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Risk Management in Construction

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ABSTRACT: In any country, infrastructure development will increase the growth of countries economy and generates the large amount of job opportunities. Hence those projects involve a large amount of investment to carry out. In view of that, if any sort of wastage (either time, resources etc) occurs that would lead to the huge monetary losses. These losses occur due to various risks associated with such mega projects. Consequently, these risks play a crucial role for the completion of project within the time schedule and planned budget. In this connection, this study mainly discusses the critical risk factors and its assessment techniques through comparative study of various international construction projects. About 50 relevant articles published over the last 25 years have been reviewed. The review resulted that a simple analytical tool will be developed for each project task to assess the risk easily and quickly, which will encourage the practitioners to do the risk analysis in their project. This review concluded that the earlier risk identification in the project and assessment during the bidding stage of the construction project will lead to the better estimation of the escalation on cost and time overruns.

KEYWORDS: Risk factors, RII, Risk analysis, weighted mean

I. INTRODUCTION

In India, construction industry is one of the important & fastest growing industries, employing large number of people on worksite involved in wide range of activities subjected to the chances of encountering occupational health risk to the workforce involved. Many workers suffer various occupational injuries/hazards at the construction work sites starting from mild to as serious as fatality. The construction companies are incurring lot of loss in terms of monetary and manpower. Assessing occupational risk is found reported at various important major projects and now with increased awareness, the construction field is no exception. Although, these practices have become mandatory for major construction projects in developed countries, the idea to assess risk at major construction project has just reported practicing at few major construction projects in India. But with fast urbanization and with application of complex modern technique, the need for risk assessment at every major project is demanded. Efforts are focused towards finding solution to assess risk at construction projects. Recently, many researchers are working towards solutions in the field of occupational health risk assessment. Lack of data or system is reported specially for determining occupational health risk assessment for construction activities in Indian condition.

1.1 RESEARCH OBJECTIVES:

The construction industry is recognized to be highly prone to risks and is characterized to be very complex, dynamic, and unique where uncertainties arise from various sources. The main objective of this research was to identify the factors affecting occupational health risk during construction process & to assess the risk during different construction activities.

1. The construction industry, perhaps more than most, is overwhelmed by risk.
2. Too often this risk is not dealt with satisfactorily and the industry has suffered poor performance as a result.
3. Infrastructure projects being huge in nature and involving a large amount of money, any sort of wastage (either time, resources etc) would lead to huge monetary losses. The losses are due to various risks associated with such mega projects
4. These risks are to be identified and mitigated to avoid the losses. This entire process of risk identification and mitigation is termed as risk management..

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1.2 The scope of the work mainly includes the following:

1. Identification of incidences relating health risk due to construction activities as well as identification of factors responsible for accidents/health risk etc. on construction site.
2. Design of questionnaire to obtain opinions of the experts in this field.
3. Conduct field survey for identification of important factors and to collect data through personal communication and analysis of data to calculate the weights of each criterion and ranking according to its importance using Relative Importance Index.
4. Also finding the risk events occurring activities with the help of weighted mean method
5. Finding the solutions for highest risk causing factors and highest risk occurring activities

1.3 METHODOLOGY:

The first phase of the research thesis proposal included identifying and defining the problems, establishing the objectives of the study and developing the research plan. The second phase included reviewing the literature related to risk assessment, health risk and risk management. The third stage was developing the questionnaire to investigate the risk factors that causes the health risk as well as the activities which causes the more occurrences of risk events.

Fourth phase includes the statistical analysis for questionnaire was done by using relative importance index (R.I.I.) and weighted mean method. Discussion for the obtained results was also made. The fifth phase was finding out the remedial measures for the risk factors and activities based on the results obtained from the field survey and literature review. Finally in the last phase i.e. phase six conclusions of research and recommendations were drafted.

II. DATA MEASUREMENT

3.4.1. DATA ANALYSIS

Data measurement for finding the risk factors

Data collected from experts in the form of questionnaires are firstly analyzed by using Relative Importance Index method.

Relative Importance Index

Relative Importance Index method helps to determine the relative importance of the each factors affecting to occupational health risk. Then five-point scale consist of,

- 1 - very low impact
- 2 - Low impact
- 3 - Average impact
- 4 - High impact
- 5 - Very high impact

After giving the basic information to the expert personal, the questionnaire was handed over to the experts. These experts personal were from various groups, various firms but having experience at least more than 2 years. In this study, the average experience of the personal was 5 years.

Data is obtained from experts, processed it & converted it to relative importance indices (RII) for each factor as follows:

$$R.I.I. = \frac{5n_5+4n_4+3n_3+2n_2+1n_1}{5(n_5+n_4+n_3+n_2+n_1)}$$

Where,

1, 2, 3, 4, 5, etc. are rating scale,

n1, n2, n3, n4, n5, etc. are no. of respondents.

E.g. For lazy movements due to lack of training

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$$R.I.I. = \frac{(5*6) + (4*9) + (3*1) + (2*0) + (1*0)}{5(6+9+1+0+0)}$$

R.I.I. = 0.8625

3.4.2. Weighted mean

Weighted mean method is used to analyze probability values taken from experts' responses

$$P_{mean} = \frac{\sum(P_i \times n_i)}{\sum n_i}$$

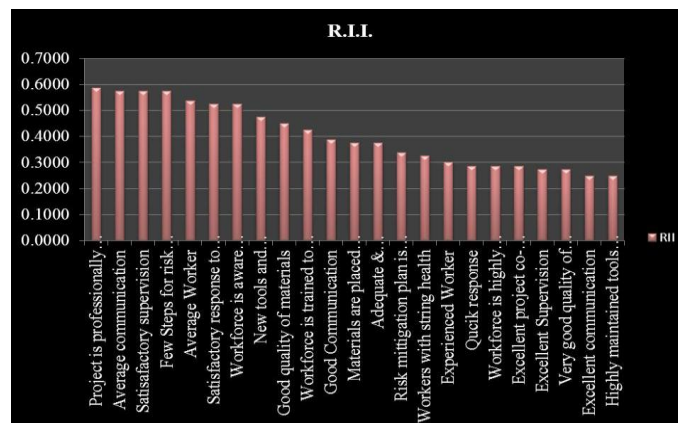
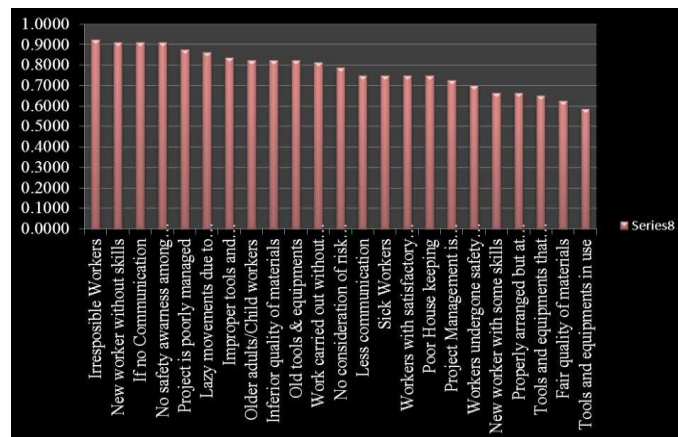
Where,

P_{mean} – Weighted mean probability

P_i – probability

n_i – no. of respondents

Result of first questionnaire:



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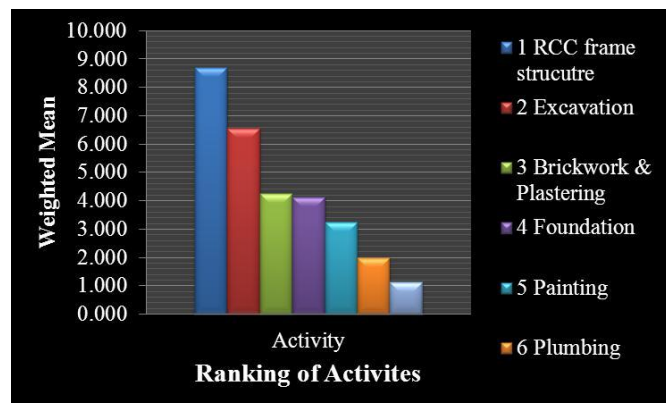
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Top ten risk factors:

SR. NO.	FACTORS	RII
1	Irresponsible Workers	0.9250
2	New worker without skills	0.9125
3	If no Communication	0.9125
4	No safety awareness among the workers	0.9125
5	Project is poorly managed	0.8750
6	Lazy movements due to lack of training	0.8625
7	Improper tools and Equipments	0.8375
8	Older adults/Child workers	0.8250
9	Inferior quality of materials	0.8250
10	Old tools & equipments	0.8250

Result of second questionnaire:

Graphical Representation of Ranking of activities:



Top three risk causing activities:

SR. NO.	ACTIVITY	WEIGHTED MEAN
1	RCC frame structure	8.688
2	Excavation	6.563
3	Brickwork & Plastering	4.250

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III. SUGGESTIONS

Recommendation for further study is that use of software for more accurate ranking and a proper interlinking of risks and activities.

MONITORING AND REVIEW

Monitoring and review help in linking risk management, a continuous monitoring is an important part in projects. A risk watch list should be maintained by the project manager to contain a list of major risks that have been taken and provided with a treatment plan.

Process:

The risk watch list contains all Extreme and High risks and will be updated during the overall process.

Meeting Agenda for Risk Monitoring:

- The progress and effectiveness of the treatment plan will be taken care prior to making an Action Plan.
- The risks classified as Extreme, High can be removed after performing the risk reduction treatments and the register can be updated.
- If any medium or low risks have been changed in status, then the risk register can be updated in place of the extreme and high risks that have been removed after applying the treatment plans.
- New Risk Management Strategies are made to overcome the general issues in the project.

1.Updating the Risk Register:

The risk register database is the main tool used for the process. It has all the risks prioritized based on their RPN. It also keeps the note of the person responsible to take care of the risk. Keeping it up to date is the responsibility of the Project Manager. The status of risks is reviewed regularly, and the action plans are made.

2.Communication and Reporting

- There are many reasons for communicating and reporting the outcomes of a risk management study. The different types of communication and reporting methods are mentioned below
- Communication within the project team.
- Communication with an owner or client.
- Communication with the providers of finance and insurance support.
- Accountability and auditability.
- Information source for future projects.
- Record for post-implementation project evaluation.

Proper communication and reporting makes an important contribution towards the planning processes as mentioned below:

- Risk management planning for the key stakeholders.
- Tactical risk action planning.
- Justification for spending money now or taking a course of action.
- Communication between the project team and the contractors or suppliers.
- Control of risk and risk management activities.

3.Reports

The large and risky projects require proper risk reporting system. The summary of the main risks, risk treatment plans, responsibilities and anticipated outcomes may provide an adequate basis for reporting. This may be in the form of a summary risk report. For major projects, more extensive reporting may be required on a periodic basis or at key milestones.

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IV. CONCLUSION

In this project more effort was given to find out the basic risks factors and risk occurring activities. After finding the risk factors, their ranking was done. So that it will give idea about the factors causing the highest risk during construction. Similarly by making of ranking of activities which causes the more occurrences of risky events, we will come to know the activities which cause more risky events. As suggested above, if proper solutions are find out to mitigate these risk factors and activities then management will be able to complete that particular projects with effectively and by taking proper precautions regarding the health of their workers.

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