Assessing Safety Measures In High Rise Residential Building

Mayur R. Patil
Dept of Construction Engineering and Management
G.H.RAISONI UNIVERSITY, AMRAVATI (MH) INDIA

Abstract- *Construction is one of the most dangerous industries in the country. The rapid growth in high-rise buildings has resulted in an increase in deaths and injuries. People dropping from heights and being hit by falling objects are the most common deaths in the building industry. This study aims to figure out what causes high-rises building construction site injuries and how to avoid them. The research aids in explaining the causes of injuries and determining areas where preventative steps can be taken. The aim is to help managers be more mindful of how to prevent workplace accidents. Construction is a high rise industry but there have been significant reductions in the number and the rate of injury over the last 20 years. This study will try to put the safety management in construction project as one of the important elements to project performance and success. The study will focus on construction project and will emphasize on awareness and the importance of safety management.*

Keywords- Fire safety, Residential buildings, Risk management, Safety design.

I. INTRODUCTION

High rates of accidents and fatalities had tarnished its reputation and image. Globally, the construction industry is still considered as one of the most hazardous industries. Both the society and economy have suffered human and financial losses as a result of the poor safety performance. According to Khalid (1996), good safety programs would certainly help in reducing injuries at construction site. It will also minimize construction costs, increase productivity and profitability and more importantly it could save lives of workers.

Falling from a high place on a construction site is not a fatal accidents at times, it is a common occurrence. Accidents above ground level are caused by negligence of works by scaffolding, by machinery, by plants. The use of faulty materials, negligence, inefficiency in the construction of scaffolding causes more and more accidents due to scaffolding. Subcontractors are generally unaware of safety at the construction site. Poor coordination, lack of proper instruction, misunderstandings in work practices can all lead to accidents in construction. The poor housekeeping in the workplace can be considered as a risk factor for occupational injuries. Working without personal safety equipment can greatly increase the chances of an accident. Some workers feel uncomfortable wearing PPE and feel that their work is indirectly reduced.

In India, tall buildings are developed in accordance with laws and standards of the National Buildings Code for structural safety. These are considered safe to resist the specific intensity of an earthquake. Some parts of India are in the seismic zone. Builders and structure safety officers have made sure that these constructions are being carried out according to set standards. The fire safety of buildings depends not only on the safety and evacuation measures of the project management agency placed by the developer and to manage the building.

OBJECTIVES-

1. To study the rules and regulations of safety in high rise residential buildings.
2. Identify the factors affecting improper safety management on construction site.
3. Evaluate the factors affected to the employees by analytical method.
4. To identify the current practices of safety management by a construction company
5. To suggest the findings for improper safety management.

SCOPE-

1. To reduce the risk of labour life during construction by proper usage of personal protective equipment.

2. To reduce the accident rate by implementing safety measures and technique.

II. OVERVIEW ON LITERATURE REVIEW

The construction industry has long been considered to have high injury and fatality rates. Many of these work-related deaths and injuries are preventable. As Williams (2000) advised, site safety should be enhanced since construction projects have become more complicated in recent times. It is crucial to promote safe construction and to

reposition the management role in safety practices. If safety performance can be enhanced, companies would benefit through improved performance. Human performance is arguably linked with safety (Bottani et al., 2009). Human errors are one of the major underlying causes of industrial accidents, and are perhaps the core component of various safety problems in high rise facilities. The study suggests workers who are distracted by physical hazards or mental diversions are at increased risk of accidents. The research shows that workers in construction sites are more at risk of being distracted by mental distractions as well as physical hazards such as physical and mental distractions. The report concludes that safety management is the key to preventing accidents at construction sites. One school of thought has established the Accident Causation Theory, which pinpoints the importance of error identification in accident prevention. Mitropoulos and Cupido (2009) suggest that production practices can prevent production errors.

III. METHODOLOGY

The project format follows the conceptual phases of literature review, factors affecting safety management, methodology development, data collection, and analysis.The data studied were used to draw further conclusions. The following chapters are included in the project:

1. The first chapter is an introductory part consists of introduction to topic, objectives of study, and organization of project.
2. The second chapter deals with Literature Survey.
3. The third chapter deals with methodology of project in which procedure of work and steps are mentioned.
4. In fourth chapter expected result is stated.
5. In fifth chapter conclusion is made and findings are suggested.

3.1 FACTORS AFFECTING IMPROPER SAFETY MANAGEMENT IN CONSTRUCTION INDUSTRY:

3.1.1 SAFETY TRAINING:

Protection preparation is one of five high-impact zero-accident techniques identified by the CII (1993) report. According to Hinze and Wilson (1999), all of the respondents in their study agreed that workplace preparation is critical for improved safety performance.

3.1.2 SAFETY INSPECTIONS:

Safety inspections are the most common method of enforcing safety on the job. Health checks, according to Hinze and Gambatese (2003), are one of the means for project managers and site administrators to learn about the essence of the site's safety conditions. According to Toole (2002), in order to successfully implement jobsite protection, the agency must be able to track the work on a regular basis. According to Wong et al. (1999), safety performance is affected by safety security reporting. According to Jaseliks et al. (1996), site protection checks could be increased. According to their findings, companies with better safety records completed more site safety checks than companies with worse safety standards.

3.1.3 SAFETY INCENTIVE AND PENALTIES:

According to Hinze and Wilson (2000), the aim of rewards is to provide positive reinforcement of desired behaviour. Safety incentives are intended to affect worker behaviour by promoting and rewarding safer worker efficiency. Safety rewards are one of the top five high-impact zero strategies, according to CII (1993). According to Hinze and Gambatese (2003), among the different forms of protection measures that businesses use to encourage worker safety, safety rewards are the most commonly introduced.

3.1.4 COMPLIANCE WITH SAFETY LEGISLATION:

In order to improve safety performance, a standard checklist is used to conduct the audit. This checklist included those items which are compliance to Occupational Safety and Health Act and Factories and Machinery Act and perceived to be important from the safety point of view (Shuratman Z. et al., 2007). These are the Occupational Safety and Health management, safety committee, machinery, scaffolding, working at height, public safety, workers quarters, storage facilities, formwork, excavation and shoring, personnel protective equipment, platform, floor opening, edge of open floor, access and egress, electrical safety, cleanliness, health and welfare, piling and demolition.

3.1.5 LABOUR TURNOVER RATES:

To improve safety performance, Harper and Kohen (1998) recommend reducing labour turnover rates. Hinze and Gambatese (2003) examine the relationship between labour turnover rates and safety record. Hinze and Gambatese (2003) study results show that higher turnover rates are associated with higher injury rates. Consequently, construction contractors are advised to decrease their labour turnover in order to improve their safety performance.

3.1.6 WORKERS' ATTITUDE TOWARDS SAFETY:

Aksorn and Hadikusumo (2008) indicate that attitude is a tendency to respond positively and/or negatively to certain persons, objects or situations. Individuals are different in their perception of risks and willingness to the risks. Successful safety programs can be achieved if the positive attitudes of employees towards safety are improved.

3.2 METHOD

3.2.1 PILOT SURVEY:

A pilot survey, also known as an exploratory survey, is a small-scale methodological evaluation designed to guarantee that proposed techniques and processes will work in practise before being included in a massive and costly study. It is a survey that is normally conducted prior to the main survey in order to gather details in order to increase the main survey's reliability. For example, determining the time it takes to complete the questionnaire or determining the most appropriate size of the sampling device, a pilot survey allows the surveyor to make changes, modifications, and warn the surveyor to any problems that were not expected during the survey proposal stage. To explain and improve the questionnaire, a pilot test will be provided to the same community of construction professionals. After integrating their feedback, a final questionnaire would be created and used to collect responses from the respondents. The questionnaire may be divided into three sections: questions about the respondents' backgrounds, reasons causing poor safety management in the construction industry, and existing safety management practices in construction projects.

3.3 DATA COLLECTION:

The aim of the data collection is to collect data on construction project safety management. Qualitative research and observation will be used to gather evidence, with the aim of evaluating the theory presented with the target. The data is gathered in a variety of ways, including:

3.3.1 QUESTIONNAIRE:

Since their comments are confidential, people are more honest when reacting to questionnaires on sensitive subjects in particular. The questionnaire survey will be conducted online mode.

3.4 EVALUATE BY ANALYTICAL METHOD:

After the data processing is completed, the data will be analyzed. All of the information gathered by the questionnaires will be analysed and summarized in order to arrive at an acceptable and appropriate conclusion for protection management in building projects. Information processing is a method of de-synthesizing the information gathered. It is a method of putting statistics and figures together to address questions, as well as a structured mechanism of using evidence to arrive at a response to a query. The Relative Importance Index (RII), Average Index Formula, and Cronbach's Alpha (using SPSS Software) methods are used to analyse the survey. The scores were then converted to significance indexes using the method below.

3.4.1 RELATIVE IMPORTANCE/DIFFICULTY INDEX:

The relative Importance Index (RII) is calculated to get the rank of the factors and the importance of safety in construction project.

Relative importance/difficulty index = $\sum W/AN$.

Where *w* is the weighting given to each factor by the respondents, ranging from 1 to 5, *A* is the highest weight (i.e. 5 in the study) and *N* is the total number of samples.

3.4.2 AVERAGE INDEX FORMULA:

The analysis was based on the qualitative measurement or ranking system. Rating for the questionnaire is 1 – Totally Disagree, 2 – Disagree, 3 – Moderately, 4 – Agree, 5 – Totally Agree.
The Average Index Formula:

Average Index (AI) = $\sum (\beta \times n)/N$

Where,

ß is weighing given to each factor by respondents
n is the frequency of the respondents
N is the total number of respondents
With the rating scale as below (Majid & McCaffer, 1997)

a) 1 = Never/Totally disagree (1.00 < Average Index < 1.50)

b) 2 = Rarely/disagree (1.50 < Average Index < 2.50) c) 3 = Sometimes/Neutral (2.50 < Average Index < 3.50)
d) 4 = Often/agree (3.50 < Average Index < 4.50)
e) 5 = Very often/strongly agree (4.50 < Average Index < 5.00)

3.4.3 CRONBACH'S ALPHA USING SPSS SOFTWARE

Cronbach's alpha is the most common measure of internal consistency ("reliability"). The Cronbach's alpha

coefficient is an internal consistency reliability test. The Cronbach's alpha coefficient value is ranged between 0.0 and +1.0 and Cronbach's alpha value nearer to 1 show higher internal consistency.

Obtaining Cronbach's alpha:

Analyzed- Scale- Reliability analysis

IV. RESULTS

5.1 RESULTS

5.1.1 PILOT SURVEY

The pilot survey has been done throughout all of the professional engineers either in the academic, construction or consultancy industry. After obtaining and analyzing the results of the pilot survey, logistical, technical and other issues or problems have been addressed. The questionnaire format was revised, or the type of survey had been altered into a more suitable one. After the revision of the survey being made, the large-scale of the survey is executed.

5.1.2 QUESTIONNAIRE SURVEY

The questionnaires survey has been done included the client, consultant, contractor, and companies, and feedback was received. General Information, Importance of Safety Management in Construction Projects, and Current Practices of Safety Management in Construction Projects are the three sections of the questionnaire.

5.2 RESULT OF RELATIVE IMPORTANCE INDEX, AVERAGE INDEX FORMULA AND CRONBACH'S ALPHA USING SPSS SOFTWARE.

5.2.1 FACTORS AFFECTING IMPROPER SAFETY MANAGEMENT IMPLEMENTATION IN CONSTRUCTION PROJECT.

Rank	Factors	Relative Importance Index (RII)
1	Labour turnover rates	0.91
2	Compliance with safety legislation	0.89
3	Safety incentives and penalties	0.85
4	Worker'sattitude towards safety	0.85
5	Safety inspections	0.85
6	Safety training	0.81
7	Availability of safety equipment	0.81
8	Safety meeting	0.81
9	Organization	0.81

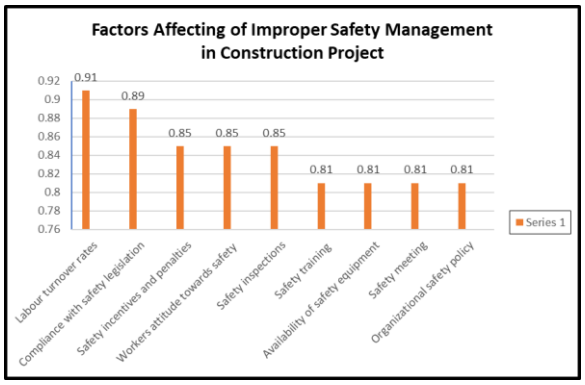

Chart 1: Factors affecting Improper Safety Management Implementation

5.2.2 CRONBACH'S ALPHA USING SPSS SOFTWARE

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.911	0.895	27

Figure 1 Reliability Statistic

5.2.3 CURRENT PRACTICE OF CONSTRUCTION SAFETY MANAGEMENTAT THE CONSTRUCTION SITE

Table 2 Current Practice of Construction Safety Management at the construction site based on ranking:

Rank	Current Practices of Safety Management	Average Index
1	A safety and health officer is employed to ensure the safety of the site	4.56
2	Any accident is notified to the nearest Department of safety and health.	4.45
3	All hoisting machinery such as mobile crane possessed a valid certificate of fitness from the Department of Occupational Safety and Health.	4.35
4	Safety signboards at workplace is put at the construction site	4.22
5	Job safety/ hazard analysis (JSA/JHA) is practiced at construction site.	4.22
6	The formwork braces and other supports is inspected by the designated person.	4.22
7	Scaffold is erected and dismantled under supervision of a designated person.	4.22
8	The workers wear proper PPE at the construction site.	4.11
9	Safety tool box is conducted daily.	4.00
10	HSE policy is published to all worker.	4.00
11	DOSH guideline is briefed to all employee.	3.76
12	Safety awareness campaign is conducted by the company.	3.69
13	Emergency response plan is used at the site.	3.57
14	Safety Management System (SMS) is established by the company.	3.45

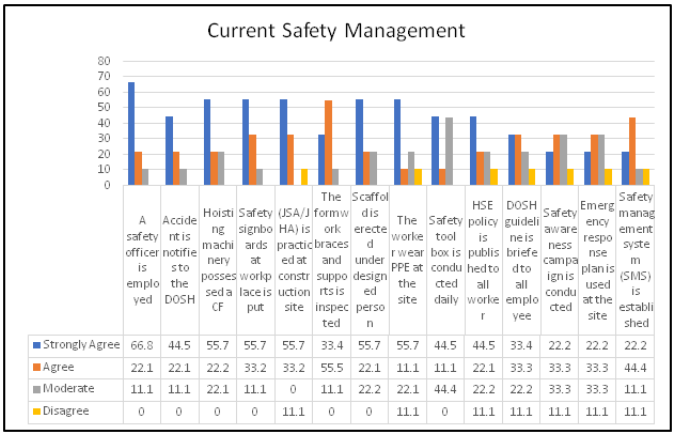

Chart 2: Current practice of safety management based on the respondent

V. DISCUSSION

Construction workers were not wearing proper protective equipment (PPE) on the work. According to the company's site engineer, the site's safety enforcement is strict. The company most likely did not adequately brief their employees on their safety policies. Aside from that, the workers themselves are unconcerned and unaware of the company's safety policies, says the study. The safety committee must take appropriate steps to ensure that all employees are aware of the firm's safety policy, current practice, and program. The items are (JSA/JHA is practiced on the construction site, workers wear PPE on the job, HSE policy is published to all workers, DOSH guidelines are briefed to all employees, safety awareness is conducted, emergency response plans are used on theJob site, and the company has established a Safety Management System) According to chart 2, 11.1 percent of respondents disagree on several items.

VI. CONCLUSION

Every industry requires a high level of safety. Preventing unforeseen accidents at high-rise construction sites is aided by safety measures. Accidents on construction sites can result in fatalities and cost a lot of money. As a result, safety and precautions should be an integral part of every construction site's operations. This will improve the program's success while also ensuring that project activities are completed on time. Each operation has its own set of hazards, and a safety program tailored to those hazards should be developed. As a result, our research has reached the following conclusions:

1. It has been observed that workers are not well-informed about safety and precautions, which is concerning. As a result, the main concern is worker training and awareness, which can be achieved through timely meetings, safety drills, and follow-up as work progresses. All workers on the job should be required to use safety equipment or take precautions in the event of an accident.
2. It was observed at the construction site that they were aware of flammable materials, their proper handling, and storage.
3. Lifts were installed, which was necessary for fire safety reasons.
4. There is no provision for a fire escape or external stairs, which is a major flaw in the construction.
5. A refugee area is provided, which is a significant benefit in terms of high-rise building safety management.
6. Proper housekeeping contributes to the reduction of many hazards on the job site.
7. There are no boilers or gas supply lines on site, which is advantageous because it eliminates the risk of a fire.
8. Fire extinguishers, a water storage tank, and automatic sprinklers have been installed in the building to assist in the event of a fire.
9. There were no air conditioning ducts, so if a fire breaks out, it will cause harm to the occupants, such as suffocation.
10. There was no nearby fire hydrant, which they should have provided.

VII. ACKNOWLEDGMENT

I am grateful to Dr. L. S. Pammar, Department of Civil Engineering, G H Raisoni University, Amravati, for advice and support. Without his informative and critical suggestions, constructive involvement in the construction of appropriate models, this thesis would not have been possible. I'd like to express my gratitude for my parents' and siblings' continued support and motivation. I would like to expressed my sincere gratitude to all of the G H. Raisonsi University staff members as well as my classmates for their tremendous time, encouragement, and cooperation.

REFERENCES

[1] Er.Saurabh J.Gawali, Prof.P.M.Attarde, **"*Safety And Ergonomics Study For High Rise Construction Project",*** IRJET, June 2016, e-ISSN: 2395-0056, p-ISSN: 2395-0072, Page no. 2335-2341.

[2] Dr.Manish Chugh, Gagan Deep Devgan, **"*An Assessment Of Fire Safety Measures And Management In India"***, IJRASET, June 2017, ISSN: 2321-9653, Page no.145-147.

[3] Venumadhav Yemul, Milind Darade, **"*Occupational Safety And Health In Construction Industry For High Rise Building"***, IJISET, December 2014, ISSN: 2348-7968, Page no.322-324.

[4] Afzan Binti Ahmad Zaini,Intan Rohani Endut,Nurzawani Binti Md Sofawan **"*A Review In Developing A High Rise Building Construction Safety And Health Risk Model"***, InCIEC 2014,May 2015,Page no. 253-262

[5] Panchal Varsha Govindbhai, Dodiya Parth Ishwarbhai***, "Safety Measurement Of High Rise Building"***, May 2013, ISSN:2250-1991,Page no. 122-124

[6] Kai Chen Goh, Hui Hwang Goh, Mohd Faizal Omar, Tien Choon Toh,Abdullah Asuhaimi Mohd Zin, **"*Accidents Preventive Practice For High Rise Construction",*** 2016,Page no.1-6.