

Study on the safety Assessment of the Building Construction Projects

Manisha Jamgade¹, Hrishikesh L Patil²

¹Assistant Professor, Department of Civil Engineering, Pillai HOC College of Engineering and Technology Rasayani

²PG student, Department of Civil Engineering, Pillai HOC College of Engineering and Technology Rasayani, India

Abstract -In the field of construction there has been many injuries and accidents compared to other industries. Thus, minimizing accidents and determining construction risks are extremely important. The study in research aims to rank the risk of construction hazards that take place in the construction industry. To achieve this aim, the severity of accidents from the most common hazards at construction sites will be evaluated. The data for this study will be collected by going to different sites and conducting survey and details will be assessed and taken from safety professionals and in chargers including safety managers, safety officers, and safety experts who were randomly selected. And of those, responses will be noted. The outcome of this study can help the company and hierarchy prepare proper safety plans and also to increase the knowledge of partners in construction sites through training and awareness programs.

Key Words: Safety, Assessment, Protection, Case Study, Questionnaire Survey

1. INTRODUCTION

The construction industry is one amongst the least organized and as a result there is a huge scope for the exploitation of labour. In a country like India, safety is all the more important because of lack of social security to the family left behind. Thus, it becomes crucial to consider certain safety measures to prevent accidents. In the created and in addition growing piece of the world, development industry is thought to be a true standout amongst the huge commercial joint ventures as far as its effect on security and safety of the working populace. Development industry is both financially and socially essential. Where in, the development business, in the meantime, is additionally perceived to be the most perilous and competitive. Albeit sensational change has taken in late decades, the safety record in the development business keeps on being one of the poorest in consideration to all. Construction Industry is an important part of the economy in many countries and is often seen as a driver of economic growth especially in many developing countries.

Owing to its relatively labour intensive nature, construction work provide opportunities for employment for a wide range of both people skilled, semi-skilled, and unskilled. Despite its importance, construction industry are considered risky with frequent and high accident rates and ill health problems to workers, practitioners and end users and all the other work force.

Safety in construction is one of the prime requisite but it often gets neglected on work sites. With the advancement in construction technology and management, the need for proper attention to safety aspects has become essential for human, economic and other considerations, the wide range of construction and building activities involving complex techniques have led to many new problems of safety. Proper steps need to be adopted to improve the safety on construction sites. Safety measures at site should be promoted which will result in better work environment, high productivity and much greater contentment among workers. Most of the accident in the construction industry happen mostly because of lack of proper education and training in regard to safety measures and also due to negligence and ignorance on the part of either the worker or management or both. In India It is a well-known fact that the construction industry employs more labour than any other industry.

1.1 GENERAL

The articles, which had “construction safety, health hazards and risk management” as keywords in research papers, were studied thoroughly. These papers have been published in journals, conference proceedings and technical reports in the respective official websites. Out of 50 articles, only thirty-two articles were reviewed, in order to identify the health hazards and risks in construction sites, causes of lacking safety practices and possible methods to improve safety in construction sites.

Safety Assessment is a procedure of analysing and for finding the hazards in each step and to developing safety precautions that can be adopted. Though this technique can be applied at various stages, i.e.during the planning phase, design and starting the process.

It can also be used in reviewing and discover hazards;

- i. Those which may have been overlooked at the design or planning stage during the layout, building, huge machinery, equipment, tools and plants, workstations etc.
- ii. That were noticed subsequently and periodically.
- iii. That were resulted from changes in work procedure or personnel error. Which is considered as the first step in accident analysis as a hazard and its safety training.

1.2 OBJECTIVE

The construction industry always has been a greater risk from generations to generations. Often this risk is not dealt with satisfactorily and as a result the industry has suffered poor performance as an outcome. 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. These risks need to be identified and mitigated to avoid such losses. Proper safety techniques could be adopted and safety aspects should be taken in account. Hence the study focuses safety application in India in field of construction.

- i. To reduce the number of accidents and injuries on the construction site project.
- ii. To do different case studies on the number of accidents that occur on site and remedial measures to be taken to overcome this situation.
- iii. To carry out questionnaire survey to know the present situation of safety usage.
- iv. Safety measures to be taken into the consideration in each and every task of a building construction project.
- v. To create awareness and safety education and training programmes to educate the workers.

2. SAFETY

Safety is one of the main factors to be considered in any work be it in civil work or any other field. Without any safety measures and precautions cannot be executed as safety of the labourers is important. Following are the types of safety that we need to keep in mind;

- i. Normative security: Standardizing security is accomplished when an item or configuration meets the material measures and practices made for outline and development or assembling, paying least concern to the item's real wellbeing history.
- ii. Substantive wellbeing: Substantive or target wellbeing happens when this present reality security history is ideal, regardless of whether the norms are met.
- iii. Perceived wellbeing: Seen or subjective wellbeing alludes to clients' level of solace and view of danger, without the thought of guidelines or security history. Case in point, activity signs are seen as protected, under rare circumstances, they can build car accidents at a crossing point. Activity roundabouts have a by and large good security record yet regularly make drivers nervous.

2.1 SIGNIFICANCE OF SAFETY IN CONSTRUCTION

The development business, utilizing the biggest work power, has represented around 11% of every single word related injury and 20% passing's coming about because of word related mischances and has customarily been considered as an unsafe occupation, because of the high occurrence of word related wounds and lethal mischances. The quantity of deadly word related mishaps in development everywhere throughout the world is difficult to measure, as data on this issue is not accessible for most nations. Global Labour Organization has evaluated that no less than 60,000 fatalities happen at development destinations around the globe consistently. This implies that one such severe mischance happens like clockwork in the area. A large portion of these mishaps are made because of hazardous conduct and risky conditions adopted during construction. In the event that pre-decided security measures in all development operations are legitimately actualized, it helps in lessening mishaps and harm to the labourers, with peril free environment which not just improves the ethical and certainty of specialists additionally the productivity of labourers which minimizes general expense of development.

2.3 SAFETY MEASURES

Prevention of accident should be termed as one of the major aims of construction management, both for human and also for financial aspects. Accidents are likely to occur causing physical injuries, casualties and loss of money though whatever may be the nature of construction projects, In order to prevent accident at construction sites, certain safety measures need to be taken in the following major activities which are prone to high risks of accidents during the construction are Excavation, Drilling and Blasting, Hot Bituminous Work, Handling Machineries, Ladders, Demolition, Form-work and other equipment, Fabrication and Erection, Storage and Scaffolding.

3. METHODOLOGY

In construction, workers perform a great diversity of activities, each one with a specific associated risk. The worker who carries out a task is directly exposed to its associated risks and passively exposed to risks adhered by nearby co-workers. Building design, materials, dimensions and site conditions are often unique, which requires adaptation and a learning curve from site to site. Injuries may occur in a number of ways and at every juncture of the process.



Fig 3.2 Accident due to Electrocution.

3.1 STAGES IN METHODOLOGY

The methodology consists of five stages. The details about the stages are as follows:

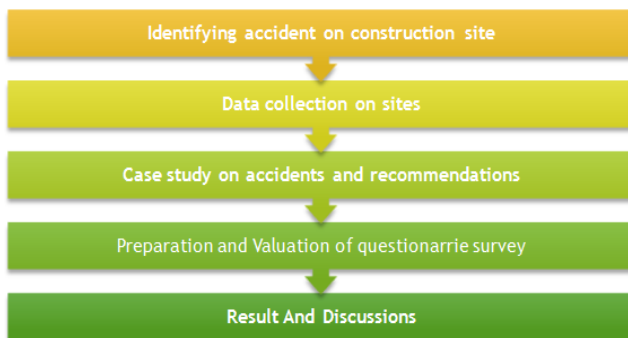


Fig 3.1 Stages adopted in methodology

3.1.2 DATA COLLECTION ON SITES

In the second stage data is collected on the site about the prices of safety equipment's and other site details which are necessary. Below table is one of the data collected from a site.

Safety Equipments and their costs			
Sl. No	Equipment Name	Unit	Cost
1	Construction safety helmet	Piece	275
2	Nylon safety belt	Piece	950
3	Nylon safety net	Sq.ft	10
4	Lanyard	Piece	1830
5	Reflectors	Piece	55
6	Safety gloves	Pair	250
7	Safety shoes	Pair	850
8	PPE kit	Set	175
9	Plastic face shield	Piece	50
10	Scaffolding net	Sq.m	11

3.1.1 IDENTIFYING ACCIDENT ON CONSTRUCTION SITE

The first stage is to know the accidents on a construction site. the common type of accidents in construction industry:

- i. Fall from Height.
- ii. Slips and falls.
- iii. Electrocution.
- iv. Caught between objects or materials.
- v. Falling material and objects.
- vi. Fire and Explosions.
- vii. Overexertion.
- viii. Machinery accidents.
- ix. Getting hit by a vehicle.
- x. Trench collapse.
- xi. Crane or hoist accidents.

3.1.3 CASE STUDY

In the third stage case study was carried out on accidents and recommendations were given based on the data collected from the site. Totally five case studies were done following is one of the case study:

Description: One of the labour was fitting the shuttering sheet for the forth level head room of North block by standing on the other shuttering sheet. In the process the shuttering on which he was standing got displaced and he fell down along with the shuttering on which he was standing after it got displaced and he fell down along with the shuttering sheet to the down floor. His head hit against a welding transformer which was kept there by the client contractor for this work. He sustained multiple injuries at his forehead.

The stair case construction has got a opening of 2mx3m to the level of ground. The height of the head room shuttering work was about 40feet from the ground level. the opening was not protected with either safety net or other means to prevent free fall to the ground. The victim was not even wearing safety belt when working at this height. Due to

this it cost a total loss of Medical Treatment (Rs. 2,20,000/-), First Aid Treatment (Rs. 7500/-) and Compensation (Rs. 3,40,000/-) along with delay of work y two days.

DK = Do not know

Cause of the accident

- i. Not wearing the safety belt when working at 40 feet height
- ii. No fall protection measures were taken
- iii. The site engineers did not advice wearing of safety belt when working at height

Recommendations

- i. Whenever the workers require working at height more than 2 meters, suitable fall protection measures must be taken to prevent free fall of person.
- ii. No person shall be allowed to work without wearing and anchoring of safety belt.
- iii. Toolbox talks must be conducted on the hazards associated with the work and proper use of safety equipment.
- iv. The site engineers should consider safety is part of their responsibility and monitor their workers closely
- v. The subcontractor should have their supervisor present and monitor workers
- vi. Repeated safety violating workers must be removed from site.

Conclusion from the case study

This accidents was caused due to poor safety culture among the subcontractors workers and our site engineers. This accident could have been averted if there was proper fall prevention measures were taken and insisted wearing safety belt by the workers.

3.1.3 PREPARATION AND VALUATION OF QUESTIONARIE SURVEY

The fourth stage consists of preparation of questionnaire survey form by compiling the factors and sending to respondents. The questionnaire form is send to the direct respondents face to face interview is carried out and questionnaire form is filled.

Questionnaire Survey Format
Every section of the audit should have a check : Yes=Observed and in compliance No=Observed and not in compliance Not Needed=Not present on jobsite

SL NO	PERSONAL PROTECTIVE EQUIPMENT NEEDED AT THE WORKSITE 1)YES 2)NO 3)DO NOT KNOW	COMMENTS
1	HARD HATS	
a	Supplied by employer	
b	Worn when required	
2	BOOTS	
a	Supplied by workers	
b	Worn when required	
3	EYE PROTECTION	
a	Supplied by employer	
b	Worn when required	
4	LADDERS	
a	Firm foundation for ladder feet	
b	Proper climbing procedures	
c	Free from obvious defects	
5	SCAFFOLDING	
a	Fall protection used if over 10 feet	
b	Set up on level, stable footing	
c	Platform is appropriate width for type of scaffold	
6	FALL PROTECTION	
a	Fall protection provided for heights 6 ft. or more	
b	Harness is worn properly and attached	
7	MACHINE HAZARDS	
a	Workers are trained on the use of power tools.	
b	Workers have appropriate PPE and keep clothing away	
c	Workers are trained prior to using nail guns	
d	Tile and concrete are cut with wet methods	
8	HEAT STRESS	
a	Are workers provided with enough water	
b	Appropriate rest breaks?	

9	LEAD PAINT HAZARDS	
a	Have workers been trained on handling lead dust?	
b	Is the work area properly contained?	

10	ELECTRICAL HAZARDS	
a	Overhead and underground electrical power lines are located, identified, and avoided.	
b	Ladders, scaffolds, equipment or materials more than 10 feet from any electrical power lines	
11	EXCAVATIONS	
a	Soil and conditions are inspected everyday	
b	Safe exits (ladders) for excavations greater than 4 ft. deep	
c	Shoring, shielding, and inclination assessed for excavations greater than 5 ft. deep	
12	ACTIONS OR CHANGES	
a	Talked to your organizers about health and safety concerns and possible changes/training	
b	Talked to co-workers about health safety concerns	
c	Talked to foreman or contractor about health or safety concerns	
d	Suggested changes in equipment procedures to co-workers	
e	Asked foreman or contractor for changes in equipment or procedures	
f	Asked foreman or contractor for training for self and/or co-workers	

4. RESULT AND DISCUSSION

The questionnaire was distributed among ten companies. These questions are not detailed ones and are responded only in Yes or No so it is difficult to analyze beyond this.

The Construction companies got to include risk as an integral part of their project management. Decision making such a risk assessment in construction projects is very important in the construction management. The identification and assessment of project risk are the critical procedures for projecting success. This study determines the key factors of risk in construction industry.

In order to minimize the risk and increase the safety we need to have planning for safety and training for safety.

4.1 TRAINING FOR SAFETY

In sites proper training about safety should be provided for workers. It is a major component of safety management. Workers should be made aware

about different hazards that can occur in sites and control of those hazards. By this training the workers should be able to handle any emergency situation of safety in sites without panic and also they should understand the relevance of safety practices in sites.

4.1 TRAINING FOR SAFETY

Every construction organization should develop a performance oriented safety program. A safety management procedure is including information about personnel protection equipments, hazardous substances in site, use of power equipments, safety practices, safety policies, emergency procedures in site, responsibilities of workers etc should be made. This safety document should be made available to all the workers in the construction site.

5. CONCLUSIONS

- i. In After doing a Questionnaire survey analysis of 10 different sites, the total Average Yes(%) and total Average No(%) were considered, wherein we come to a conclusion that usage of safety equipments should be made compulsory and needs to be strictly followed to minimise the number of injuries and accidents on sites.
- ii. After analysing the case studies we come to conclusion that the accidents was caused due to poor safety culture among the sub-contractors workers and our site engineers. This accidents could have been averted if there was proper fall prevention measures were taken and insisted wearing safety belt by the workers.
- iii. Through case studies we also come to a conclusion that Medical treatment, First aid treatment, Compensation, Property damage, Rework cost will add on to the total cost of the project which is a major loss to the contractor or company.
- iv. We also come to a conclusion that training programs and seminars should be conducted compulsorily on regular occasions and intervals to create alertness among the workers and to know the value of safety.

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