



# IMPACT OF RISKS ON PERFORMANCE OF CONSTRUCTION PROJECT

<sup>1</sup>Padma Kokate, <sup>2</sup>Dr. Pallavi Kharat, <sup>3</sup>Gaurav Vispute

<sup>1</sup>Post graduate student, <sup>2,3</sup>Assistant Professor,

<sup>1,2,3</sup>Department of Civil Engineering,

<sup>1</sup>Dr. D. Y. Patil School of Engineering and Technology, Lohegaon, Pune, India

**Abstract :** The construction industry is the pillar of the success of modern countries. Many construction projects have faced the achievement of multiple objectives but were unable to achieve all of them; for example, many construction projects are delivered according to predetermined quality but at the same time they face issues like delays or cost issues. This study focuses on various types of risk factors and their impact on the performance of construction project. In particular, it understands the effect of risk on the time and cost of the construction project. This case study has been done on a residential project in Jaysingpur. A survey was done by a team of project management specialists from the construction project in Jaysingpur using interviews and checklist methods, and the data were analyzed using the probability impact matrix approach, which is made up of two key components: money and time. The risk assessment will be done by the qualitative method. This method focuses on defining the weight of risk impact and probability of risks, as well as expressing their impact on the ability to influence. From this, the risk can be categorized according to its controllability. This makes it easy to determine which risk an organization should focus on.

**Keywords - Construction Project, Impact of Risk, Project Performance, Risk**

## I. INTRODUCTION

Construction sector plays an important role in the economy of the country. With increasing modernity, the method of construction as well as its demand is changing. Before funding the project people need to make sure that project is completed on time. But it is almost impossible to complete any project without any Risk. There are many types of risk in construction industry because of many people are involved in project and lot of people need lot of funds to complete the project. In addition, there is legal and technical restriction. Compare to other industries, the construction industry is more affected by risks. If these risks are not taken into account, then there is a maximum likelihood of cost overruns, time delays and low quality, resulting poor project performance.

Construction risk has huge impact on time and cost of the construction project, resulting poor quality of work. Risk management is widely acknowledged as one of the most important project management procedures and capabilities. Risks are more prevalent in the construction sector than in other industries. Cost overruns, schedule delays, and inadequate quality are all possibilities if these risks are not considered. As a result, project performance suffers. The objective of this study is to recognize various types of risks in construction projects and established impact of risk. Also, to find out how risks affect the cost and time of construction project and accordingly the overall performance of construction project.

## II. LITERATURE REVIEW

Varun Raj et. al. [1] studied the various risk factors such as social, legal, economic, environmental, political, logistic, management and technological sources affecting the constructions in India. The executing a project within the specified budget, time frame and optimal quality is critical. Reza Mohajeri et. al. [2] used structural interviews to identify a risk in road construction projects. This research concluded that natural disasters have highest risk, other risks include lands funding, technical and management problems. Mhentre K. V. et. al. [3] used Primavera risk analysis software (PRA). They have predicted the duration of construction project by using PRA software which gives 90% assurance. They have considered the risks as funds, non availability of labours, environmental, political, material, etc. Aarthipriya et. al. [4] used qualitative method to analysis risk. They concluded that improper investigation of soil, material rate fluctuations, improper quality estimation and improper planning of resources are the reasons of cost overrun. They have also discussed the mitigation measures to reduce the cost overrun. Abroon Qazi, Abdelkader et al [5] is explores the impact of risk attitude on the assessment of project uncertainty encompassing both risk and opportunity and expected project performance. The findings reveal that the impact of risk attitude significantly varies across multiple dimensions of project uncertainty and project performance According to S. Keerthana et al. [6], enterprise development remains sluggish. The most important elements that affect the construction process include corruption and bribery effects, increase in employee perks, fluctuation in estimated finance than predicted, revision of material prices, recession in the infrastructure area, and incomplete design. Naseer Alsaadi et. al. [7] applied quantitative method to examine relationship between risk management and project performance for the construction project located in Oman. They concluded that qualified project manager having knowledge of risk management is required also to improve the performance of project there is a need of practicing risk management.

### III. RESEARCH METHODOLOGY

The research will be conducted according to the following stages:

- Theoretical data will be gathered through a variety of sources, including textbooks, past research, the internet, and research papers. This theoretical section will lead to a better understanding of the gap between theoretical and practical aspects of risk assessment
- The next phase will consist of collecting information and facts related to specific case study and potential issues and the current situation in a construction project in Jaysingpur and as well as interviews with project managers and other management team
- Case studies will be developed based on an awareness of risk management practice and experience, as well as outlining the key goal of stakeholders from risk analysis.
- Risk assessment will be done by the probability impact matrix method.

#### 3.1 Data Collection

As already mentioned above, the data used for conducting from case study in Jaysingpur of Ashtvinayak construction company. Details of project are as follows.

Table 1. Profile of project.

Name of the Company	Ashtvinayak construction, Jaysingpur.
Construction project	Residential building project, four building having 12 floors for each building, 1 Club house, 1 commercial mall.
Investment cost	45,15,50,688.00 Rs.
Gross sectional area	32000 Sq.m.

Ravindra Shrivastava et.al [8] uses a questionnaire survey to get various risk variables. In this study for identification of risk factor the questionnaires were prepared and distributed to the project manager, site supervisor, and other project management team based on their knowledge and experience. Totally six responses were collected and analysed and list of information obtained. Checklists are prepared for calculating impact range and probability range with the expert.

Table 2. Profile of Respondents.

No	Respondent	Work Experience	Responsibility
1	Project manager	10 years	Running the project
2	Sr. engineer	7 years	They prepare project plans, inspect designs, and manage budgets and resources.
3	Site engineer	5 years	Daily work on site
4	Quantity surveyor	7 years	Cost and quantity
5	Structural Engineer	8 years	Update possible structural changes
6	Architect	6 years	Update possible architectural changes

#### 3.1.1. Risk Identification

Table 3. Various Risks affecting Building Construction Projects

Type of Risk	Code	Risk Factors
Physical Risk	PH1	Unavailability of material
	PH2	Accidents and injuries
	PH3	Unavailability of transportation mode
Construction risk	C1	Not finding the right contractor
	C2	Errors in documentation
	C3	Improper Construction Methods
	C4	Material wastage
Financial risk	F1	Non availability of fund
	F2	Labour has problem with payment
	F3	Contractors has problem with payments
	F4	Fluctuation of Material Prices
Design risk	D1	Periodic changes of design
Management risk	M1	Lack of coordination, communication, cooperation between parties

	M2	Labors dispute
	M3	Leader ship do not take decisions on time
	M4	Legal gap knowledge
	M5	Contractor has no proper experience and knowledge
	M6	Possible errors/ take more time to fix it
	Environmental Risk	E1
Socio Political Risk	S1	Legal gap knowledge.
	S2	Negotiation process take more time
	S3	Political issue

3.1.2. Risk Analysis

Table 4. Risks are classified according to their occurrence probability.[9,10]

Probability	Very Low	Low	Medium	High	Very High
Risk	0.1	0.3	0.5	0.7	0.9

Table 5. Risks are classified according to their impact on the project 's objectives.[9,10]

Identified Risk	Project Objective	Very low 0.05	Low 0.1	Moderate 0.2	High 0.4	Very High 0.8
Risk	Cost	No Significant cost increase	Cost Increase of <10%	Cost increase 10-20%	Cost increase 20-40%	Cost increase >40%
	Time	No significance Time increases	<5% time increase	5-10% Time increase	10-20% time in crease	Time increase >20%

3.3.3 Risk Assessments

The process does not end with the Rate of Impact table; additional computations are required to obtain a result. A risk assessment matrix, also known as a risk control matrix, is a tool used in project planning during the risk assessment stage.

Table 6. Risk Probability-Impact Matrix.

0.8	0.8	0.24	0.4	0.56	0.72	
0.4	0.04	0.12	0.2	0.28	0.36	
0.2	0.02	0.06	0.1	0.14	0.18	
0.1	0.01	0.03	0.05	0.07	0.9	
0.05	0.005	0.015	0.025	0.035	0.045	
I	P	0.1	0.3	0.5	0.7	0.9

Table 7. Impact assessment of identified risk [11]

Code	Project Objective	Probability	Impact	Matrix impact
PH1	Cost	0.9	0.2	0.18
	Time		0.4	0.36
PH2	Cost	0.5	0.4	0.2
	Time		0.8	0.4
PH3	Cost	0.5	0.4	0.2
	Time		0.2	0.1
C1	Cost	0.5	0.8	0.4
	Time		0.2	0.1

C2	Cost	0.3	0.05	0.015
	Time		0.1	0.03
C3	Cost	0.1	0.1	0.01
	Time		0.4	0.04
C4	Cost	0.5	0.8	0.4
	Time		0.2	0.1
F1	Cost	0.5	0.8	0.4
	Time		0.8	0.4
F2	Cost	0.1	0.4	0.04
	Time		0.1	0.01
F3	Cost	0.3	0.05	0.015
	Time		0.2	0.06
F4	Cost	0.5	0.4	0.2
	Time		0.2	0.1
D1	Cost	0.3	0.1	0.03
	Time		0.4	0.12
M1	Cost	0.5	0.05	0.025
	Time		0.8	0.4
M2	Cost	0.3	0.05	0.015
	Time		0.2	0.06
M3	Cost	0.1	0.1	0.01
	Time		0.8	0.8
M4	Cost	0.3	0.1	0.03
	Time		0.2	0.06
M5	Cost	0.5	0.2	0.1
	Time		0.1	0.05
M6	Cost	0.3	0.05	0.015
	Time		0.8	0.24
E1	Cost	0.3	0.05	0.015
	Time		0.4	0.12
S1	Cost	0.9	0.2	0.18
	Time		0.8	0.72
S2	Cost	0.5	0.05	0.025
	Time		0.2	0.1
S3	Cost	0.7	0.2	0.14
	Time		0.4	0.28

#### IV. RESULTS

Risks with a high degree of impact account for 38% of the total number of risks stated in the Checklist, while risks with a moderate level of effect account for 29% and risks with a low level of impact account for 33%.

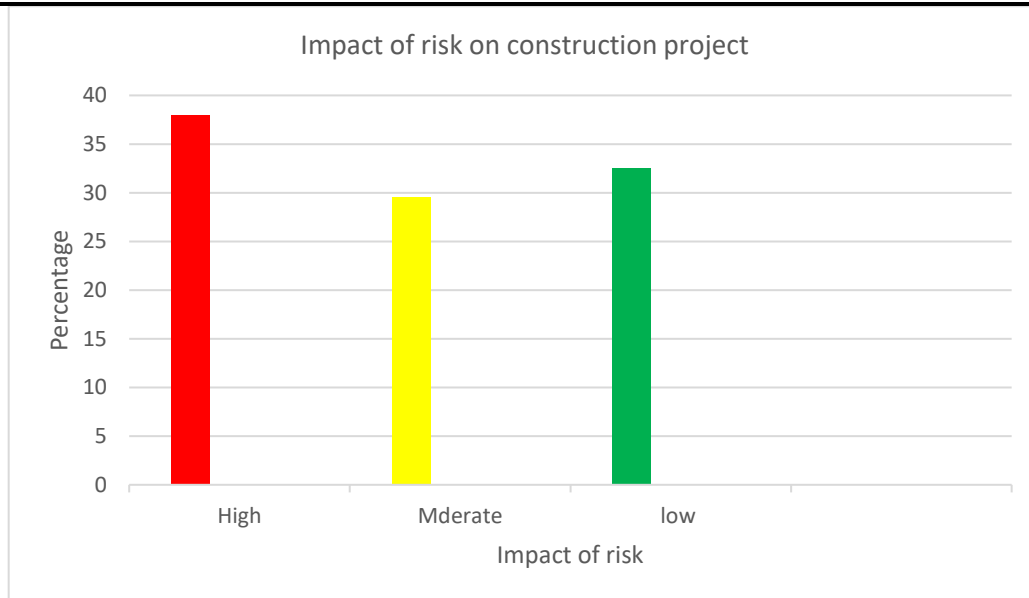


Figure 1 : Impact of Risk on construction project

In that case, it can be seen that risk analysis has an impact on both cost and time. The graph shows the identified risks and their impact on the project's cost and timeline.

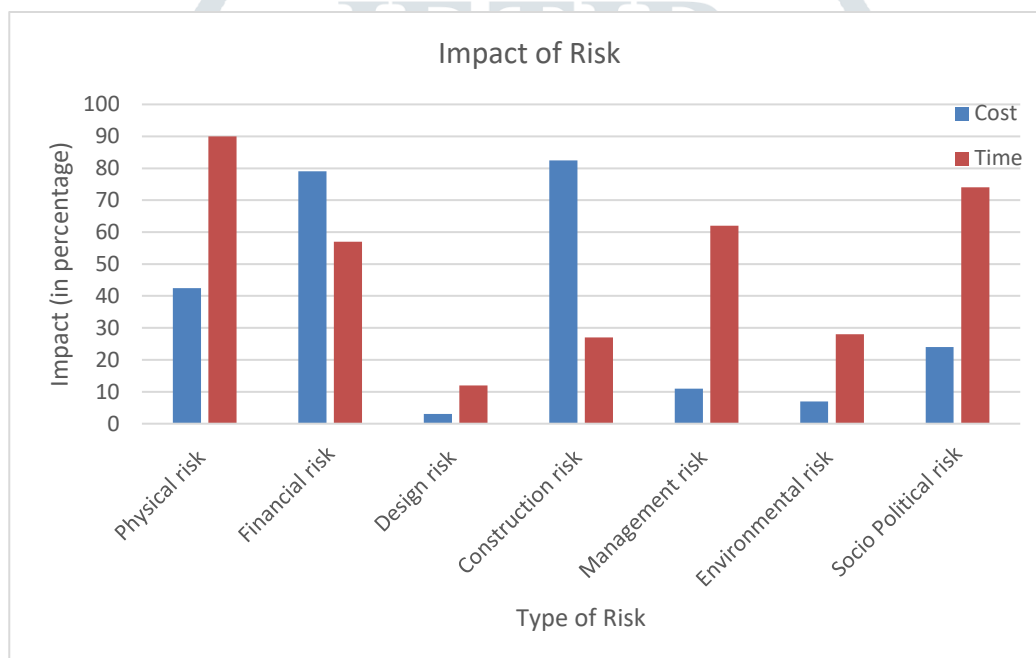


Figure 2 : Impact of Risk on performance of the project

**V. CONCLUSIONS**

There are various types of risks in the construction sector. Impact of risk will be more or less on project cost and time according to which types of risk occurs and what is the frequency of that risk. Accordingly, its affect to project performance also. Developing and conducting this study should guide to know the risk factor, and help to analyze it, accordingly which risks affect more or less on project cost and time and to improve the performance of project. A qualitative risk assessment should helpful for prioritize and manage risk better as well as utilize time and resources. This makes easy to determine which risk an organization should focus on. As a results, risks had been ranked using mean score method. That is a high impacted, moderated, and having low impact risk. Risk affects the project cost and time, accordingly project quality also affected. This study should help in risk management process of construction project and reduce the extreme risks to high, high risks to medium and medium risks to low and to achieve the basic goal of a construction industry such as completing the project in estimated budget and right time.

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