their role is todevelop effective risk response. WBS breaks downlarge activities into small, manageable units and creates linked, hierarchical series of independent activities. RBS categorizes risks and shows their dependencies. The role of the second method, Risk Urgency Assessment, is to prioritize risks according to how quick response they require.

C. Risk Response

This third step of the risk management process indicates what action should be taken towards the identified risks and threats. The response strategy and approach chosen depend on the kind of risks concerned. Most common strategies for risk response are: avoidance, reduction, transfer and retention. Beyond those types of responses, describes that sometimes it is difficult to take a decision based on too little information. This may be avoided by waiting until the appropriate information is available in order to deal with the risk. This way of acting is called Delay the decision but this approach is not appropriate in all situations, especially when handling critical risks. Those need to be managed earlier in the process.

D. Risk Monitoring

This final step of Risk Management Process (RMP) is vital since all information about the identified risks is collected and monitored. The continuous supervision over the RMP helps to discover new risks, keep track of identified risks and eliminate past risks from the risk assessment and project. The assumptions for monitoring

and controlling are to supervise the status of the risks and take corrective actions if needed. Tools and techniques use to risk monitor and control are:

1) Risk reassessment – identification of new potential risks. This is a constantly repeated process throughout the whole project.

2) Monitoring of the overall project status – are there any changes in the project that can effect and cause new possible risks

3) Status meetings – discussions with risks owner, share experience and helping managing the risks.By managing the whole RMP, the process can be evaluated. This is a method of creating a risk register where all risks and their management can be allocated in order to facilitate future projects. This is also a way to improve the project work, since the advantages and disadvantages will be brought up.

RISK FACTORS AFFECTING BUILDING CONSTRUCTION PROJECTS

Based on the preliminary assessment, seven risks are identified in the projects handled by construction companies in India. The assessment is based on Interview which is subjected to limitations. Therefore, a secondary data collection by combining Expert opinion and Literature study had been conducted. The expert opinion provided by technical expert in the field helped to shortlist the risks. Thus 27 risks are shortlisted under seven section.The various risks identified by are the following: Physical Risk, Construction Risk, Financial Risk, Design Risk, Management Risk, Environmental Risk and Socio Political Risk. Each of these risks are sub-divided into various sub factors:

Table 1.Various Risks affecting Building Construction Projects

Physical Risk	Supply of Defective Materials
	Labour Injuries
	Insecurity and Theft
	Damage to Equipment
Construction Risk	Labour Disputes
	Non availability of resources
	Availability of camp for labours
	Improper Construction Methods
	Design Changes
	Equipment Failure
Financial Risk	Delay in Payment
	Fluctuation of Material Prices
	Inaccurate Estimates
Design Risk	Improper Specifications
	Inadequate Site Investigation
	Improper Planning &Scheduling
Management Risk	Poor Site Management
	Poor Communication between Involved Parties
	Inexperienced Work Force
	Client-Contractor Disputes
Environmental Risk	Weather Condition
	Pollution by Construction Waste
Socio Political Risk	Permits and approval delays
	Bribery/Corruption
	Language/Cultural Barrier
	Political Influence
	Change in Laws and regulation

CONCLUSION

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 of India has proposed a risk rating system will help the developers to develop projects at a faster pace by taking quick decisions. Each rating agency will have its own methodology to rate projects. Construction projects are unique in terms of design, construction methods, personnel, location, etc. Variations in these factors will induce different types of risk factors into construction projects. In addition, risk factors could come from many different directions, such as social, legal, economic, environmental, political, logistic, management and technological sources. Furthermore, in a building construction project where cost, time and quality really matters, executing a project within the specified budget, time frame and optimal quality is critical, therefore properly implementing a risk management process will enhance the successful completion of building construction projects and thereby making the project more profitable.

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