

Risk Management in Infrastructure Projects – A Case Study on Pune Metro

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ABSTRACT

The construction industry is one of the largest sector in the world and plays a vital role in budget and ultimately economic growth of the country. Performance of construction of infrastructure projects has most complex behavior hence prone to the failure of project. These failures directly affect the economy of the nation as well as Institutions. Numerous risks being faced during lifecycle of the infrastructure projects, due to their inherent complex nature, intricate relationship between the stakeholders, casual approach towards the identification and control of the uncertainties leads to the failure of the projects. Thus, consistent failures of the infrastructure projects attracts attention towards study on scientific approach to identify, analyze, plan & control of the risks frequently encountered during the lifecycle, particularly at construction stage of the projects. This research aim to deals with the various risks encountered in infrastructure projects during construction through application of scientific approach to accomplish successful completion of the projects, in time with assured quality without any impact on environment, social and the most important within an assigned budget of the project. This study focus on identification, assessment, response, plan and mitigation though interviews as well as questionnaire survey conducted though professional experts Govt. officials, project management consultants at all levels.

Keywords - Infrastructure, Risk Management, Scientific Approach, Quantitative Analysis.

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I. INTRODUCTION

Infrastructure is vital sector for faster economic growth and alleviation of poverty in any country. The adequate infrastructure in the form of roads, railways, ports, airports, power sector etc. and their efficiency is the need for the economic growth of the nation. The building of infrastructure needs investment of huge capital. Lack of infrastructure leads additional cost in terms of time, efforts and money of the habitat for accessing essential social services and basic needs of modernization. With large investment in infrastructure India has become second largest and fastest growing country in the world, but recently it is slowed down due to stalled of an infrastructure projects.

According to world bank estimate developing countries made investment of round about \$ 500 billion in new infrastructure which is almost equal to 20% of GDP. But the need of infrastructure is still large. Railways and roads are one of the most important amongst the infrastructure sector. The world bank estimate 10% rise in infrastructure assets directly increases GDP by 1%. Hence the infrastructure projects are high on agendas. (Most of infrastructure project suffers from significant under management of risk throughout the life cycle of project as the management of risk is not

properly accounted for during time. Variety of stakeholder are associated with completion of infrastructure projects hence risk/ uncertainty is most likely throughout the life cycle of the project as such the risk has direct impact on time cost overruns and quality of the project. Hence each project should undergo risk identification, analysis, control and thereof.

Construction industry highly prone to the risks that may encounter at any period throughout the life cycle of project with different likelihoods and impacts. The risks associated with the construction sector can generate more or less severe consequences for an organization (Aven, 2011). Risk in a construction context is typically referred to as a variable in the process of construction whose occurrence results in uncertainty as to the final cost, duration and/or the quality of the project (Odeyinka et al, 2006). To try to mitigate or eliminate construction risk, the count on risk management, which is an integral part of project management. Construction risk management is a positive and proactive process intended to reduce the likelihood and impact of unsatisfactory consequences to the project in its different stages, such as design, construction and operation (Rohaninejad and Bagherpour, 2013). Hence, the main purpose of construction risk management is to identify, evaluate,

and control the risk for project success (Lee et al, 2009). Overall, risk management process includes the following main steps: (1) Risk identification; (2) Risk assessment (qualitative and quantitative) and (3) Risk response (4) Control of Risk.

Risk management tool which helps in identifying the uncertainties and develop a strategic response to mitigate it. The systematic process of risk management is associated with risk classification, risk identification, risk analysis and risk response. Risk response can be handled with four action accept, transfer, mitigate and avoid (ATMA). Risk management is a such an effective method is does not only help to understand various risk but even helps in managing risks in various stages of the project.

II. PROBLEM STATEMENT

Risk involved during the life cycle of projects are varies extensively having uncertainties, complex in nature and directly affects the cost to the individual institutions as well as the loss of national wealth. Scientific approach for identification, analysis and control of risk is not implemented as a part of contract so far. Hence, identification of the risks, generation of statistical data of ongoing projects, analysis and to conclude the decisions for particular project and recommendation for implementation in projects.

III. OBJECTIVES

- Risk Identification through documentation review, brainstorming sessions, questionnaire survey, interviews.
- Risk assessment by qualitative and quantitative analysis.
- Risk response planning Strategies by Avoid, Transfer, Mitigate, Accept (ATMA).
- Recommendations Based on Case Study.

IV. METHODOLOGY



V. DATA COLLECTION AND INTERPRETATION

Table 1: Probability rating

Probability	Probability Rating Scale
Below 20%	Minor
20% to 40%	Low
40% to 60%	Moderate
60% to 80%	High
80% to 100%	Extreme

Table 2: Impact rating

Impact	Impact Rating Scale
Can be covered with slight changes in Planning / Methodology	Minor (< 20%)
Can be covered with deployment of additional Resources / Techniques	Low (20% to 40%)
Additional time to complete	Moderate (40% to 60%)
Additional cost & loss of business	High (60% to 80%)
Possibility of non-completion / Abandon / Closure of project	Extreme (80% to 100%)

Table 3: Response Recommendation

Recommended methods for control	Response Rating Scale
Always avoid	Avoid
Subcontracting / CAR Policy / Insurance	Transfer
Remedial measures with proper planning	Mitigate
Accept since it can be controlled without affecting the objective of project	Accept

Table 4: Attributes Based on Pilot Survey

Sr. No.	Attributes
1	Non-availability of required land for execution (Land acquisition)
2	Delay in decision by Client
3	Exposure of unidentified utilities
4	Unrealistic time limit for completion
5	Change in structural design
6	Delay in approval of design and drawing
7	Change in geometric design
8	Improper project planning
9	Poor Performance of sub-contractors
10	Scarcity of manpower/skilled labour
11	Political Influence
12	Improper contract management
13	Lack of coordination between different stakeholders
14	In-adequate budgetary provision and delay in payment
15	Monitoring and controlling of project
16	Disputes due to discrepancy in contract document
17	Accident due to moving traffic adjacent to project site

VI. EXPECTED OUTCOMES

- According to studies conducted, risk management has to be followed by the all firms to maintain the decorum of construction site and organization.
- The team working on the project should have ability to look through the contract and site details and recognize the risks.
- It's better to know and plan for risk in the initial stage of the project and Implement that technique at the time of emergency.

REFERENCES

- [1]. Mihnea Creciu "New Type of Risk in Infrastructure Projects" in modern economy published in 2011.
- [2]. Ana I. Irimia-Diégueza*; Alvaro Sanchez-Cazorlaa; Rafaela Alfalla-Luquea,, Risk Management in Megaproject - Procedia – Social and Behavioral Science, 2014
- [3]. Xiaohua Jina,*; Guomin Zhangb, Junxiao Liuc, Yingbin Fenga, Jian Zuod- Major Participants in the Construction Industry and Their Approaches to Risks: a Theoretical Framework – Procedia Engineering – 2017
- [4]. S.S. Timofeevaa,*; D.V. Ulrikhb, N.V. Tsvetkuna published Professional Risks in Construction Industry in International Conference on Industrial Engineering, ICIE 2017
- [5]. Mohammed Algahtanya*, Yasir Alhammadib, Dean Kashiwagic "Introducing a New Risk Management Model to the Saudi Arabian Construction Industry- 2016
- [6]. Adam Abderisak and Göran Lindahl* "Take a chance on me? Construction client's perspectives on risk management" in 8th Nordic Conference on Construction Economics and Organization – 2015
- [7]. Chaitali S. Pawar, RMD SSOE, Suman S. Jain, RMD SSOE, Jalinder R. Patil RMD SSOE, IJIRAE ISSN: 2349-2163
- [8]. Chike F Oduoza, Onengiyeofori Odimabo and Alexious Tamprapoulos by Framework for Risk Management software system for SMEs in the Engineering Construction Sector – 2017
- [9]. Pawel Szymanski by Risk Management in Construction Project – 2nd International joint conference on Innovative solution in Construction Engineering and Management- 2017.
- [10]. Jerzy Paslawaski – Flexible approach for construction process management under risk and uncertainty – 2017
- [11]. Pawel Szymanski - Risk management in construction projects (2017)

- [12]. Alfredo Federico Serpella, Ximena Ferrada, Rodolfa Howard, Larissa Rubio – Risk Management in Construction Projects – a knowledge based approach (2014)
- [13]. Lina Maria Sastoque, Carlos Alejandro Arboleda, Jose Luis Ponz – A Proposal for risk allocation in social infrastructure projects applying PPP in Colombia (2016)
- [14]. Mohammed Algahtany, Yasir Alhammandi, Deam Kashiwagi – Introduction a new risk management model to the Saudi Arabian Construction Industry (2016)
- [15]. Kim Bang Salling – A New Approach to Feasibility Risk Assessment within Transport Infrastructure Appraisal (2012)

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