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# Analyze Monte Carlo Simulation Applications for Project Management

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***Abstract: Risks have an important impact on construction comes in terms of its primary objectives. Construction comes that are tortuous in nature, uncertainty and risks within the same will develop from completely different sources. The record of the development trade isn't acceptable in terms of header up with risks incomes. Risk management is a process which consists of identification of risks, assessment with qualitatively and quantitatively, response with a suitable method for handling risks, and then control the risks by monitoring. This study proposes to use the risk management technique which has well - documented procedures for the one stop resolution all kinds of hazards possibly to occur throughout any construction project.***
***Keywords: Risk, Risk Management, Construction Projects, Risk Management Process, Monte Carlo Simulation***

## I. INTRODUCTION

Risk may be outlined because the event that negatively affects the project objectives like time and schedule, cost, quality of labor. Risk Management is that the method of distinguishing the potential risk related to risk and responding to those risks. Risk in any project may be a various rather than fate. According to the characteristic of the development trade, that has high uncertainty, thus it'll occur several risks throughout the development section and our operational building? Risk in construction has been the article of attention owing to time and price over-runs related to construction comes. Risk is a gift all told the activities during a project; it's solely the quantity that varies from one activity to a different. . Risks and uncertainties inherent within the industrial area unit quite the other industries. Many industries became a lot of proactive regarding exploitation risk management techniques in project. However, with relevancy the development trade, constant isn't used normally. Risk is an integral component of any project. Risk is a gift all told comes regardless of their size or sector. No project is totally free from risks. If risks are not properly analyses and strategies are not trained to deal with them, the project is likely to lead to failures.

## II.OBJECTIVES

The main objectives of this study include the following:

*A.* To identify the causes of risk in construction projects.
*B.* To identify the approaches for solving the problems regarding risk.
*C.* To minimize the effect of risk in construction project

## III. METHODOLOGY

In this paper, general focus has been created on the danger factors. The target of this study is to spot the foremost reason behind risk within the construction project and access the relative importance of those causes, from the aspects of construction contractors and consultants. The study was performed on the idea of form, divided into two main components. Half one associated with general info for each the corporate and respondent. Each contractor and consultants were more requested to answer the queries bearing on their expertise in the housing industry. Half two includes the list of known causes of risk in the housing industry on the idea of form distributed arbitrarily to contractors & consultants operating in the construction comes, response were collected. The data gotten inside the survey were poor down by Relative Importance Index (RII) technique. During this paper, general focus has been created with the overall ideas of risk management. Risk identification has been through with the study of literature. A form was developed when the known factors poignant risk. Risk assessments are often through with the help of qualitative and measure. Risk response can be planned with the idea of the result of the study. Risk management is that the last step within the method of risk management.

### *A. Relative Importance Index (RII)*

Assess the relative significance among risks, previous literature work study suggests establishing a risk significance index by calculating a significance score for each risk. For Calculating the significance score, multiply the probability of occurrence by the degree of Impact. The significance score for each risk assessed by each respondent can be obtained through the model

$$S^i_j = A^i_j * B^i_j$$

Where $S^i_j$ = Significance score assessed by respondent j for risk i

$A^i_j$ = Occurrence of risk i, assessed by respondent j

$B^i_j$ = degree of impact of risk I, assessed by respondent j.

By averaging scores from every one of the reactions, it is conceivable to get a normal importance score for each hazard, and this normal score is known as the hazard record score and is utilized for positioning the dangers. The model for the figuring of hazard list score can be characterized as

$$R_s^i = \sum_j^T = 1\ S^i_j / T$$

Where $R_s^i$ = index score for risk i

$S^i_j$ = Significance score assessed by respondent j for risk i

T= total number of responses

### *B. Applicability of Test Results to Construction Industry-*

Monte Carlo simulation produces distributions of possible outcome values. Monte Carlo simulation provides a number of advantages over deterministic, or "single-point estimate" analysis: Probabilistic Results.

## IV. CONCEPT OF RISK ANALYSIS AND MANAGEMENT

Risk management could be a method that identifies the project risks, analyses them, and confirm the actions to avert the threats on any project. All steps within the risk management method ought to be enclosed to handle risks, so as to implement the method of the project. Thanks to the character of construction comes, risk management could be an important method.

Risk associated with construction industry can be broadly categorized into:

| S.NO | RISK CATEGORIZED | | |
|---|---|---|---|
| 1. | Technical Risks: | 2. Construction Risks: | 3.Physical Risks |
| | Inadequate specification | Labour productivity | Damage to structure |
| | Incomplete design | Rush bidding | Supplies of defective materials |
| | Unknown site conditions | Site condition | Labour injuries |
| | Investigation Change in scope | Equipment failures | Varied labor and equipment |
| | Construction procedures | Design changes | |
| | Labor shortages | Difference in actual and contract executed quantities | 6. Management Risks |
| | Errors in design drawing | Lower quality of work | Ambiguous planning due to project complexity |
| | Material shortage | Labour productivity | Resource management |
| | Industrial disputes | | Changes in management ways |
| | Incompetence of transportation facilities | | Information unavailability |
| | | | Poor communication between parties involved |
| 4. | Organizational Risks | 5. Financial Risks | 7. Political Risks |
| | Contractual | Monopolizing of materials due to closure and other unexpected | Change of government |
| | Relations | Low market demand | Change of government policy |
| | Contractor's | Exchange rate fluctuation | Attitudes of participants |
| | Experience | Payment delays | 7. Environmental Risks |
| | Attitudes of participants | Un managed cash flow | Weather implications |
| | Inexperienced work | Change in bank formalities and | Natural Disasters |

| | | | |
|---|---|---|---|
| | | lenders | |
| | | Insurances risks | Any adverse impact on project due to climatic conditions |
| | | | Any impact on the environment due to the project |
| | | | Any impact on the environment due to the project |
| | | | Fire |
| 8. | Logistics Risks | 9. Design Risks | |
| | Unavailable labour, materials and equipment | Not coordinated design | |
| | Undefined scope of working | Inaccurate quantities | |
| | High competition in bids | Lack of consistency between bill of quantities, | |
| | Inaccurate project program | Awarding the design to unqualified designers | |
| | | Rush Design | |

## V. RESULT AND DISCUSSIION

| INTERVIEW NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | Total | MEAN(m) | SD(s) | C.O.V=(s/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Technical Risk | | | | | | | | | | | | | | | | | | | | | |
| Inadequate specification | 0.8 | 0.48 | 0.48 | 0.36 | 0.64 | 0.64 | 0.6 | 0.6 | 0.64 | 0.64 | 0.48 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 10.28 | 0.604 | 0.113 | 0.187 |
| Incomplete design | 0.8 | 0.48 | 0.48 | 0.36 | 0.64 | 0.64 | 0.6 | 0.6 | 0.64 | 0.64 | 0.48 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 10.28 | 0.604 | 0.113 | 0.187 |
| Unknown site conditions | 0.8 | 0.36 | 0.36 | 0.36 | 0.64 | 0.64 | 0.6 | 0.6 | 0.64 | 0.64 | 0.48 | 0.64 | 0.48 | 0.64 | 0.6 | 0.8 | 0.64 | 10 | 0.588 | 0.113 | 0.192 |
| Investigation Change in scope | 0.8 | 0.36 | 0.36 | 0.36 | 0.64 | 0.64 | 0.6 | 0.6 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.48 | 0.64 | 0.48 | 9.88 | 0.581 | 0.226 | 0.389 |
| Construction procedures | 0.6 | 0.48 | 0.48 | 0.36 | 0.64 | 0.64 | 0.6 | 0.6 | 0.64 | 0.64 | 0.64 | 0.48 | 0.64 | 0.64 | 0.48 | 0.64 | 0.48 | 9.76 | 0.574 | 0.084 | 0.147 |
| Labor shortages | 0.8 | 0.64 | 0.64 | 0.64 | 0.48 | 0.8 | 0.5 | 0.6 | 0.8 | 0.64 | 0.64 | 0.48 | 0.8 | 0.48 | 0.48 | 0.64 | 0.64 | 10.72 | 0.630 | 0.113 | 0.179 |
| Errors in design drawing | 0.8 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.6 | 1 | 0.64 | 0.64 | 0.64 | 0.64 | 0.8 | 0.64 | 0.64 | 0.64 | 0.64 | 11.56 | 0.68 | 0.113 | 0.166 |
| Material shortage | 0.6 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.6 | 0.8 | 0.64 | 0.8 | 0.64 | 0.48 | 0.64 | 0.64 | 0.48 | 0.64 | 0.48 | 10.68 | 0.628 | 0.084 | 0.135 |
| Industrial disputes | 0.48 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.6 | 0.6 | 0.64 | 0.6 | 0.64 | 0.48 | 0.64 | 0.64 | 0.36 | 0.48 | 0.48 | 9.92 | 0.583 | 0 | 0 |
| Incompetence of transportation facilities | 0.48 | 0.64 | 0.64 | 0.48 | 0.64 | 0.48 | 0.6 | 0.6 | 0.64 | 0.6 | 0.64 | 0.64 | 0.64 | 0.64 | 0.36 | 0.36 | 0.48 | 9.64 | 0.567 | 0 | 0 |
| Labor shortages | 0.6 | 0.64 | 0.64 | 0.64 | 0.48 | 0.6 | 0.5 | 0.6 | 0.8 | 0.64 | 0.64 | 0.64 | 0.8 | 0.36 | 0.48 | 0.64 | 0.64 | 10.36 | 0.609 | 0.028 | 0.046 |
| Construction Risks | | | | | | | | | | | | | | | | | | | | | |
| Labour productivity | 0.8 | 0.36 | 0.36 | 0.48 | 0.64 | 0.48 | 0.6 | 0.6 | 0.36 | 0.64 | 0.48 | 0.64 | 0.64 | 0.36 | 0.48 | 0.48 | 0.48 | 8.96 | 0.527 | 0.226 | 0.429 |
| Rush bidding | 0.8 | 0.36 | 0.36 | 0.48 | 0.64 | 0.48 | 0.6 | 0.6 | 0.36 | 0.64 | 0.48 | 0.64 | 0.64 | 0.36 | 0.64 | 0.64 | 0.48 | 9.28 | 0.545 | 0.226 | 0.414 |
| Site condition | 0.8 | 0.36 | 0.36 | 0.48 | 0.64 | 0.48 | 0.6 | 0.6 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.36 | 0.64 | 0.64 | 0.48 | 9.72 | 0.571 | 0.226 | 0.395 |
| Equipment | 0.8 | 0.3 | 0.3 | 0.4 | 0.6 | 0.4 | 0. | 0. | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.4 | 0.64 | 0.8 | 0.6 | 10.1 | 0.597 | 0.113 | 0.189 |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| failures | | 6 | 6 | 8 | 4 | 8 | 6 | 6 | 4 | 4 | 4 | 4 | 4 | 8 | | | 4 | 6 | | | |
| Design changes | 0.8 | 0.48 | 0.48 | 0.48 | 0.48 | 0.48 | 0.5 | 0.8 | 0.64 | 0.8 | 0.64 | 0.64 | 0.64 | 0.48 | 0.8 | 0.48 | 0.64 | 10.24 | 0.602 | 0.113 | 0.187 |
| Difference in actual and contract executed quantities | 0.8 | 0.64 | 0.64 | 0.48 | 0.48 | 0.36 | 0.5 | 0.8 | 0.64 | 1 | 0.36 | 0.64 | 0.64 | 0.48 | 0.48 | 0.48 | 0.48 | 9.88 | 0.581 | 0.226 | 0.389 |
| Lower quality of work | 0.8 | 0.64 | 0.64 | 0.48 | 0.64 | 0.64 | 0.6 | 0.8 | 0.64 | 0.64 | 0.36 | 0.64 | 0.64 | 0.48 | 0.8 | 0.8 | 0.48 | 10.76 | 0.632 | 0.226 | 0.357 |
| Physical Risks | | | | | | | | | | | | | | | | | | | | | |
| Damage to structure | 0.48 | 0.64 | 0.64 | 0.64 | 0.36 | 0.64 | 0.4 | 0.6 | 0.48 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.8 | 0.8 | 0.64 | 10.32 | 0.607 | 0.113 | 0.186 |
| Supplies of defective materials | 0.48 | 0.64 | 0.64 | 0.64 | 0.48 | 0.64 | 0.5 | 0.6 | 0.48 | 0.64 | 0.64 | 0.64 | 0.8 | 0.64 | 0.8 | 0.8 | 0.64 | 10.72 | 0.630 | 0.113 | 0.179 |
| Labour injuries | 0.48 | 0.64 | 0.64 | 0.36 | 0.36 | 0.64 | 0.4 | 0.6 | 0.48 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.8 | 0.8 | 0.64 | 10.04 | 0.590 | 0.113 | 0.191 |
| Varied labor and equipment | 0.48 | 0.64 | 0.64 | 0.64 | 0.36 | 0.64 | 0.4 | 0.6 | 0.48 | 0.8 | 0.64 | 0.36 | 0.8 | 0.64 | 0.8 | 0.8 | 0.64 | 10.36 | 0.609 | 0.113 | 0.185 |
| Financial Risks | | | | | | | | | | | | | | | | | | | | | |
| Monopolizing of materials due to closure and other unexpected | 0.36 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.6 | 0.6 | 0.64 | 0.64 | 0.48 | 0.48 | 0.64 | 0.64 | 0.48 | 0.48 | 0.64 | 9.96 | 0.585 | 6.78 | 11.586 |
| Low market demand | 0.36 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.6 | 0.5 | 0.64 | 0.64 | 0.48 | 0.48 | 0.64 | 0.64 | 0.48 | 0.64 | 0.64 | 9.96 | 0.585 | 6.78 | 11.586 |
| Exchange rate fluctuation | 0.36 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.6 | 0.6 | 0.64 | 0.64 | 0.48 | 0.48 | 0.48 | 0.64 | 0.48 | 0.64 | 0.48 | 9.8 | 0.576 | 6.67 | 11.579 |
| Payment delays | 0.36 | 0.64 | 0.64 | 0.64 | 0.8 | 0.64 | 0.8 | 0.5 | 0.8 | 1 | 0.48 | 0.64 | 0.36 | 0.64 | 0.36 | 0.48 | 0.48 | 10.24 | 0.602 | 6.98 | 11.598 |
| Unmanaged cash flow | 0.36 | 0.64 | 0.64 | 0.64 | 0.8 | 0.64 | 0.8 | 1 | 0.8 | 1 | 0.48 | 0.64 | 0.64 | 0.48 | 0.36 | 0.36 | 0.48 | 10.76 | 0.632 | 7.35 | 11.618 |
| Change in bank formalities and lenders | 0.36 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.6 | 1 | 0.64 | 0.64 | 0.64 | 0.36 | 0.64 | 0.64 | 0.48 | 0.36 | 0.48 | 10.08 | 0.592 | 6.87 | 11.591 |
| Insurances risks | 0.36 | 0.64 | 0.64 | 0.64 | 0.64 | 1 | 0.6 | 0.8 | 1 | 0.64 | 0.64 | 0.36 | 0.6 | 0.48 | 0.64 | 0.64 | 0.48 | 10.84 | 0.637 | 7.410 | 11.621 |
| Financial failure of the contractor | 0.36 | 0.64 | 0.64 | 0.8 | 1 | 0.8 | 1 | 0.8 | 1 | 0.64 | 0.64 | 0.64 | 0.8 | 0.48 | 0.64 | 0.48 | 0.64 | 12 | 0.705 | 8.23 | 11.660 |
| Inexperience when pricing tender | 0.36 | 0.64 | 0.64 | 0.8 | 0.64 | 1 | 0.6 | 0.8 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.48 | 0.64 | 0.64 | 0.48 | 10.96 | 0.644 | 7.49 | 11.625 |
| Loss due to fluctuation of interest rate | 0.36 | 0.64 | 0.64 | 0.8 | 0.64 | 0.8 | 0.6 | 0.8 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.48 | 0.64 | 0.64 | 0.48 | 10.76 | 0.632 | 7.35 | 11.618 |
| Management Risks | | | | | | | | | | | | | | | | | | | | | |
| Ambiguous planning due to project complexity | 0.48 | 0.36 | 0.36 | 0.6 | 0.64 | 0.48 | 0.6 | 0.6 | 0.64 | 0.48 | 0.48 | 0.64 | 0.48 | 0.36 | 0.64 | 0.48 | 0.64 | 9.04 | 0.531 | 6.052 | 11.382 |
| Resource management | 0.48 | 0.36 | 0.36 | 0.6 | 0.64 | 0.36 | 0.6 | 0.6 | 0.64 | 0.36 | 0.64 | 0.8 | 0.8 | 0.36 | 0.48 | 0.36 | 0.48 | 9 | 0.529 | 6.02 | 11.37 |
| Changes in | 0.4 | 0.3 | 0.3 | 0.6 | 0.6 | 0.4 | 0. | 0. | 0.6 | 0.3 | 0.6 | 1 | 0.4 | 0.6 | 0.48 | 0.3 | 0.4 | 9.28 | 0.545 | 6.22 | 11.39 |

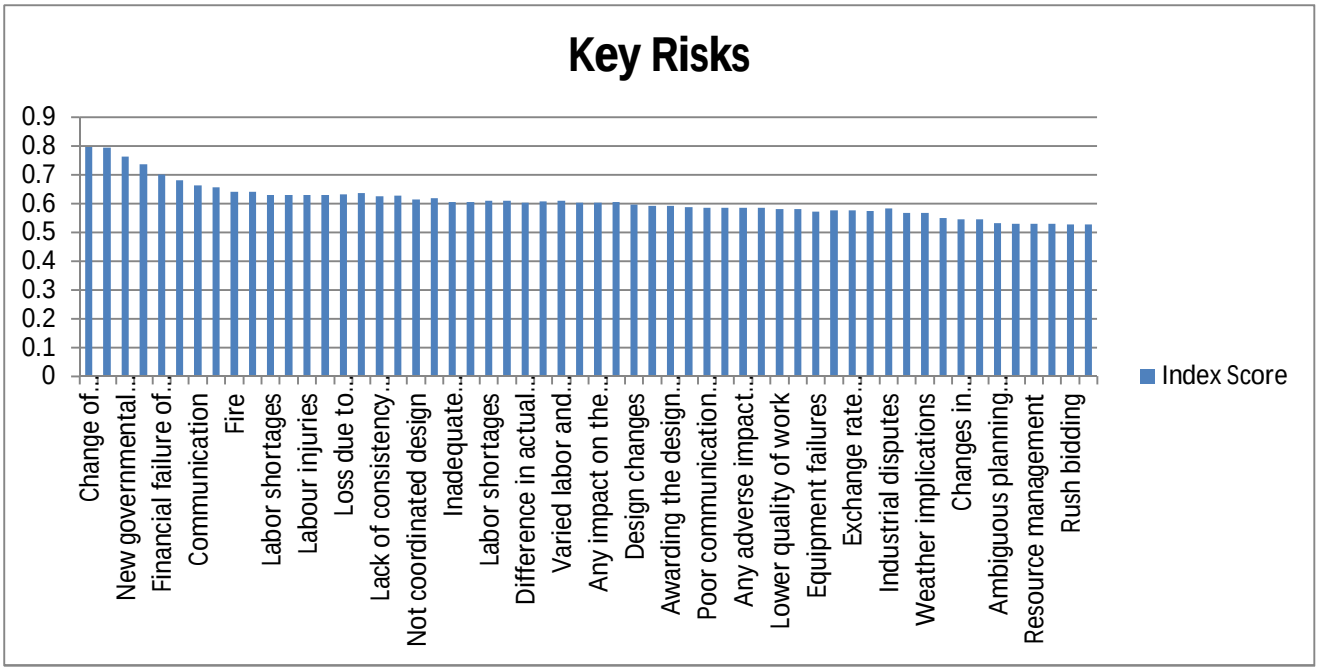
| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| management ways | 8 | 6 | 6 | | 4 | 8 | 6 | 6 | 4 | 6 | 4 | | 8 | 4 | | 6 | 8 | | | | |
| Information unavailability | 0.48 | 0.36 | 0.36 | 0.36 | 0.64 | 0.48 | 0.6 | 0.6 | 0.48 | 0.64 | 0.48 | 1 | 0.48 | 0.64 | 0.48 | 0.36 | 0.48 | 9 | 0.529 | 6.02 | 11.37 |
| Poor communication between parties involved | 0.48 | 0.36 | 0.36 | 0.48 | 0.64 | 0.48 | 0.6 | 0.6 | 1 | 0.64 | 1 | 0.8 | 0.48 | 0.64 | 0.48 | 0.36 | 0.48 | 9.96 | 0.585 | 6.70 | 11.44 |
| Political Risks | | | | | | | | | | | | | | | | | | | | | |
| Change of government | 0.8 | 0.8 | 0.8 | 1 | 0.8 | 0.8 | 0.8 | 0.8 | 1 | 0.8 | 0.8 | 1 | 0.6 | 0.64 | 0.8 | 0.64 | 0.64 | 13.52 | 0.795 | 0.11 | 0.14 |
| Change of government policy | 0.8 | 0.8 | 0.8 | 1 | 0.8 | 0.8 | 0.8 | 0.8 | 1 | 0.8 | 0.8 | 1 | 0.64 | 0.64 | 0.8 | 0.64 | 0.64 | 13.56 | 0.797 | 0.11 | 0.14 |
| Attitudes of participants | 0.8 | 0.8 | 0.8 | 1 | 0.6 | 0.8 | 0.6 | 0.8 | 1 | 0.8 | 0.8 | 0.36 | 0.48 | 0.8 | 0.8 | 0.64 | 0.64 | 12.52 | 0.736 | 0.11 | 0.15 |
| New governmental acts or legislations | 0.8 | 0.8 | 0.8 | 1 | 0.6 | 0.8 | 0.6 | 0.8 | 1 | 0.8 | 0.8 | 0.64 | 0.8 | 0.64 | 0.8 | 0.64 | 0.64 | 12.96 | 0.762 | 0.11 | 0.14 |
| Communication | 0.8 | 0.64 | 0.64 | 1 | 0.8 | 0.36 | 0.8 | 0.5 | 0.64 | 0.64 | 0.64 | 0.64 | 0.48 | 0.64 | 0.8 | 0.64 | 0.64 | 11.28 | 0.663 | 0.11 | 0.17 |
| Environmental Risks | | | | | | | | | | | | | | | | | | | | | |
| Weather implications | 0.64 | 0.64 | 0.64 | 0.8 | 0.64 | 0.48 | 0.6 | 0.5 | 0.48 | 0.64 | 0.48 | 0.64 | 0.48 | 0.64 | 0.48 | 0.36 | 0.48 | 9.64 | 0.567 | 0.11 | 0.19 |
| Natural Disasters | 0.64 | 0.64 | 0.64 | 0.8 | 0.64 | 0.48 | 0.6 | 0.5 | 0.48 | 0.64 | 0.48 | 0.64 | 0.48 | 0.64 | 0.48 | 0.36 | 0.64 | 9.8 | 0.576 | 0 | 0 |
| Any adverse impact on project due to climatic conditions | 0.64 | 0.64 | 0.64 | 0.8 | 0.64 | 0.48 | 0.6 | 0.6 | 0.64 | 0.6 | 0.48 | 0.64 | 0.48 | 0.8 | 0.48 | 0.36 | 0.36 | 9.96 | 0.585 | 0.19 | 0.33 |
| Any impact on the environment due to the project | 0.64 | 0.64 | 0.64 | 0.8 | 0.64 | 0.48 | 0.6 | 0.6 | 0.64 | 0.6 | 0.64 | 0.64 | 0.48 | 0.8 | 0.48 | 0.36 | 0.48 | 10.24 | 0.602 | 0.11 | 0.18 |
| Any impact on the environment due to the project | 0.64 | 0.64 | 0.64 | 0.8 | 0.64 | 0.48 | 0.6 | 0.6 | 0.64 | 0.8 | 0.64 | 0.64 | 0.48 | 0.64 | 0.48 | 0.36 | 0.48 | 10.28 | 0.604 | 0.11 | 0.18 |
| Fire | 0.64 | 0.64 | 0.64 | 0.6 | 0.64 | 0.8 | 0.6 | 0.5 | 0.6 | 0.64 | 1 | 0.64 | 0.8 | 0.64 | 0.48 | 0.36 | 0.64 | 10.88 | 0.64 | 0 | 0 |
| Logistics Risks | | | | | | | | | | | | | | | | | | | | | |
| Unavailable labour, materials and equipment | 0.48 | 0.36 | 0.36 | 0.64 | 0.36 | 0.64 | 0.4 | 0.5 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.48 | 0.48 | 0.48 | 8.96 | 0.527 | 0 | 0 |
| Undefined scope of working | 0.48 | 0.36 | 0.36 | 0.8 | 0.36 | 0.64 | 0.4 | 0.5 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.48 | 0.48 | 0.36 | 9 | 0.529 | 0.08 | 0.160 |
| High competition in bids | 0.48 | 0.36 | 0.36 | 0.8 | 0.48 | 0.48 | 0.5 | 0.6 | 0.64 | 0.64 | 0.8 | 0.48 | 0.64 | 0.64 | 0.48 | 0.48 | 0.48 | 9.36 | 0.550 | 0 | 0 |
| Inaccurate project program | 0.48 | 0.36 | 0.36 | 0.8 | 0.36 | 0.48 | 0.4 | 0.6 | 0.64 | 0.64 | 0.8 | 0.48 | 0.64 | 0.64 | 0.48 | 0.48 | 0.64 | 9.28 | 0.545 | 0.11 | 0.20 |
| Design Risks | | | | | | | | | | | | | | | | | | | | | |
| Not | 0.8 | 0.3 | 0.3 | 1 | 0.6 | 0.8 | 0. | 0. | 0.6 | 0.6 | 0.6 | 0.4 | 0.3 | 0.3 | 0.8 | 0.8 | 0.4 | 10.4 | 0.614 | 0.22 | 0.36 |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| coordinated design | | 6 | 6 | | 4 | | 6 | 6 | 4 | 4 | 4 | 8 | 6 | 6 | | | 8 | 4 | | | |
| Inaccurate quantities | 0.8 | 0.36 | 0.36 | 0.64 | 0.64 | 0.8 | 0.6 | 0.6 | 0.64 | 0.64 | 0.64 | 0.64 | 0.36 | 0.48 | 0.8 | 0.8 | 0.64 | 10.52 | 0.618 | 0.11 | 0.18 |
| Lack of consistency between bill of quantities, | 0.8 | 0.36 | 0.36 | 0.64 | 0.64 | 0.64 | 0.6 | 0.6 | 0.64 | 0.64 | 0.64 | 0.64 | 0.64 | 0.48 | 0.8 | 0.8 | 0.64 | 10.64 | 0.625 | 0.11 | 0.18 |
| Awarding the design to unqualified designers | 0.8 | 0.36 | 0.36 | 0.64 | 0.64 | 0.64 | 0.6 | 0.4 | 0.48 | 0.64 | 0.64 | 0.64 | 0.64 | 0.36 | 0.8 | 0.8 | 0.64 | 10.08 | 0.592 | 0.11 | 0.19 |
| Rush Design | 0.8 | 0.64 | 0.64 | 0.64 | 0.48 | 1 | 0.5 | 0.6 | 0.48 | 1 | 0.64 | 0.64 | 0.64 | 0.48 | 0.8 | 0.8 | 0.36 | 11.16 | 0.656 | 0.31 | 0.47 |

Ranking of Risks

| S.No | Risks | Index Score | Rank order |
|---|---|---|---|
| 1 | Change of government policy | 0.797 | 1 |
| 2 | Change of government | 0.795 | 2 |
| 3 | New governmental acts or legislations | 0.762 | 3 |
| 4 | Attitudes of participants | 0.736 | 4 |
| 5 | Financial failure of the contractor | 0.7 | 5 |
| 6 | Errors in design drawing | 0.68 | 6 |
| 7 | Communication | 0.663 | 7 |
| 8 | Rush Design | 0.656 | 8 |
| 9 | Fire | 0.64 | 9 |
| 10 | Inexperience when pricing tender | 0.64 | 9 |
| 11 | Labor shortages | 0.63 | 10 |
| 12 | Damage to structure | 0.63 | 10 |
| 13 | Labour injuries | 0.63 | 10 |
| 14 | Unmanaged cash flow | 0.63 | 10 |
| 15 | Loss due to fluctuation of interest rate | 0.632 | 10 |
| 16 | Insurances risks | 0.637 | 10 |
| 17 | Lack of consistency between bill of quantities | 0.625 | 11 |
| 18 | Material shortage | 0.628 | 11 |
| 19 | Not coordinated design | 0.614 | 11 |
| 20 | Inaccurate quantities | 0.618 | 11 |
| 21 | Inadequate specification | 0.604 | 12 |
| 22 | Incomplete design | 0.604 | 12 |
| 23 | Labor shortages | 0.609 | 12 |
| 24 | Labour productivity | 0.609 | 12 |
| 25 | Difference in actual and contract executed quantities | 0.602 | 12 |
| 26 | Supplies of defective materials | 0.607 | 12 |
| 27 | Varied labor and equipment | 0.609 | 12 |
| 28 | Payment delays | 0.602 | 12 |
| 29 | Any impact on the environment due to the project | 0.602 | 12 |
| 30 | Any impact on the environment due to the project | 0.604 | 12 |
| 31 | Design changes | 0.597 | 13 |
| 32 | Change in bank formalities and lenders | 0.592 | 13 |
| 33 | Awarding the design to unqualified designers | 0.592 | 13 |
| 34 | Unknown site conditions | 0.588 | 14 |

| | | | |
|---|---|---|---|
| 35 | Poor communication between parties involved | 0.585 | 15 |
| 36 | Monopolizing of materials due to closure and other unexpected | 0.585 | 15 |
| 37 | Any adverse impact on project due to climatic conditions | 0.585 | 15 |
| 38 | Low market demand | 0.585 | 15 |
| 39 | Lower quality of work | 0.581 | 15 |
| 40 | Investigation Change in scope | 0.581 | 15 |
| 41 | Equipment failures | 0.571 | 16 |
| 42 | Natural Disasters | 0.576 | 16 |
| 43 | Exchange rate fluctuation | 0.576 | 16 |
| 44 | Construction procedures | 0.574 | 16 |
| 45 | Industrial disputes | 0.583 | 17 |
| 46 | Incompetence of transportation facilities | 0.567 | 18 |
| 47 | Weather implications | 0.567 | 18 |
| 48 | High competition in bids | 0.55 | 19 |
| 49 | Changes in management ways | 0.545 | 20 |
| 50 | Inaccurate project program | 0.545 | 20 |
| 51 | Ambiguous planning due to project complexity | 0.531 | 21 |
| 52 | Information unavailability | 0.529 | 22 |
| 53 | Resource management | 0.529 | 22 |
| 54 | Undefined scope of working | 0.529 | 22 |
| 55 | Rush bidding | 0.527 | 22 |
| 56 | Unavailable labour, materials and equipment | 0.527 | 22 |




## VI. CONCLUSION

Risk management technique seldom utilized by the participants in the construction comes. The participants accustomed to handle the risks with a casual approach. This method isn't used due to less data and awareness among the development business. The danger management technique ought to be applied into any construction project at the initial stage of the project to induce most advantage of the technique. Hence, there's thriving have to be compelled to have a well-documented procedure

that ought to be a one stop answer to any or all hazards that are seeming to occur throughout the project life cycle. There ought to be the additional wholesome approach towards risk management rather than the current irregular approach towards the risks. This research examines the Monte Carlo simulation method and its uses in various fields, focusing primarily on its use in the field of project management. Monte Carlo simulation becomes more popular in project management, more creative studies will propose practical, applicable improvements to current practices and continue to contribute positively to the field. Monte Carlo simulation, once the Monte Carlo simulation technique is thoroughly explained and demonstrated, hands-on experience will allow project managers to realize that the statistical knowledge they are required to apply is quite minimal, and the tools are relatively easy to use once their project network and schedule have been created.

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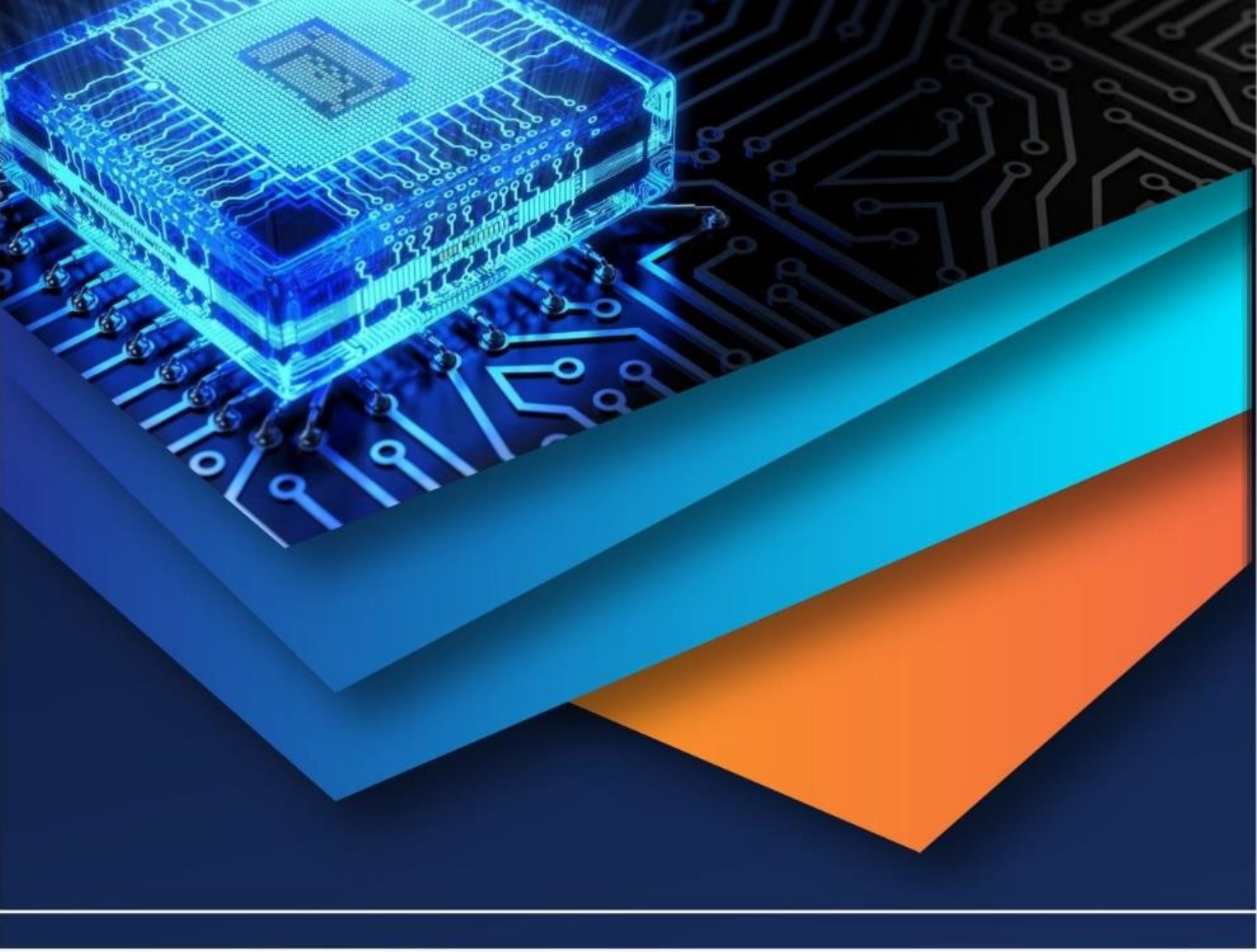

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