

Comprehensive Investigation For Risk Evolution In Infrastructure Project

Praja Lakade

School of Engineering and Technology

G.H Rasoni University, Amravati

Abstract- Risk management is a practice that is gaining traction in a variety of industries. Many organizations implement a risk management procedure in their programs in order to improve results and earnings. Construction projects are often complicated and involve large budget, and as a result, reducing the risks associated with each project should be a top priority for each project manager. Construction projects are launched in complex and dynamic settings, resulting in high uncertainty and risk, compounded by tight deadlines. This study presents implementation of risk management in project cycle of project. This paper explains how to think about and quantify risk in construction schedules in a systematic way. The paper present risk assessment of construction for the multi- storey residential project. A case has been selected for further studies and risk matrices was used to find out and categorized risks as high, moderate and low

Keywords- risk, risk management, risk matrices, project cycle, uncertainty

I. INTRODUCTION

The construction industry is now one of the fastest growing industries in the world, with a huge impact on India's economy. If we take a look at the majority of developing countries, primary development activities account for about 85 percent of average capital wealth, about 15 percent of GDP, and more than half of the capital invested in fixed assets. The construction industry has a lot of job openings. There are several tasks that have substantial time and cost overruns. When large construction programmes are postponed, they result in an increase in the overall budget. The project must be carefully planned and organised in order to be completed on schedule and with high quality work. This has increased competition among construction companies across the world. Because of these incidents, construction companies and consumer behaviour have changed. With the objective of improving quality and lowering costs by increased performance, there is a need for suitable administration activities that can deal with the project in a fair and efficient manner. Planning and scheduling are crucial aspects of project management that will enable the project to be completed on

schedule and within budget. However, the exercises in the building industry are subjected to various exercises during the project life cycle, which may result in an increase in project costs as well as project delays. As a result, risk planning must be included in order to handle various risks that can arise during the project. As a result, risk management tactics must be accepted.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

The analysis methods are used in this study to collect data, analyse it, and report on the results and outcomes. The risk management approach chosen is the delivery of questionnaire surveys to different contractors and customers, as well as the project consultant. Data is analysed using qualitative risk analysis. The research is being carried out with the following goals in mind. • Sort the risks into categories and assign each one a likelihood, influence, and urgency ranking. • Create risk matrices to determine which risks are elevated, moderate, and low. • Suggestion for a risk response for a construction project with a high level of risk.

1. Risk identification Since new risks emerge as the project advances through the project life cycle, risk detection is a continuous process. The risk valuation format should be continuous so that the consequences of one risk can be compared to those of another. The project team members are included in the organization's identification process. The various risks that arise in the construction phase during the formulation, mobilisation, and construction stages are classified and specified for this reason.

2. Questionnaire survey For the case study Skyline Developers, a questionnaire survey was conducted with ten construction companies, and the ratings for likelihood effect, urgency, and priority were obtained for further project analysis.

3. Qualitative risk analysis entails assessing the likelihood and effect of different risks and listing them in order to increase the project's success and productivity by prioritising the risks. The likelihood or probability of risks occurrence, the resulting

effect of risks if they occur, and the urgency of risk response that we take are used to value the priority defined risks. The qualitative risk analysis is performed using the matrices mentioned below:

i) Probability – Impact Matrix: It aids in determining the priority of each risk for consideration and its significance. The following are the likelihood and effect ratings: 1–5 probabilities

- High - Chance of incidence ranges from 4-5.
- Chance of occurrence medium – 3
- Low - Chance of incidence is about 1-2.

a. High-risk event with the potential to have a significant effect on the project's schedule, efficiency, timeliness, and expense. The work of an operation cannot be continued and will be stopped; as a result, the work will be postponed.

b. Medium - The occurrence of a risk that will have a minor effect on the company's project priorities and objectives. At this stage, the work will be continued.

c. Low – the occurrence of risk would have no effect on the project's priorities and objectives.

ii) Impact -urgency matrix: It lists the threats that will necessitate a quick response or that must be handled right away. 1–5 on the scale of urgency

- High - The incidence of a danger that must be dealt with immediately/quickly.
- Medium - When a danger occurs, there is sufficient time to take action.
- Low - The occurrence of risk is of low importance.

iii) Probability -urgency matrix : Assessing threats based on their likelihood of occurrence and urgency is critical for the project's risk response.

iv) Priority-urgency matrix: Risk priority is a ranking outcome based on the likelihood of a risk occurring and its likely effects. Priority is defined as the product of probability and effects.

4. RISK RESPONSE PLANNING

Risk response preparation entails evaluating methods to reduce or eliminate any project risks, as well as the chances of reducing their effects. The project's qualitative risk analysis comes next. A risk response plan is used to resolve high-

priority risks. A risk response owner or risk specialist will be assigned the task of managing the risk by incorporating necessary activities and resources into the budget, project schedule, and management plan as required. The risk response is also in charge of minimising the likelihood and impact of risks, as well as increasing the likelihood and impact of opportunities.

TECHNICAL RISKS

Table 5: - Results obtained from Questionnaire survey

Sr. No.	RISKS		P	I	U	PR
1	Type of contract	T1	2	2	2	3
2	Preliminary plan of project	T2	3	4	4	4
3	Insufficient investigation of site	T3	3	4	4	3
4	Changes in scope & requirement of project	T4	2	3	3	2
5	Designs errors & faults	T5	3	4	4	4
6	Subcontractors	T6	2	2	2	3
7	Delays due to change in design & drawings	T7	3	4	4	4
8	Insufficient experience	T8	2	2	2	4
9	Allocation of resources	T9	4	4	4	4

10	Unknown productivity of resources	T10	3	4	2	3
11	Failure to complete work according to planning & scheduling	T11	2	3	3	3
12	Improper scheduling and delay by contractor	T12	3	4	4	3
13	Controlling, tracking and execution	T13	2	3	3	3

FINANCIAL RISKS

Sl. No.	RISKS		P	I	U	PR
1	Investment	F1	2	2	2	3
2	Delay in wages	F2	3	3	4	4
3	Increase in cost of materials	F3	3	4	3	4
4	Import procedures	F4	2	2	2	3
5	Releasing of funds	F5	2	2	2	3
6	Foreign exchange availability & undulation	F6				

LOGISTICS AND CONSTRUCTION RISKS

SL. No	RISKS		P	I	U	PR
1	Transportation services	L1	2	3	2	2
2	Disposable of plant and equipment's	L2	2	2	3	2
3	Unfamiliarity with local bodies	C1	2	2	3	2
4	Demands for local firms and Agents	C2	2	2	2	2
5	Technology	C3	2	2	3	3
6	Absence of protection	C4	3	4	4	3

MANAGEMENT RISKS

SL. No.	RISKS		P	I	U	PR
1	Communication	M1	1	1	2	2
2	Insufficient job assignment	M2	2	2	2	3
3	Unskilled staff	M3	2	2	2	3
4	Uncertainty about relationship between project employees	M4	2	2	2	2
5	Clashes in team	M5	1	2	2	2
6	Allocation of resources	M6	2	2	3	3

POLITICAL RISKS

SL. No.	RISKS		P	I	U	PR
1	Before tendering	P1	2	2	2	2
2	Contract acceptance	P2	1	2	2	2
3	Complaints	P3	2	2	2	2
4	Contract finalization	P4	1	1	1	2
5	Resident tolls	P5	1	2	2	2
6	Permissions, clearance, permits	P6	3	4	4	3

ENVIRONMENTAL RISKS

SL. No.	RISKS		P	I	U	PR
1	Natural disasters	E1				
2	Weather variations	E2	3	4	3	3
3	EIA reports	E3				

Qualitative Risk Analysis

For defined threats, qualitative risk analysis is performed by averaging the values of Probability, Effect, Urgency, and Priority obtained from the questionnaire survey. There are three major regions in the matrix below. Color codes are used to distinguish between three levels: high, moderate, and low. The orange-colored blocks represent high risks, while the blue-colored blocks represent moderate risks and the green-colored blocks represent low risks

Probability Impact Matrix

Likely	4				T9	
Possible	3				T2,T3,T5,T7,T10,T12,F2,F3,P6,E2	
Unlikely	2	T1,T6,T8,F1,F2,F5,L2,C1,C2,M2,M3,M4,M6,P1,P3	T7,T11,T13			
Very unlikely	1	M1,P4,E1,E3	M5,P2,P5			
	0	1	2	3	4	5
		Very Low	Low	Moderate	High	Very high

Impact Urgency Matrix

Very Likely	5					
Likely	4			F3,E2	T2,T3,T5,T7,T10,T12,F2,F3,P6,E2	
Possible	3		L1	T4,T11,T13,C3		
Unlikely	2	M4	T1,T6,T8,F1,F2,F5,L2,C1,C2,M2,M3,M4,M6,P1,P3	F1,F5,C2,M5		
Very unlikely	1	P4,E1,E3	F4,M1			
	0	1	2	3	4	5
		Very Low	Low	Moderate	High	Very high

Figure 5.2:- Impact Urgency matrix

Probability Urgency matrix

Likely	4				T9	
Possible	3			F3,E2	T2,T3,T5,T7,T10,T12,F2,F3,P6,E2	
Unlikely	2	T1,T6,T8,F1,F2,F5,L2,C1,C2,M2,M3,M4,M6,P1,P3	T4,T11,T13,F1,F5,C1,C2,M6			
Very unlikely	1	P4,E1,E3	M1,M4,P2,P5			
	0	1	2	3	4	5
		Very Low	Low	Moderate	High	Very high

Figure 5.3:- Probability- Urgency matrix

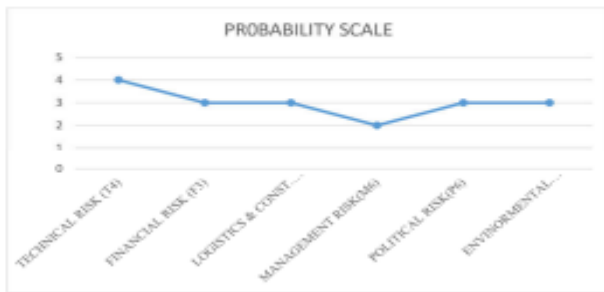
Priority Urgency Matrix

Very Likely	5					
Likely	4			F3	T2,T5,T7,T9,T10,F3	
Possible	3		T1,T8	T4,T11,T13,F1,F5,C3,M6,E2	T3,T12,C4,P6	
Unlikely	2	M4,P4	T6,L1,L2,C2,M1,M5,P1,P2,P3,P5	F4,C1,M2,M3		
Very unlikely	1	E1,E3				
	0	1	2	3	4	5
		Very Low	Low	Moderate	High	Very high

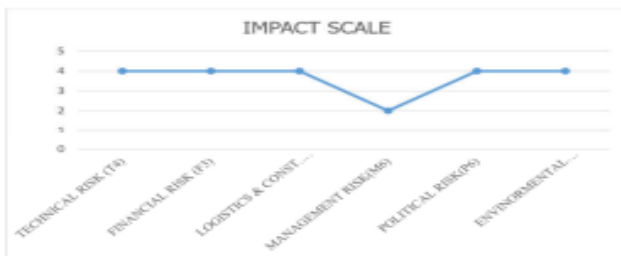
Figure 5.4:- Priority Urgency matrix

GRAPHS FOR HIGH RISKS QUESTIONNAIRE SURVEY

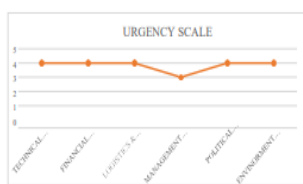
Probability Scale



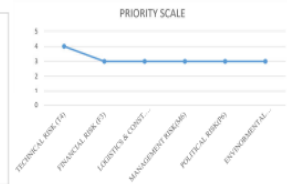
Impact Scale



Urgency Scale



Priority Scale



III. STUDIES AND RESULTS

Nowitis looked at a variety of risk factors, and the following are some of the findings:

- The risk assessment process begins before the project begins.
- To incorporate best risk management practices, there must be proper cooperation with all parties involved in the project.
- A record of all risks that have arisen and will occur in the future should be kept.
- Any company, large or small, should follow risk management practices to reduce the effects of project risks and their impact on project objectives.
- The project must be well-planned and tracked.
- A thorough understanding of the project scope, including an explanation of the project's overall result.
- In the designs, it is best to avoid making repeated design changes.
- Workers' wages should not be withheld.
- Supplies should be delivered on schedule on site.

Based on the findings, it is fair to conclude that the majority of construction projects lack a formal risk management policy.

The project looked at a variety of risk factors, and the following are some of the findings:

- The risk assessment process begins before the project begins.
- To incorporate best risk management practices, there must be proper cooperation with all parties involved in the project.
- A record of all risks that have arisen and will occur in the future should be kept.
- Any company, large or small, should follow risk management practices to reduce the effects of project risks and their impact on project objectives.
- The project must be well-planned and tracked.
- A thorough understanding of the project scope, including an explanation of the project's overall result.
- In the designs, it is best to avoid making repeated design changes.
- Workers' wages should not be withheld.
- Supplies should be delivered on schedule on site.

Based on the findings, it is fair to conclude that the majority of construction projects lack a formal risk management policy

IV. CONCLUSION

A strategies for classifying project risks, which have been tailored for construction projects, have been presented from a variety of perspectives by construction companies and firms that may be able to assist in the creation of project management during the planning and construction phases. High risks were labelled on a matrix for probability-impact, impact-urgency, probability-urgency, and priority-urgency. A brief mitigation strategy is prepared for avoiding and addressing the threats. The scope of the project is also expanded to include a case study of an existing project that follows the same risk assessment, risk analysis, and mitigation plan protocol. Risk assessment is carried out in an informal manner. All risks were recorded, and ratings were assigned based on their likelihood of occurrence, effect on the project, and urgency of resolving each risk. Conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

REFERENCES

[1] Agnieszka Dziadoz, Mariusz Rejment “Risk analysis in construction projects chosen method”, operational

research in sustainable development and civil engineering
– meeting of euro working group and 15th German-Lithunain-polish colloquium(ORSDE2015), PP 258-265.

- [2] Absulmaten Taroun, “Towards a better modeling and assessment of construction risk”, Journal of Civil Engineering Research 2014, 4(2A),volume 32, PP 101-105.
- [3] Ana I, Irimia-Diequez, Alvaro sanchez-carzola, Rafaela alfalla-luque “Risk management in megaprojects”, science direct procedia – social and behavioral sciences, vol.119 (2014), PP 407-416.