

# Risk Management Process for Managing the Problem of Cost overrun in Construction Projects

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**Abstract - Cost overrun in construction projects takes place because of a variety of factors which are associated with some types of risks and uncertainties. For the successful delivery of the project it becomes necessary to apply the formal risk management process to manage the risks and uncertainties causing cost overrun for better control on project cost and support in identifying possible solutions to avoid cost overruns in future. In this paper the existing risk management process is described.**

**Key words - Cost overrun, construction projects, risk, risk management process (RMP)**

## I. INTRODUCTION

Construction industry has become a very vital part of any nation which contributes a great deal to the socio-economic development. Projects are growing fast day by day, especially in developing countries. The most important objectives of any project are to finish the project within given schedule, stipulated budget and with specific quality standards [1]. It has been experienced that the construction projects are facing the issues regarding cost overruns and schedule delay owing to the inherent risks and uncertainties. The cost is a very important factor as available in the literature [2-3]. There are various reasons which are responsible for cost overrun like hostile climatic condition, improper planning, fluctuation in material prices, delay in material procurement, modification in design, poor decision making [4-6]. Therefore, construction industry demands for a systematic risk management approach to manage and control the problem of cost overrun. In this paper the available definitions of risk and uncertainty in the literature are exposed, and the existing risk management process is described.

## II. RISK

The definition of risk is indistinct[7]. It mainly depends on people's outlook, beliefs and their judgments[8] (Akintoye and Macleod, 1997). The risk has been widely described as the possibility of occurrence of either negative or positive effects[9-11]. Risk always does not give negative results; sometimes it shows the likelihood of opportunities also. It means risk can be in positive or negative direction. Risk can be expressed as

Risk = f (uncertainty of an event, potential loss/gain from event)

## III. RISK MANAGEMENT

Currently risk management is being considered as an important feature of the projects to control the cost brought by probable risks [12]. In the available literature the risk management (RM) has been defined with slight differences by various authors, institutes and professional bodies, but the core information remains same. According to (Uher, 2003)[13] risk management may be described as "a systematic way of looking at areas of risk and consciously determining how each should be treated. It is a management tool that aims at identifying sources of risk and uncertainty, determining their impact, and developing appropriate management responses." Fig.1 shows the risk management process to be adopted in construction projects.



Fig. 1 Risk management process

The Project Management Institute (PMI) has outlined a recommended project risk management process (RMP). Project risk management process includes the following important elements:

**A. Risk Identification:**

The very first step of the process is to recognize the important risks related to the project which may be problem for achieving the various project objectives. All information about risks should be characterised and this should be registered in risk register. The important methods of risk identification are shown in fig. 2:

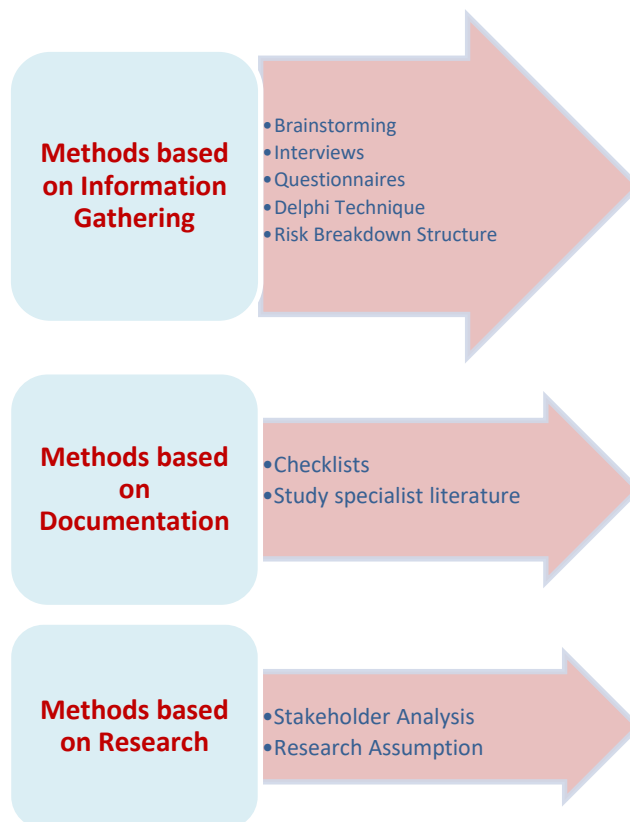


Fig. 2 Important methods of risk identification

**B. Risk Assessment**

The next step of the risk assessment method is to assess the risks. A number of methods are available in literature which is employed for various purposes. These methods can be classified as either quantitative or qualitative.

**1) Qualitative Analysis;**

In qualitative method, risks are measured using descriptive scales. Risk and its various impacts are expressed in terms of qualitative scale such as very hot /moderately hot /cold. For identifying requirements for further analysis or action risk events are ranked and evaluated after joining their probability and impact [11]. These methods are used for quick assessment [14]. As indicated by Lyons and Skitmore [15], it is the most common type of technique for risks analysis. Barnes [16] modelled risk as probability and impact (P-I) by defining risk impact as a variance in cost estimate. The important techniques of these methods are as:

Risk probability and impact assessment  
 Probability-Impact matrix

## 2) Quantitative Analysis;

In this approach, the risks are analysed numerically. Quantitative analysis quantifies the combined effect of risk on project objectives. These methods are based on probability distribution of risks. For quantitative risk analysis usually Probability Theory (PT) based tools are used [17]. This method of analysis is helpful and gives more precise results, if sufficient and adequate data are available.

These methods can further be classified as follows:

**Simple classical method:** It includes sensitive analysis, fault tree analysis, event tree analysis, failure mode & effect critical analysis etc.

**Advanced models.** The models based on monte –carlo simulation for stochastic modelling analysis and fuzzy set theory are considered as advanced models of risk assessment. Important techniques of Risk assessment methods are described in fig.3.

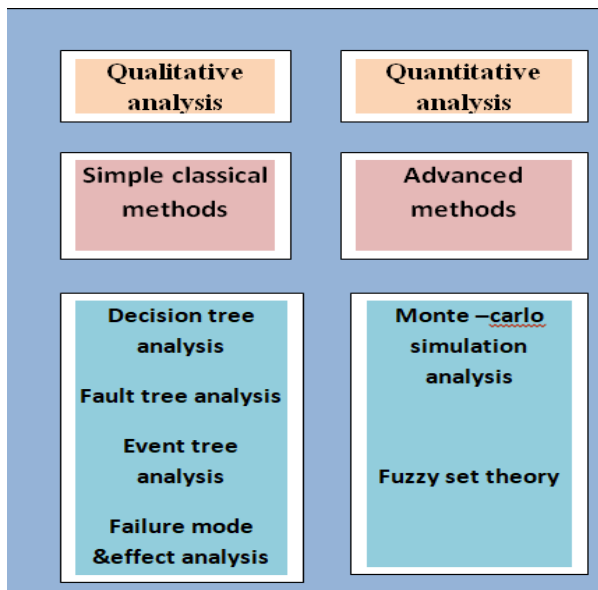


Fig. 3: Important methods of risk assessment

### C. Risk Response

The next step of the risk management process (RMP) is risk response where the action towards identified risks and threats are taken to control and eliminate them. The policies are developed to eradicate the potential impact and control of risk. Most common strategies for risk response are avoidance,

reduction, transfer, sharing and retention [

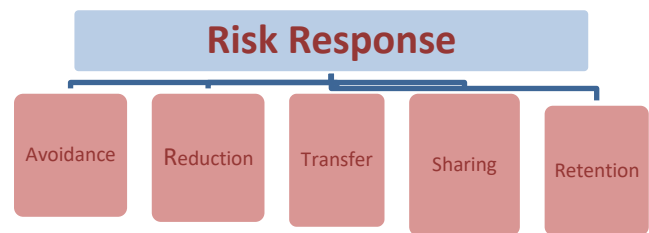


Fig. 4 Risk response methods

### D. Risk Monitoring and Control:

This is considered as the last step of risk management process. The application of risk response is monitored at this stage. Feedback from the members of risk management team is gathered and risk register is updated. It is a very important part of risk management process which gives its cyclic nature. Tracking the identified risks, monitoring any new risks, monitoring the execution of the response strategies and evaluating their effectiveness are the activities of this stage.

## IV. APPLICATION OF RISK MANAGEMENT PROCESS MANAGING THE PROBLEM OF COST OVERRUN IN CONSTRUCTION PROJECTS

For managing and controlling the cost overrun in construction projects the risk management process can be applied as follows:

- (1) Out of various techniques available, a suitable technique should be adopted for recognising the risk causing cost overrun for that particular project. The factors responsible for cost overrun should be identified for this purpose. The technique will depend upon the nature, size and complexity of the construction project.
- (2) Risks recognised are then assessed and analysed. This is a very important part of risk management process. The probability of occurrence and their consequences should be determined using qualitative or quantitative methods of risk analysis. Risks factors causing cost overrun should be prioritized so that the action towards them can be taken according to their seriousness. Fuzzy set theory is found suitable for handling the poorly defined and complex problems due to the partial and inexact information for decision making. It is a branch of modern mathematics was established by Zadeh [19] to model vagueness which is inherent in human cognitive process. Fuzzy sets are able to incorporate information described in linguistic terms. Many researchers [20-21] used the process in construction industry for risk analysis.

- (3) The action towards identified risks factors are taken to control and remove them. The policies and strategies are developed to eradicate the potential impact of risk factors which are responsible for cost overrun in construction projects.
- (4) Risk factors are then monitored and control after getting feedbacks from the members of risk management team and risk register is updated.

## V. CONCLUSION

Construction industry has become a very vital part of any nation which contributes a great deal to the socio-economic development. The most important objectives of any project are to finish the project within given schedule, stipulated budget and with specific quality standards. It has been experienced that the projects are suffering from the problem of cost overruns and delay due to the intrinsic risks and uncertainties. Therefore, construction industry demands for a systematic risk management approach to manage and control the problem of cost overrun. Identification, assessment, response and monitoring and controlling are the important component of risk management process. For managing and controlling the cost overrun in construction projects a suitable technique should be adopted for recognising the risk causing cost overrun for that particular project and then risk factors should be assessed for prioritizing the factors. Fuzzy set theory is found suitable for handling the risks in construction projects as it is a very appropriate for poorly defined and complex problems containing partial and inexact information for decision making.

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