An Empirical Study of Safety Management in Construction Industry using (Relative Importance Index) Method

Chilamkuri Vasudha, D Satish Chandra, S.S. Asadi

Abstract: ***A Risk, high or low, is a chance which can hamper the growth of an organization and construction industry is no exception. Every construction project needs to implement efficient construction project management techniques for successful completion of work, and no such technique will be complete unless it addresses the various types of risks like Labor, Financial, Logistic, Socio-political, Environmental and Health & Safety risk etc. Keeping these risks in view, a questionnaire is prepared and distributed among different scale of construction companies so that data can be obtained from different levels of project management employees such as Labor Contractor, Engineer, Middle-level management & High-level management. Results obtained through questionnaires were analyzed using RII (Relative importance index), an empirical method and priority of risks were arranged according to Relative importance index in project management. The preventive and safety measures are taken at different stages in order to reduce risk in CPM.***

Index Terms: - Risk, construction project management, Relative importance index (RII), safety.

I. INTRODUCTION

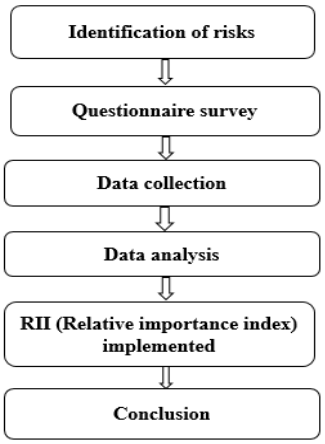
Now a days in India construction and infrastructure development projects are being carried out with rapid speed. During progress of construction, the project faces many risks from different categories such as labour, health&safety; contractor related and change in order. Especially labour related risks, be it resulting from fatal accidents are procuringlabour with training and skill (particularly on PPE, handling tools) throw significance challenge for construction managers in the course of project completion. Furthermore, various studies have shown that lack of friendly communication between workers and contactor has negative effect on the project, while good attitude of the workers help the organization to minimize the risks to zero level in these areas [1]By using BIM (Building information modeling) software in construction sites the health & safety issues and several problems are easily identified. [2]Explained that behavior of every employee is most important factor to consider in construction industry their behavior towards safety also matters a lot. [3]Suggested to collect data from contractors in major type of construction and known organizational safety policy's, training meetings, inspection, incentives, penalties equipment etc. Concluded by providing at set of recommendations and strategies for contractors to improving the safety in construction industries.[4]says that by using sound education, training labour and conducting awareness program on site helps for occupational safety in construction industry.[5]told that the paper helpful to identify hazard substances in building materials ,to avoid public health issues by getting knowledge on building materials help to adopt health & safety environmental industry.

II. RESEARCH SIGNIFICANCE

The main objective of the project is to find out risks faced from different categories during various stages of the construction work. Ranking the risks according to priorities so that, appropriate management techniques can be laid out to deal with those risks.

III. DESCRIPTION OF WORK

A. Methodology Owned For This Paper



Flow chart 1: methodology

The above flow chart 1 Explains about the methodology, and Step by step process followed for this paper**.**

This paper identified various types of risks like Labor, Financial, Logistic, Socio-political, Environmental and Health & Safety risk etc. Based on this different risks questionnaire survey is conducted with 50 questions and distributed to different categories of employees in construction industry. Eproxmatly 12 responses are taken in to consideration. With this data collection analysis was

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made by using RII (Relative Importance Index) method. According to the results obtained, this paper is concluded with required mitigation measures.

B. Data Collection

For the sake of data collection questionnaire survey with 50 questions had been used to collect data from different people who are employed as construction managers. 12 respondents are chosen from different organizations based on the size of the company like (ManjeeraMonarch, Sadhanaconstructions, Dolphin shelter Pvt.Lt, Sri ramasai constructions, Sri Balaji constructions)etc., and scale of the projects so that the data gathered gives broader picture in understanding the significance and prioritizing risks. Range of responses include employee designations such as Contractors, Engineers, Proprietors, Middle-level and High-level management employees. The questionnaire has been further drilled down to group risk significance pertaining to areas like Contractor, Health & safety, Labour and Change-In-Order that are faced by the people responsible for day to day operations for successfully completing the project.

A sample question in questionnaire survey from the category of Labour risk is given below:

Example:

Shortage of Skilled Labours

Yes☐No☐ 1☐ 2☐ 3☐ 4☐ 5☐

Very strongly preferred	(5)
Strongly preferred	(4)
Moderately preferred	(3)
Less preferred	(2)
Very less preferred	(1)

All the responses from the respondents have been used to find out the relative importance value by using the below mentioned formula:

RII = ∑W/A*N

RII= (5n5 + 4n4 +3n3+ 2n2+ 1n1) /A*N

Here ∑W represents = $5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1$

Where, (1-5) is Scale value n_1, n_2, n_3, n_4, n_5

A = Highest possible weight given as a response

N = Number of respondents

Table 1: Explains about Labour related risks

S.no	Factors causing risk
1	Shortage of skilled labour
2	Increase in labour cost
3	Poor selection of site
4	Delay in work approvals
5	Lack of proper training

Table 2: Explains about Change In order risks

S.no	Factors causing risk
1	Declining sales
2	Inflation risks
3	Mobile change order
4	Technical risks
5	Raising interest rates

Table 3: Explains about Contractor risks

S.no	Factors causing risk
1	Supply chain risks
2	Operational risks
3	Political risks
4	Certified Contractors
5	Lack of Quality

Table 4: Explains about Health and safety risks

S.no	Factors causing risk
1	Material handling problems
2	Moving objectives risks
3	Lack of machine maintenance
4	Lack of monitoring
5	Hand & Vibration syndrome

IV. DATA ANALYSIS

Relative importance index (RII): Relative importance index method is calculated to each and every question & rating is given accordingly.

Where formula is

RII = ∑W/A*N

∑W$(5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1)$

Where, (1-5) is Scale value n_1, n_2, n_3, n_4, n_5

A = Highest possible weight given as a response=5

N = Number of respondents= 12

RII = ∑W/A*N

RII=∑W (5(2) + 4(7) +3(3) + 2(0) + 1(0)) / 5×12

=10+28+9+0+0/60

=0.783

Here are

Table 5: Explains about Labour related risks and their Relative importance index method (RII) values

S.no	Factors causing risk	RII Values
1	Shortage of skilled labour	0.783
2	Increase in labour cost	0.766
3	Poor selection of site	0.216
4	Delay in work approvals	0.65
5	Lack of proper training	0.56

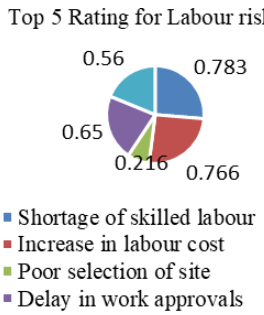

Figure 2: This Pie chart shows about the top 5 rating for labour risk.

Table 6: Explains about Change In order risks and their Relative importance index method (RII) values

S.no	Factors causing risk	RII Values
1	Declining sales	0.633
2	Inflation risks	0.416
3	Mobile change order	0.355

4	Technical risks	0.333
5	Raising interest rates	0.266

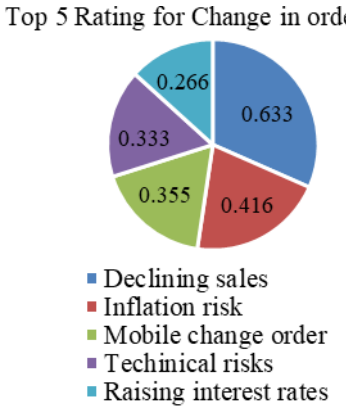

Figure 3:This pie chart shows about top 5 Rating for change in order risk

Table 7: Explains about Contractor risks and their Relative importance index method (RII) values

S.no	Factors causing risk	RII Values
1	Supply chain risks	0.966
2	Operational risks	0.866
3	Political risks	0.816
4	Certified Contractors	0.633
5	Lack of Quality	0.383

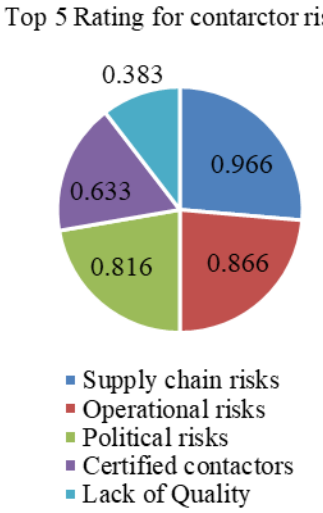

Figure 4: This pie chart shows about the top 5 rating for contractor risk.

Table 8: Explains about Health and safety risks and their Relative importance index method (RII) values

S.no	Factors causing risk	RII values
1	Material handling problems	0.733
2	Moving objectives risks	0.516
3	Lack of machine maintenance	0.383
4	Lack of monitoring	0.366
5	Hand & Vibration syndrome	0.333

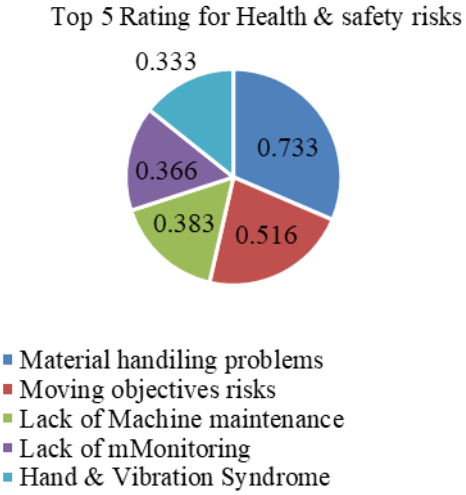

Figure 5: This Pie chart shows about the top 5 rating for Health & Safety risk.

V. RESULTS AND DISCUSSIONS

Table 5,6,7,8 shows the factors related to Labour risk, change in order risk, contractor risk, and Health and Safety risk with their relative importance index method RII values. Figures 2,3,4,5 represent individual rating for above risks.

Overall data analysis shows risks arising from Labour and Contractor categories are shown in figure 2 and 4 respectively poses a significant challenge for construction companies in order to successfully complete the projects. The highest RII (Relative importance index) method values shown in figure 2 and 4 for these two categories shows that projects can be impacted irrespective of size and scale of operations.

VI. CONCLUSIONS

During the survey difference in management has been observed based on the size of the company and scale of operations. Big company like AMARAJA Infrastructure is implementing higher effective methods for Labour and Health & Safety through specifically designed programs like JSC and TBT

JSC:

JSC provides information like PPE, Safety belts, Helmets, Protective glasses, Gloves, Hard Shoes. Irrespective of workers knowledge of safety, this program aims for daily routine on each individual for safety precautions especially PPE equipment.

TBT:

The talk cover the points like how to use each and every manual and electric tool properly which results in clarifying doubts and avoiding delays due to accidents during works.

REFERENCES

1. G. Abdulkadir and A. J. Godfaurd, "Integrating Building Information Modeling and Health and Safety for Onsite Construction," *ELSEVIER*, vol. 6, no. 2015, pp. 39-45, 2015.
2. J. k. Malgorzata, S. Katarzyna and S. Marek, "Behaviour based interventionfor occupational safety-case study,"

3. S. T and L. R, "Safety Management Analysis In Construction Industry," *Journal of Engineering Research and Applications*, vol. 4, no. 6, pp. 117-120, 2014.
4. K. Maria and S. Zuzana, "Multimedia Educational programs for improvement of occupational safety awareness in construction industry," *ScienceDirect*, vol. 106, no. 2013, pp. 1866-1875.
5. S. A. Sabarinah, I. Zarina, Y. Zaharah and M. S. Mustapha, "Knowledge Sharing of Research Information for Construction Health and Safety Practices," *ScienceDirect*, vol. 105, no. 2013, pp. 239-248, 2013.

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