

# Study of Management of Risk and Loss Control Program in Civil Engineering Projects

Mohammed Shareef Mahmoud Shareef, R.K. Pandey

**Abstract** - Most of the construction projects are having their own risks and loss factors involved, and hence in order to control such damages we have use strategies to control those risk and loss factors related to project. In this article we are presenting the study over techniques for management of risk and loss control in construction projects. For construction projects, there are many risk and loss facets as well as complicated relations, which will influence it. The complicated relations include direct, indirect, obvious, implicit or unpredictable, What's more, the various risk factors will cause different severity of the consequences. If you do not consider these risk factors, or ignore the major factors, they all will cause damage because of decision-making errors. Quality targets, time targets, cost targets are the three objectives of project management. In the construction project, the time objective is closely and inseparably related to the cost objective. Hence risk and loss management of construction period is a key part in the risk management of construction.

**Keywords**-

## I. INTRODUCTION

Risk management in addition} pictured as “a systematic manner of observant areas of risk and consciously deciding but each need to be treated. it is a management tool that aims at distinctive sources of risk and uncertainty, deciding their impact, and developing acceptable management responses”. The Risk management of scientific methodology has been divided into risk classification, risk analysis, risk identification, and risk response, where risk response has been further divided into four actions, i.e. retention, transfer, reduction, and turning away. Associate in Nursing economical risk management technique can facilitate to understand not only what types of risks unit round-faced, but collectively the thanks to manage these risks in many phases of a project. Thanks to its increasing importance, risk management has been recognized as a necessity in most industries currently and a gaggle of techniques are developed to control the influences brought by potential risks [1]. Compared with many different industries, the event business is subject to further risks as a result of the distinctive choices of construction activities, like long quantity, refined processes, abominable surroundings, financial intensity and dynamic organization structures. Hence, taking effective risk management techniques to manage risks associated with variable construction activities has never been further necessary for the thriving delivery of a project [2].

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In recent years, intensive analysis and development has been tired the realm of construction project risk and loss management. It's notable place along of the foremost essential procedures and capability areas among the sphere of project management. Voetsch, Cioffi, and Anbari found a statistically necessary relationship between management support for risk management processes and a reported project success. However improvement and shortcomings opportunities throughout this field unit known. Kind of the shortcomings unit associated with the ever increasing complexness of return. Subcontracting is increasing since several firms unit focusing utterly on their core businesses, which end up in more refined project networks and bigger numbers of project participants. The scarcely studied viewpoint among the project risk management field is imagined to this complexness. Though the interaction between project actors happens at many alternative levels, analysis done to review however networks act in preventing or mitigating risks is moderate.

Construction comes unit characterized as terribly refined comes, wherever uncertainty comes from varied sources. Construction comes gather on many stakeholders that make it tough to review a network as an entire. However at an equivalent time, these returns give wonderful surroundings for network and risk management analysis. Additionally, construction comes unit oftentimes utilized in management analysis, and kind of different all entirely completely different tools and techniques have already been developed and notably for this kind of project. However, there's a distinct segment between risk management techniques and their use by construction contractors. This study tries to hunt out reasons for this gap and works to decrease it [3] [4].

We know that risk management of construction amount is that the management on the aim in time in unsure conditions. As results of the accordance to construction project implementation, the technical and economic analysis is predicated on the prediction and judgment analysts turn out of future events. the event project implementation technique is weakened into many specific parts, and these parts unit oftentimes stricken with the political and economic surroundings sources condition technical development, therefore there unit uncertainties on their future modification, what's more, there unit limitation on the predictable ways in which and dealing conditions. Therefore, the assessment and predicting outcomes unit getting to be incorrect results inevitably. This builds come-at-able deviation between actual worth and predicting worth that make huge risk to each the owner and collectively the event firms [5].

## II. PROBLEM DEFINITION AND OBJECTIVES

There are many risk factors and complicated relations, which are ready to influence construction project. The tough relations embody direct, indirect, obvious, implicit or unpredictable, what is extra, the numerous Risk factors will cause utterly completely different severity of the implications. If you're doing not take under consideration these risk factors within the slightest degree, or ignore the foremost factors, they go to cause injury as results of decision-making errors. Quality targets, time targets, value targets unit the three major objectives of construction project management. Significantly among the development project, the time objective is closely and inseparably related to the worth objective. Therefore, we tend to tend to cannot ignore risk management of the result on time objective caused by risks throughout construction section.

The objective of the study is to include risk management and control procedure within the method of conceptualization and implementation of construction project.

To search out risk management implies that for the risks that are associated with the project network structure of civil construction. And to make improvement suggestions on the utilization of these risk management ways in which. Currently, a massive type of risk management ways in which exist, but none of them pertain to a state of affairs where multiple actors are required to work on one project. Following are the foremost objectives of this study:

1. To assess the foremost major and customary risks that cause unhealthy impact on construction quantity.
2. To figure out reasonable and low cost solutions.

## III. LITERATURE SURVEY

### 3.1 Introduction to Risk

- While risk is fairly well documented within the literature, the language isn't systematically applied across project management, construction, health, engineering and safety, surroundings, business and different industries. Risk will be classified as voluntary or involuntary, reckoning on whether or not or not the events resulting in the danger ar underneath the management of the persons in danger or not. Risk not as associate degree inherent quality of the physical world however as a illustration of the interaction between physical and psychosocial characteristics with the assessment of risk involving judgments regarding what's valued.
- Developed a model that identifies four distinct phases of risks during a project:
- Developmental risks – technical, commercial financial feasibility Project social science, authorization, third-party intervention and political modification
- Construction risks – schedule, cost, performance, style changes, important harm, force country risk, rate increase, currency changes [6]
- Operational risks – market changes, statutory changes, strikes, acts of God, third-party liability etc.
- Following table one shows the varied factors that are associated with Risk in civil construction comes

	Tight project schedule Design variations Variations by the client Unsuitable construction program planning Occurrence of dispute Price inflation of construction materials
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<b>Cost related risks:</b>	Excessive approval procedures in administrative government departments Incomplete approval and other documents Incomplete or inaccurate cost estimate Inadequate program scheduling
<b>Time related risks:</b>	Tight project schedule Design variations Excessive approval procedures in administrative government departments Variations by the client Incomplete approval and other documents Unsuitable construction program planning Inadequate program scheduling Bureaucracy of government High performance or quality expectations Variations of construction program
<b>Quality related risks:</b>	Tight project schedule Inadequate program scheduling Unsuitable construction program planning Incomplete or inaccurate cost estimate Low management competency of subcontractors High performance or quality expectations Variations of construction programs Unavailability of sufficient amount of skilled labour Design variations Lack of coordination between project participants
<b>Environment related risks:</b>	Tight project schedule Variations of construction programs Unavailability of sufficient professionals and managers Excessive approval procedures in administrative government departments Variations by the client Inadequate or insufficient site information. Low management competency of subcontractors High performance or quality expectations Inadequate program scheduling Serious noise pollution caused by construction
<b>Safety related risks:</b>	Tight project schedule Low management competency of subcontractors Unsuitable construction program planning Variations of construction programs General safety accident occurrence High performance or quality expectations Design variations Lack of coordination between project participants Excessive approval procedures in administrative government departments Unavailability of sufficient amount of skilled labor Unavailability of sufficient professionals and managers

Table 1: ranked risks as per their significance in relation to project objectives

### 3.2 Risk and Uncertainty

Although risk is wide studied, it still lacks a clear and shared conception definition: risk is often entirely perceived as associate unwanted, unfavorable consequence. Such a definition embodies a pair of dishonorable concepts: initial, among professionals there is an old agreement that risk should be viewed as having every negative and positive consequence. Second, risk isn't entirely related to events, i.e. single points of action, but risk to boot relates to future project conditions.



Conditions might find you being favorable or unfavorable. The aim is that future project conditions unit toilsome to predict within the early stages of the project life-cycle. To boot, conditions can amendment throughout the project life-cycle and thus the risk is that the conditions unit completely different, and probably extra severe than was initial calculable. Risks analyzed entirely as sure events unit any criticized for not taking the degree of impact into thought. Risks unit seldom on-off-types, which means that risks do not either happen or “not-happen”, the impact of the risk varies greatly, looking on the conditions at the time of the potential incidence. Variability and thus the extent of quality (uncertainty) of the longer term things verify the quality of risk analysis done of late [7].

Thus many researchers have urged that the term risk got to get replaced with an extra neutral term that may embody an even bigger scope of than risk traditionally denotes. The term uncertainty is typically counseled to change risk as a result of it'll merely embody the variability and ambiguity of risk. For a term that got to dissipate the negative or positive nuances. Following table a pair of explains the various types of uncertainty concerned in construction come.

Choices are involved with variables that are ordinarily classified as risks or uncertainties. Risks are unknowns, the likelihood of the incidence of which may be assessed by applied math means that (risks are sometimes insurable). Uncertainties are unknowns, the likelihood of the incidence of that cannot be assessed (uncertainties are uninsurable). It's doable, however, for a decision-maker to assign a subjective likelihood to AN uncertainty. As information will increase in conjunction with the number and detail of applied math information, areas of uncertainty are more and more regenerate to areas of risk. The evolution of weather information And associated prediction techniques is such an example.

Signifies that uncertainty has two varieties of origins — non-cognitive and psychological feature. Non-cognitive uncertainty results from physical randomness. This sort of uncertainty is often controlled by using current applied math and probabilistic. Psychological feature varieties of uncertainty result from humans expressing subjective judgments. Use a fuzzy pure mathematics approach for the event of prices and schedules for complicated engineering systems. Uncertainty continually exists within the modeling and project management of complicated construction comes and this uncertainty is thanks to the model representing real systems and is additionally attributed to humans UN agency categorical risk in subjective terms. Some points out that risk and uncertainty characterize things wherever the particular outcome for a selected event or activity is probably going to deviate from the estimate or forecast worth. As well, risks exist in comes attributable to their singularity and temporary nature and may impact on the project contractor and sub-contractors, stakeholders and project owner in a very form of ways in which [8].

<b>Uncertainty</b> An overarching term that could have two possible outcomes, a risk or an opportunity	
<b>Epistemic risk and uncertainty</b> Lack of knowledge about possible outcomes. Lack of knowledge about what you do not know. <i>Example: Lack of knowledge about that you should consider ground pollution when acquisitioning property.</i>	<b>Dynamic risk</b> Is a risk where there could be both a positive and a negative outcome. Examples are fluctuations of prices on material, technical solutions, weather <i>Example: Ground pollution where you have a good solution for solving such problems, but are unsure if it works in this specific environment.</i>
<b>Aleatory risk</b> Random risk, possible set of outcomes is known, but how much consequence and probability are not known even though they are calculable. <i>Example: Knowledge about the risk of ground pollution, but uncertain regarding the possibilities and consequences for such an event.</i>	<b>Static risk</b> Or 'pure risk' and is related to losses and negative outcome of an event. Examples are damage, injuries and losses. <i>Example: Ground pollution of such a character that it severely threatens to pollute the groundwater or be hazardous to workers on site when dealt with, regardless of method used.</i>
<b>Opportunity</b> Uncertainty with positive effects <i>Example: Ground pollution where you have a unique and good solution for solving such problems.</i>	

Table 2: the relation between uncertainty, Risk and Opportunity

### 3.3 Introduction to Risk Management

Risk management is that the method by that purchaser and their project managers build choices supported information generated in risk assessments. Risk management involves creating educated choices concerning completely different configurations, construction eventualities and operational parameters.

This half focuses on process and explaining the weather of risk management and presents the counseled overall structure for implementing risk management. (The Figure 1) reflects a structure that mirrors the attitude of the Project Management Institute's PMBOOK (® Guide (2004) among the structure environmental ontext.

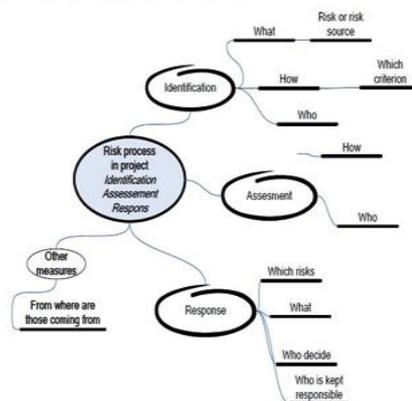


Figure 1 : Risk management approach at site level

The Australian New Sjaelland customary 4360:1999 defines risk management as a generic framework for establishing the context, identification, analysis, evaluation, treatment, observation and communication of risk. However, the quality isn't prescriptive, however rather describes the systems and processes needed for risk management. These Points out that the employment of this customary is associate integral part of fine management observe across associate enterprise and makes the quality a perfect alternative because the frameworks for project risk management. It provides the same, structured system will which will that may be used across a corporation and by that purchasers can higher perceive risk problems on individual comes [9].

The management of risk is seen as a vital part of the management of comes. Methods for mitigating risks on comes embody

- reducing the uncertainty related to the project
- avoiding the risk by finding a unique approach of doing the project
- abandoning the project
- reducing the probability of the risk occurring or the impact on the project
- transferring the risk to different parties like contractors or insurance firms
- Accepting risk and making a contingency set up

Risk management is additionally obsessed with various factors like trade sector, the dimensions of the project, and also the stage of the project life cycle. to incorporate a number of these concepts for the management of risk, the risk register is usually been seen because the start line. Additionally discussion of however the risk register will assist within the allocation of risk and also the preparation of risk management plans. The employment of project risk registers is usually seen as a vital step within the recycle of historical project info. They'll be seen as repositories of non-public data or structure recollections wherever experiences concerning risks and responses are ceaselessly recorded.

### 3.4 Categories of Risk

Risks in construction comes is also classified in a very range of the way. One form of risks classification is as follows:

#### 1. Safety risk

The first one would be safety risk. His opinion, this is often this can be often the foremost necessary issue that have to be compelled to be paid attention to. Supported plans for safety and health, all the works have to be compelled to have its own precautions. The placement manager ought to produce secure operational surroundings for labors. If any accident happens throughout the tactic, not only the schedule area units risked but jointly the alternative area unit as are affected. Therefore, enough money is supplied to create positive the labor safety on lot. At the mean star time, web site manager ought to produce and implement a security and health decides to assure the safety of the operational technique. Manually inspections and direction are necessary [10].

#### 2. Material supply risk

The second would be risk on material supply. Material supply may be a needed a region of the event project. at a lower place the influences of worldwide economy crisis,

many suppliers face bankruptcy. By choosing a supplier whereas not nice name and funding, it ought to lead the event to facing Risk on delivery. If it's throughout the crucial methodology, it will certain Risk the whole construction. In business, the danger on time frequently values lots of. It would be an additional sturdy set up for the general contractor to decide on a supplier company sagely to avoid wanting material and Risk on delivery. For computing device manager, his responsibility would be contacting supplier and prepare the material delivery and transfer.

#### 3. Unforeseen Extra Work

Third of all, unforeseen further work is to boot one altogether web site managers' problems. Most of the unforeseen additional works happen on soil work. It's as a results of that natural science exploration info cannot predict and analyze the precise condition of natural science. The rest additional work may happen in different construction work ways that. The positioning manager declared that during this project, the soil draw back has caused a Risk for couples of weeks. However, there is nothing the positioning manager can do regarding this instance [11].

#### 4. Omissions of Construction Work

The last main risk would be omissions of construction work. Because of the thought valuable, shoppers all wish to finish the event as rapidly as gettable. This could bring ample pressure to the complete contractor. They are making an attempt to undertake to their work faster. Once dashing into doing things, further mistakes could happen. As a result, the quality of the event will extraordinarily be reduced. This finally ends up within the omissions throughout construction quantity. However, they still would like to balance the time and quality. Consequently, total contractor will rent further competent and older staff as compensation. They're getting to concentrate to the essential elements of the work whereas dashing au fait the easy ones. And it's known that the Germans are good with concrete part work, the Italians are good with wet house surface work. Throughout the number of construction comes, computing device manager ceaselessly confirm, assess and management risks supported their own experience. This could be together thought-about as a result of the foremost wise and convenient risk management. There are alternative routes that can't be neglected, like risk breaking down system, conferences planning then on [12].

### 3.5 Factor-Factor that Affecting Risk Problem in Construction

Following area unit various factors those area unit moving the risks in construction projects:

1. Socioeconomic factors
  - Environmental protection
  - Public safety regulation
  - Economic instability
  - Exchange rate fluctuation
2. Structure relationships
  - Contractual relations
  - Attitudes of participants
  - Communication
3. Technological issues
  - Design assumptions
  - Site conditions
  - Construction procedures

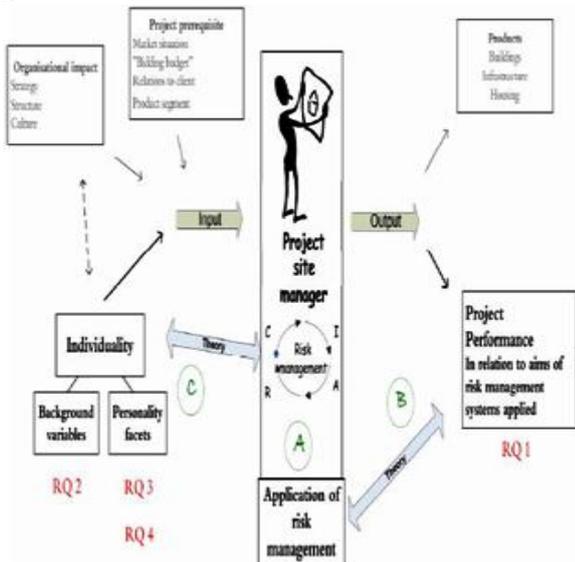
IV. RESEARCH METHODOLOGIES

Risk Management designing is concerning shaping the method of the way to interact and superintend risk management activities for a project. Risk Management designing is a vital a part of project management. Having an inspiration on the way to manage risk, permits one to task to arrange versus innovating and deciding once the very fact and within the inside the way to handle a risk. the sooner Risk Management designing is engaged among will increase the likelihood of success of all risk management activities and processes particularly if the method definition was created with input and buy-in from the project manager and key project stakeholders.

In ideal risk management, a prioritization method is followed whereby the risks with the best loss (or impact) and also the greatest likelihood of occurring are handled 1st, and risks with lower likelihood of prevalence and lower loss are handled in downward order. In apply the method of assessing overall risk will be tough, and equalization resources won't to mitigate between risks with a high likelihood of prevalence however lower loss versus a risk with high loss however lower likelihood of prevalence will typically be mishandled [13].

Intangible risk management identifies a replacement sort of a risk that features a 100 % likelihood of occurring however is unnoticed by the organization as a result of a scarcity of identification ability. For instance, once deficient data is applied to a scenario, a data risk materializes. Relationship risk seems once ineffective collaboration happens. Process-engagement risk is also a problem once ineffective operational procedures are applied. These risks directly cut back the productivity of information staff, decrease value effectiveness, profit, service, quality, reputation, complete price, and earnings quality. Intangible risk management permits risk management to make immediate price from the identification and reduction of risks that cut back productivity.

Risk management additionally faces difficulties in allocating resources. This can be the thought of cost. Resources spent on risk management may are spent on additional profitable activities. Again, ideal risk management minimizes defrayment (or men or different resources) and additionally minimizes the negative effects of risks.



V. WORK DONE

This section discusses the attainable results and discussion of kind survey relating to time and value overruns from contractors, consultants and owner viewpoints throughout this study. During this sensible analysis of this study we've got specialize in describing the respondent\'s characteristics to boot to the discussion of the factors that influence time and value overruns.

Once the scale of a project is massive, the event quantity is reasonably long. There will be multitudinous unsure factors facing the overall project. At the beginning of the event project, the contractor and so the owners have already expected that positive factors inflicting the implementation of the project will definitely occur throughout the implementation technique. Therefore on safeguard each interest, both sides builds some special rules once language a contract. Once confirming the following factors, the event quantity is Risk whereas not paying for any fine to the patrons endeavor project as long as results of the arts units suggest apply to units guilty of construction. The factors embrace:

1. Modification of operating quantity and style
2. Contractors won't be chargeable for the harm brought by the work stoppages owing to blackout, wanting provide water system water facility installation or gas supply that not belong to.
3. Unavoidable casualty
4. There meet unpredictable obstacle or ancient tombs, cultural relic, quicksand which require to be restricted throughout the inspiration construction.
5. Provider don't provide the materials in time, the purchasers don't pay construction fund on time or the other conditions the consumer admits.

VI. CONCLUSION

Thus during this analysis article we've got given the careful study over the literature survey of risks and their management in civil construction comes. we have a tendency to mentioned what's risk, however it's managed, what are the various forms of risks in construction comes. Moreover we have a tendency to given the analysis methodology and analysis model of risk management for construction comes. Finally I mentioned the varied sensible study connected factors that we have a tendency to be reaching to gift in our thesis.

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