

Risk Management in Infrastructure Project

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Abstract—Risk management in infrastructure project consider as a very important management process to achieve the objective of project. The objective of this paper is to identify, categories, analyse risk involved in infrastructure project. Various factors affecting project objectives has been listed out by referring various literature available on risk and risk management and the data has been collected by floating questionnaire to the various organizations working on infrastructure project. Impact of risk factors has been observed by qualitative risk analysis by using Monte-Carlo Stimulation. Effect of social things, changes in design, delay in work, labour and material availability affects the project objectives. Risk mitigation has been suggested accordingly.

Keywords: Infrastructure project, Risk, Risk management, risk analysis.

1. INTRODUCTION

Every Infrastructure Construction project has unique character and do not give any standardization. The Construction project are of dynamic nature and it faces various up and downs throughout life of project. Hence, it becomes very important to take a lot of care in handling each construction project. There are various agencies those involve in construction activity such as client, consultant contractor. Every project faces difficulties during the life of project. Project management is the process of application of knowledge, skills, tools and techniques to project activities to achieve project objectives. Risk is defined as “The uncertainty” arises in planes and possibility happening that can affect the objectives or goal of project. Project risk management involves the processes which identifies analyses and respond to factors involving risk. The risk is the probability of variation in the occurrence of an event, which may have either positive or negative Impact on project. Risk can also be defined as an event that may or may not occur which can lead to variation in costs, extension of the project, failure to quality requirements, failure to satisfy information requirements and failure to satisfy specified organizational Risk Management. The risk for one person may be an opportunity for another that is completely depends on a range of possible outcomes, individual consequences and probability.

2. METHODOLOGY

The objectives of this study are to indentify risk, categories risk and suggest risk mitigation and accordingly research methodologies are used in order to collect data, analysis data and report on findings and results. The research methodology selected for this risk management project involves comprehensive literature review, followed by open interviews and distributing questionnaire surveys to the various organization i.e. client, contractors, consultants of the projects. For data analysis purposes qualitative risk analysis method is used.

Fig. 1 shows the research methodology flow chart used for this study.

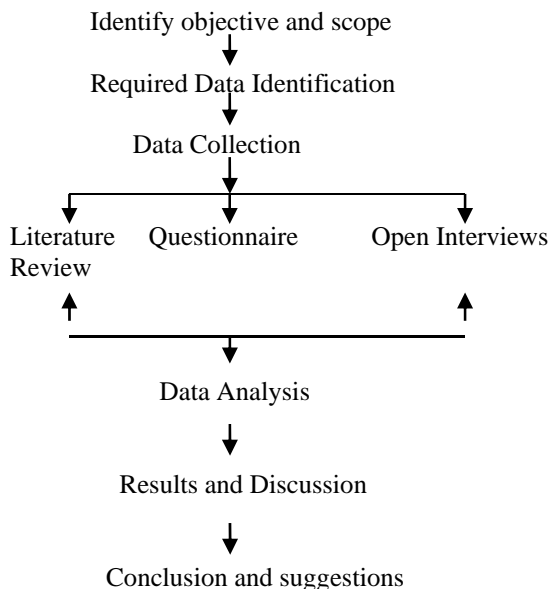


Fig. 1: flow chart for research methodology

3. RISK MANAGEMENT IN INFRASTRUCTURE

The risk is the probability of something happening that will have an impact upon project objectives. Risk includes a possibility of loss or gain or variation from desired or planned goal of the project. The risk in projects depends perception of

uncertainty and it is a measure of the probability and consequence of not achieving a project goal. Risk deals with probability of occurrence and its impact hence risk is considered as function of probability and impact. Risk can be defined as uncertain condition or situation which can be generated by something or the lack of something, this situation of danger is known as hazard. Hence it becomes important to overcome such hazards, hence risk can also be considered as function of hazards and safeguard. Risk management is the systematic process to understand the nature of risk and to deduce the level of it, and it is the process of systematic application of management policies, procedures, and practices of identifying, analyzing, evaluating, responding, monitoring, reviewing and communicating risk. Also the risk management is the planning, identification, analysis, response planning, and monitoring and control on the project.

Risk management provides support to gain better control over a project when it comes to time, cost, quality, scope and organization. Risk management may help to increase progress of the activities within a project, firmly establishes confidence in the project, encourage communication within the project and support the decision-making process within a project. Generally every company or organization does not apply the risk management due to deficiency of time, money (do not have capacity), also most of the companies are not familiar with the concept of risk management.

The stages in the risk management process are:

- Risk Identification
- Risk Classification
- Risk Analysis
- Risk Response

Risk involves at every stage in every infrastructure project like initiation, planning, implementation, and closure.

Risk management process involves:-

1. Risk classification

It involves defining risk factor, risk analysis, calculation its impact.

2. Risk identification

It involves risk analysis, risk planning, risk tracking, and controlling.

3. Risk management

It involves defining risk, analysis of impact of risk, planning risk control, providing mitigation.

4. DATA COLLECTION:

To conduct this study, questionnaire survey is conducted from various ongoing infrastructure projects. This questionnaire

contains various factors which affect the objectives of the projects.

List of factors which affect the objective of project:

1. Site condition related issues- weather condition, climate condition, geotechnical investigation issues, etc.
2. Resource related issues- material storage, procurement issue, defective material issue, equipment breakdown and efficiency issues, labour productivity issues, etc.
3. Project feature related issues-change in rules and regulations, community attitude toward project, etc.
4. Project party related issues- delay in payments, delay in handing over the site to contractor for work, change in design work, defective work, etc.

Survey based on the factors listed above has been conducted through questionnaire survey and according to impact of these factors has been calculated.

1. Classification of risk:

On the basis of factors affecting the objectives of project, and uncertainty arises during the project implementation risk can be classified into various forms, such as,

1. **Financial risk-** it is the risk arises from insufficient financing structure or hedging transactions.
2. **Technical risks-** it is the risk related to design and construction.
3. **Construction risk-** it is the risk due to faulty workmanship, poor quality of raw materials and execution delays.
4. **Operational risks-** it is the risk due to operating machine and risk in maintenance costs exceeding estimates.
5. **the risk of force majeure,** including events such as wars or natural disasters
6. **Regulatory risks,** arising from changes in the organizational environment and adverse effects of the regulatory rules.
7. **Environmental risks-** the adverse effects of infrastructure project may have on the environment.
8. **Political risk-** it is the risk arises due to political interference in to the process or progress of the construction.
9. **Legal risk-** this type of risk arises due to unawareness about legal terms related to project. This may become reason of quarrel. It may lead to stop the progress of the construction.
10. **Contractual risk-** it is due to unawareness of the terms used in the contract or due to not following the rules of contract which may become reason of dispute and due to adequate and defective contract documentation and also inappropriate contract arrangements.

5. RISK ANALYSIS

In this study various risk factors in involve in the infrastructure project are identified, studied, classified and analyzed. By considering risk factors its impact and the probabilities are calculated. The analyse risk is carried out by using the montecarlo stimulation which gives the accurate severity of each factors and its level of effect and factors needs to care first and also its level of acceptance, avoidance. hence by considering the effect of each factor is divided into various categories such as financial risk, physical risk, legal risk, construction risk, political risk, environmental risk, design risk and contractual risk, etc.

6. CONCLUSION

Risk management plays an important role in order to achieve project objectives. By this study various factor affecting project objectives are listed out. Data had been collected by using questionnaire survey. This survey helps to evaluate the probability and impact of the risk factor and with help of data collected risk are classified into various types which are discuss above. By using result obtain from the analysis we got the value of severity of individual factors based. In this study we have considered factors involves at every stage of the project hence we came to know that we factor should consider more risky or not and also its occurrence can also be defined.

Hence it can help to provide mitigation measures for risk factors. Hence it becomes important to apply risk management process from the starting phase of the project. It is also an equally important to make people aware about risk, risk factors, its impact, hazard, etc. Try to avoid involving into such condition which may arise risk in progress of project. Also we must have to give preference on that factor which has more impact on project. If factors have positive impact then occurrence of such factors should get increase if its impact is negative them its occurrence must reduce up to its tolerance limit.

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