Novelty Journals

ISSN 2394-7349

International Journal of Novel Research in Engineering and Science
Vol. 2, Issue 1, pp: (31-34), Month: March 2015 - August 2015, Available at: www.noveltyjournals.com

Risk Assessment for PPP Infrastructure Projects

Ashwini Yadav[1], Prof.B.V.Birajdar[2]

[1]M.E.Civil (Construction and Management) Engineering Student, Department of Civil Engineering
[2]Head of Department of Civil Engineering
[1, 2]Tatyasaheb Kore Institute of Engineering and Technology,Warananagar, Tal- Panhala, Dist-Kolhapur, Maharashtra, India-416113

Abstract: **In this paper, we discuss the method of risk measurement of project risk, based on the risk matrix method. Generally project risk management primarily deals with cost and time uncertainties and risk associated with each activity of the project network. In this paper, we have identified the major risk sources and quantified the risk in terms of likelihood, impact and severity in a complex infrastructure project. The methodology for this work was the response from the experts associated and involved in this and other projects. The risk assessment for this project is carried out by risk matrix method. And risks are categorized according to the priority.**

Keywords: **Project risk assessment, Risk matrix method, Risk management.**

I. INTRODUCTION

Risk assessment is an important part of risk management in major projects where huge amount of money is invested. For an infrastructure project, risk assessment can be carried out effectively by investigating and identifying the sources of risks associated with each activity of the project. These risks can be assessed or measured in terms of likelihood and impact. Now we will assess the risk associated with infrastructure project. The major activities concerned with underground construction are project feasibility report, sub soil exploration as well as drainage studies of area where construction is supposed to carry out. We have developed a questionnaire survey and personally interviewed experts. In this process, we have identified the risks at various phases of the project starting from the feasibility phase to the completion of the project. This paper is organized as follows section two deals with literature survey and further section three deals with methodology and objectives. In section four we will discuss the conclusion of the projects.

II. LITERATURE RIVEW

Risk can be defined as a measure of the probability, severity and exposure to all hazards for an activity (Jannadi and Almishari, 2003). For an infrastructure project there is always a chance that things will not turn out exactly as planned. Thus project risk pertains to the probability of uncertainties of the technical, schedule and cost outcomes. Williams, Walker and Dorofee (1997) worked on developing methods by which risk management could be put into practice. Their methods were based on software intensive programs (SEI) along with which specific road maps were designed. These could guide and help identify various risk management methods which could be easily put into practice Complex projects like the construction of an underground corridor for operations involve risks in all the phases of the project starting from the feasibility phase to the Operationalphase. These risks have a direct impact on the project schedule, cost and performance. Reilly (2005), Reilly and Brown (2004), Sinfield and Einstein (1998) carried out their research on underground tunnel projects. Reilly and Brown (2004) state that infrastructure underground projects are inherently complex projects with many variables including uncertain and variable ground conditions.

International Journal of Novel Research in Engineering and Science
Vol. 2, Issue 1, pp: (31-34), Month: March 2015 - August 2015, Available at: www.noveltyjournals.com

III. METHODOLOGY

Risk can be assessed either using a qualitative analysis. Qualitative risk analysis covers a range of techniques for assessing the impact and likelihood of identified risk. These approaches can be used to prioritize the risks according to their potential effect on project objectives and is one way to determine the importance of addressing specific risks and guiding risk responses. Quantitative analysis uses numerical ratio scales for likelihoods and consequences, rather than descriptive scales. There are many tools available for evaluation of risk and risk controls, ranging from experience – base judgment, checklists and risk matrices to specialist review and analysis techniques. Anna Klemetti [5] explain that risk can be evaluated by estimating risk probability and impact in simple scales for example, from 1 to 5 or from high to low. The risks can be mapped in a probability – impact grid. On the grid, risk that require the most attention are easily detectable wherein actions to control them can be taken only if there are sufficient resources or if mitigating the risk costs are less than the product of possibility of risk's occurrences and its impact on project objectives (expected values). Al-bahar and Crandall [1] quantified risk as the product of probability and impact where impact may be gain or loss in a construction project. The significance of a risk is termed as 'Risk Factor' and is expressed in termed as 'Risk Factor' and is expressed in terms of its consequences or impacts on project objectives, and the like hood or consequences of those consequences arising. To calculate risk factor or levels, the descriptive like hood assessments are converted to numerical measures. P. A similar process is followed for the consequences assessments, to give an average consequence measures, C. A. risk factor RF or combined risk measure is then calculated for each risk. The significance of a risk is termed as 'Risk Factor' and is expressed in termed as 'Risk Factor' and is expressed in terms of its consequences or impacts on project objectives, and the like hood or consequences of those consequences arising. To calculate risk factor or levels, the descriptive like hood assessments are converted to numerical measures. P. A similar process is followed for the consequences assessments, to give an average consequence measures, C. A. risk factor RF or combined risk measure is then calculated for each risk.

3.1 Risk Consequence:

The notion of being a function of risk likelihoods and risk impacts is known as risk consequences. There are two ways to express risk consequence. First, it can be expressed as a simple numerical rating with the value ranging between 0 to 1.

3.2 Risk Factor (RF):

The risk factor is expressed in terms of its consequences or impacts on project objectives, and the likelihood or occurrences of those consequences arising. The risk factor can be calculated by using following formula,

$$RF = P + C - (P * C) \qquad (1)$$

Where;

RF = Risk factor.

P = Probability (occurrences) measure on a scale 0 to 1.

C = Consequences (impact) measures on scale 0 to 1.

The risk factor will be high if probability P is high, or consequences C are high or both are high. This formula only works if P and C are scales from 0 to 1. The simple matrix as shown in graph.3 is used to combine the likelihood and consequences rating to generate initial priorities for the risk. Risk matrix is plotted using two dimensional scales from 0 to 1 of impact/consequences and occurrences/probabilities. Risk matrix gives idea about the criticality of risk. Risk matrix groups risks in 4 categories as low, medium, high, critical. Group Low means risk is of no moreimportance, so it may be ignored or solve in last priority. Similarly group critical means all those risk laying in this group need more serious attentionof project manager and team. The numerical scores of occurrences and impact for risk are converted from scale 1 to 5 to scale 0 to 1 by using following formula:

$$\text{Required score} = (\text{responded score} * 2)/10.$$

Risk factor (RF) or combined risk measure is then calculated for each risk by using Eq.1.

International Journal of Novel Research in Engineering and Science
Vol. 2, Issue 1, pp: (31-34), Month: March 2015 - August 2015, Available at: www.noveltyjournals.com

The score and calculated risk factors are indicated in table 3.Risk matrices are plotted using two dimensional scales 0 to 1 of Impact/ Consequences and Occurrences / Probability which are also plotted with respect to the decreasing order of calculated risk in order to resolve it. Risk matrix (Refer graph.3) and risk profile (Refer graph.2) are plotted. As stated by Cooper, et. al[2] the scale of 1 to 5 was chosen and converted to 0 to 1.

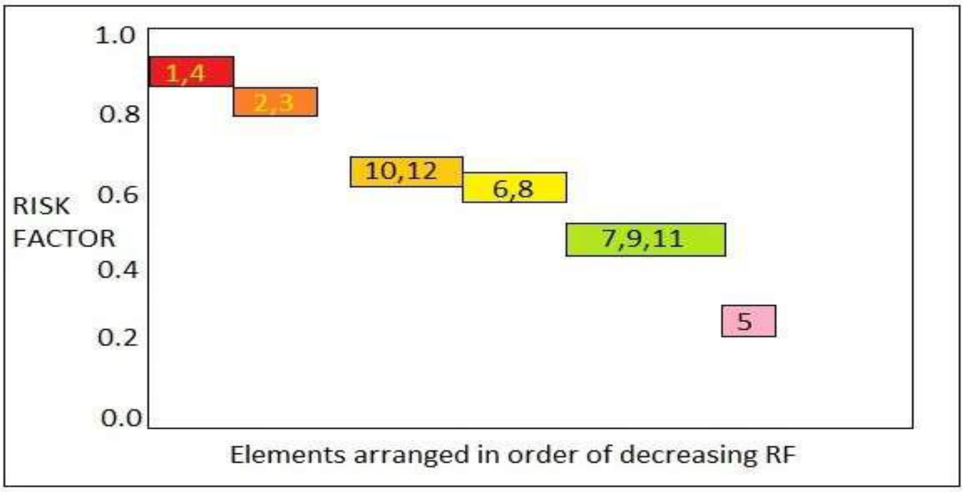
TABLE: 1 SCALE OF LIKELIHOOD AND IMPACT

Value Scale	Assessment of Likelihood(P)	Assessment of Impact(C)
1	Rare	Nil/Very minor effect
2	Considerable	Low effect
3	Medium	Medium effect
4	Frequent	High effect
5	Always	Extreme high effect

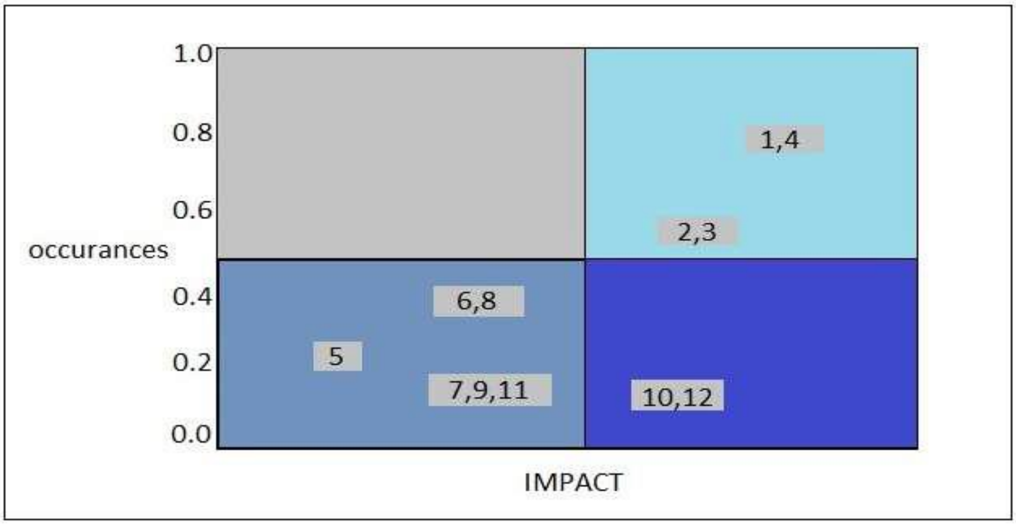
The survey also asked the respondents has to give the probability (chance of occurrence) & their possible/ probable Impact scaling from 1 to 5 in order to assess risks.

TABLE: 2 QUESTIONNAIRES RESPONSES

Sr. No.	Risks shortlisted	Responses (On scale 1 to 5)	
		Occurrence	Impact
1	Risks due to delay in approval of detailed project report(DPR)	4	4
2	Land acquisition risks	3	3
3	Design risks	3	3
4	Technology selection risks	4	4
5	Approval and permit risks	1	1
6	Joint venture risks	2	2
7	Financial and investment risks	2	2
8	Political risks	2	2
9	Environment related risks	1	2
10	Geo technical risks	1	2
11	Major / minor accidents during execution	1	2
12	Unforeseen heavy rain	1	3
13	Force Majeure risks like flood, fire earthquake etc.	Group insurance	



Graph: 1 Risk Occurrence Verses Impact Matrix



Graph 3: Risk Matrix for Collected data

IV. CONCLUSION

It can be concluded that risks can be assessed by using priority model. This will be helpful for risk monitoring and mitigation. Further study for risk evaluation is required. In this paper it is found that in most of the infrastructure projects delay in approval and design, selection of technology are major risk which causes delay in project. It is recommended to study these risks through risk evaluation techniques.

ACKNOWLEDGEMENTS

I wish to express my thanks to Professor B.V. Birajdar (Guide and Head of Civil Engineering Department), for the input he has given during the preparation of this work. I wish to express my sincerely thanks to Dr. S.V. Anekar, Principal, Tatyasaheb Kore Institute of Engineering and Technology, Warananagar, who contributed with important supervision in thesis preparation and for supporting me to do this dissertation work. I acknowledge with thanks tofaculty, teaching and non-teaching staff of the department, Central library and Colleagues.

REFERENCES

[1] Al-Bahar J. F. and Crandall K. C., "Systematic Risk Management Approach for Construction Projects", Journal of Construction Engineering and Management, ASCE, Vol. 116, No. 3, 1990.

[2] Cooper Dale and Stephen Grey, "Project Risk Management Guidelines", John Wily & Sons Ltd. Publications, Chichester, England, 2005.

[3] Peter Dent, "Risk Management for major Construction Projects", Oxford Brooks University, COBRA, 1997.

[4] Ward, s., and Chapman, c., "Project Risk Management: Process, Techniques and Insights", John Wiley & Sons, 1997.

[5] Arthurson, K. (2001), "Achieving Social Justice in Estate Regeneration: The Impact of Physical Image Construction", Housing Studies , Vol.16, No.6, pp. 807-826.