

Implementation of Safety Management through Review of Construction Activities in M. S. Building Projects.

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Abstract - Construction Industry in India has changed drastically during the last few decades. It is the second largest employing sector next to agricultural sector, but first in terms of accidents close to the road accidents. From the construction of building simple structures, roads and minor civil work projects, the construction industry has changed significantly over the last few decades. Safety on construction job site has been ignored by construction companies worldwide and particularly in countries where labour force is required. Due to increasing numbers of reported accidents and injuries on construction projects, safety is becoming an important issue in construction environment today; also safety is usually discarded by its operator. Hence, safety management plays a very important role in construction industry. Research has shown that false practices by workers and inadequate supervision are the basic causes of an accident. Also failures of management towards safety practices (safety training, safety education, awareness programme, etc) are other consequences of accidents.

The aim of this work is to provide a state of safety and health management in various construction activities, study the health and safety of the workers, study the performance and awareness programs of the organization related to safety of the workers.

Keywords - Construction industry, Safety management, Workers, activities, accidents, etc.

1. Introduction

In India, construction industry is the second largest employer next to agriculture whereas it is next to the road accidents in our country. Construction industry is one of the world's major industries. Its achievement in

rebuilding areas devastated by both natural and man-made disasters, and in providing power, services and communications to meet the rising needs and expectations of people throughout the world, has conferred great benefits on the human race. Despite mechanization, construction remains a major employer of labour – it often employs between 9 and 12 per cent of a country's working population, and sometimes as much as 20 per cent. However, there has been a price to pay for this continuous growth and activity.

Safety at all job sites does not just occur. A safe operation is one which is organized, clean and efficient. If all the employees view accidents in the same way as we consider all other aspects of the company operations, we will be in excellent position not only to control accidents but also to improve the total performance of our company. Therefore it is of utmost importance that all aspects of our safety management be strictly enforced and followed. Although it is difficult to obtain accurate statistics in an industry in which many accidents go undetected and unreported, in many countries known fatal accidents, and those involving loss of working time, frequently exceed those in any other manufacturing industry.

Contributing to the high rate of accidents are those characteristics of the industry which distinguish it from the rest of the manufacturing sector and these are:

1. Damage to plant and equipment.
2. The high proportion of small firms and of self-employed workers.
3. Loss of productive work time while debris is cleared and damaged work rebuilt.
4. The variety and comparatively short life of construction sites.
5. The high turnover of workers.
6. Loss of confidence and reputation.

7. The large numbers of seasonal and migrant workers, many of whom are unfamiliar with construction processes.
8. Exposure to the weather.

The construction industry is one of the most injury-prone industries, in which production is usually prioritized over safety in daily on-site communication. Workers have an informal and oral culture of risk, in which safety is rarely openly expressed. Safety on construction job site has been ignored by construction companies worldwide particularly in countries where large labour force is required. Due to increasing number of reported accidents and injuries on construction project, safety is becoming an important issue today in construction environment.

2. Literature Survey

2.1 Introduction

Construction injuries have a direct impact on the individuals involved in construction as well as on the work itself. Impacts include personal suffering of the injured worker, construction delays and productivity losses, higher insurance premiums that result from injuries, and the possible liability suits for all parties involved in the project. There are many other indirect impacts such as revenue losses on the part of the owner for late project delivery and reduced morale of the work force. The most frequent causes of injuries and deaths on construction sites are falls, being struck-by an object, being caught in or between objects, electrocution, and others, such as toxic gases, drowning, and fire. Generally, most companies follow established safety guidelines and policies that meet OSHA guidelines. However, most incidents and injuries on construction sites are a direct result of not adhering to their established safety procedures. Therefore, to ensure a successful safety program three conditions must exist;

1. Management commitment and leadership.
2. Safe working conditions.
3. Safe work habits by all employees.

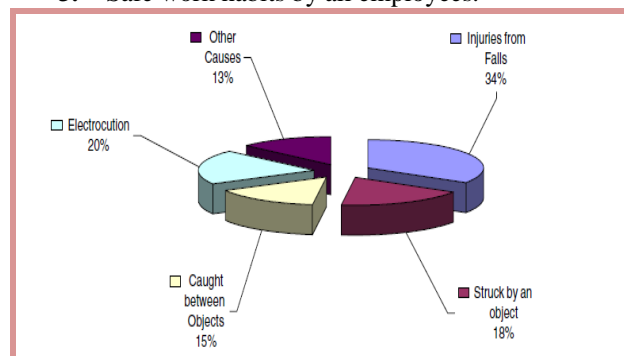


Fig. 2 Percentage Breakdown of Accidents

In other words, a successful safety program relies on the participation of both managers and workers in policymaking and in establishing a feedback system that drives continuous improvement. Moreover, there is a direct correlation between a safe work environment and the safety climate which includes management commitment, communication, and workers involvement and attitudes.

In a study done by Ministry of Labour and Social Affairs, some of the study sample which includes construction and other industries did not keep record of accidents. Some companies did not even report any accident to Ministry of Labour, which makes it hard to identify the accidents and their causes.

As far as the safety of workers is, concerned, Factory act and Mines act are in prevailing in India; but they are legally not applicable to construction accidents as construction is not yet recognised as an industry. Further contract workers are not deemed to be governed under the factories act. Therefore today there is need of accident prevention programme on every project in order to reduce the cost of construction measured in terms of;

- Human lives sacrificed.
- Injuries to workers of any extent.
- Loss of damage to equipment.
- Loss of time during and after construction accident.
- Compensation, insurance cost to workers if expire at work site, during construction period.

Due to accident at any construction site there are injuries to one or more workers which may lead to the death of one or more workers. No doubt the compensation in the form of insurance is paid to the worker; medical assistance is granted; still there are always certain indirect expenses in any form; the contractor has to bear. These losses that are not covered by insurance or compensation are called indirect cost and include the following:

- Cost of lost time of injured employee and that of other employees who either stop the work due to accident or those who are employed for first aid and after assistance to that injured person.
- Cost of supervisory staff in assisting that injured employee involved in investigations for cause of accident and preparing accident report.
- Cost lost due to damaged equipment or damage of other property material, etc.
- Cost due to delayed progress of the work due to accident.

- Cost of payment of wages to the injured person, during the period of the injury; the labour or worker could not attend his duties.
- Cost due to Slowing down the work of other workers/employees due to accident, as there is always a tendency to take extra unnecessary precaution by each worker after the accident; hence works of other employees also slow down and suffer.

Studies have shown that loss due to indirect cost is about four times that of loss of direct cost. As such it is always necessary to take safety measures to avoid accidents.

“Safety Management” means the management functions connected with the carrying on of an enterprise that relate to the safety of personnel in the enterprise, including —

- a) The planning, developing, organizing and implementing of a safety policy.
- b) The measuring or auditing of the performance of those functions.

2.2 Causalities in Construction Activities

Having suggested that current understanding of site safety roles is a problem within the construction industry; this study tempts to reduce the problem by analysing the ability of each entity that plays a major role on construction sites to influence the root causes of accidents. It is suggested that all construction accidents result from one or more of the causes as mentioned in the table below.

- **Negligence** - Failure to observe basic safety rules of instructions or to maintain equipment.
- **Anger/Temper** - Causes a person to become irrational and to disregard common sense.
- **Hasty Decision** - Acting before thinking can lead people to make hazardous “Shortcuts.”
- **Indifference** - A lack of attention to the task; not alert; daydreaming.
- **Distractions** - Interruptions by others perhaps caused by family troubles, bad news, and horseplay while someone performs normal duties or no-routine hazardous tasks.
- **Curiosity** - Workers do something unexpected just to see what will happen.
- **Inadequate Instructions** - Results in an untrained or improperly trained worker.
- **Poor Work Habits** - Cluttered floors / work areas, loose clothing, etc.
- **Overconfidence** - Displayed by behaviour that is too cocky, risk-taking, and macho.

- **Lack of Planning** - Two or more people, each depending on the other to do something, and it doesn't get done.

2.3 Duties and Responsibilities

Duties and responsibilities of each and every one in construction industry are at-most important, failing to which leads to various consequences. Some of these are discussed below;

2.3.1 Project Manager/ Site Manager

- Implement the safety management program and procedures.
- Lead and execute the overall safety programme.
- Be the Chairman of safety committee and take follow-up action on safety matters discussed.
- Conduct regular inspections and audits on safety provisions.
- Responsible for safety and health at the site and other relevant legislation.
- Ensures safety takes precedence over work operations.
- Organize safety patrol and inspection programs.
- Enforce the company's safety rules and regulations.

2.3.2 Site Engineer

- In-charge of overall structural work and inspection.
- Act as a site manager in the absence of the site manager.
- Implement all safety provisions during the progress of work.

2.3.3 Safety Officer

- Act as the secretary of safety committee.
- Ensures that the safety management is being implemented and monitored accordingly and also assuring its adherence.
- Promotes the safe conduct of work within the site.
- Advises management on all matter pertaining to safety.
- Facilitate accident investigation and put up recommendations to prevent recurrence of similar accidents
- Conduct periodic safety inspections / direct his safety supervisors to inspect on his behalf to identify unsafe acts / unsafe conditions.
- Advise the safety committee on safety matters.
- Maintains all documents pertaining to safety.

2.3.4 Site Safety Supervisor

- Act as Asst. secretary of safety committee.
- Conduct daily inspection and act on unsafe acts and conditions.
- Train and monitor workers work practices.
- Monitor the conduct of toolbox meetings.
- Maintain and monitor safety records and checklist.
- Check each sub-contractor's work plan or work procedure from the safety point of view and advise the person in charge during progress of work.
- Safety supervisor shall advise the main/ sub-contractors' site supervisors of his opinion or concept from safety point of view.
- Safety supervisors shall patrol the site daily.

2.3.5 Site Foreman/Site Supervisor

- Check the sub-contractors work to ensure compliance with the safety regulations.
- Rectify any unsafe condition and correct any unsafe practice immediately.
- Attend the safety meeting to contribute the work site safe working condition.
- Take instruction from site staff related to safety matters.
- Promote safe conduct and safe work practices.
- Participate in safety patrol and inspections.

2.3.6 Sub-Contractors Foreman

- Ensure compliance of safety provisions at their work areas.
- Conduct daily inspection and act on unsafe acts and conditions.
- Conduct daily toolbox meeting.
- Monitor workers for safe work practices.
- To attend safety meeting.

2.3.7 Sub-Contractors Safety Supervisor

- Ensure safe work practices during operations under his control.
- Take instructions from site safety personnel pertaining to safety matters.
- Ensure safety provisions are adequately provided and maintained.
- Ensure workers under his control are trained in safety.
- Observe all safety procedure and report any unsafe conditions and practices.

- Attends safety committee meetings and participates in safety promotional activities.

2.3.8 Workers

- It is their primary duty to wear and make use of all personal protective equipment issued by the company while carrying out their duties.
- All equipment and hand tools must be kept in good condition.
- They must observe all safety precautions and report any unsafe conditions immediately.
- All injuries, accident or dangerous occurrence must be reported immediately.
- All workers must undergo the compulsory Safety Orientation Course.

3. Data Collection

Data is collected by means of visiting various sites and obtaining data from the responded. The data is collected with the help of following questionnaires.

- Physical examination of workers
- Personal protective equipment
- Safety orientation
- Field safety meeting (toolbox meeting)
- Company organization with regard to safety
- First aid personnel
- Job site safety inspections:
- Discussing safety during site visits
- Safety awards
- Safety budget
- Allocation of safety expenses
- Safety inclusion in progress meetings

Latter survey was carried amongst the workers working in the firm to know how safety management practices are taking place at the site. In this survey, suggestions from workers who are given various tasks are taken. The survey was carried out at two different firms irrespective of their size.

Common questionnaires were prepared for the two sites in the tabular format as shown below.

Table.3.1 Format for Questionnaires

Sr. No.	Questions	Every Time / Always	Frequently	Not at all
1	Health check-up of workers.			
2	Provision of PPE at workplace.			
3	Maintenance of PPE.			
4	First aid facilities at site.			
5	Availability of safety in-charge, safety officer, safety supervisor. (Site Supervisors looks into the matter)			
6	Education regarding safety via. Training, workshops, etc at site.			
7	Provision of safety notices, safety boards, safety banners at site.			
8	Provision of regional language notices in regard to safety.			
9	Good workplace conditions.			
10	Periodic safety inspection.			
11	Motivate workers.			
12	Safety awards.			
13	Expenditure for safety.			
14	Provision for any compensation.			

4. Analysis of Data

Data analysis is the procedure of bringing out meaning to the data collected. In this section, the data collected from various sites are analysed. The data is analysed depending upon the workers opinion about safety practices at workplace. The analysis is done by showings various pie diagrams which determine the percentage of safety practices at site.

Every Time/Always = Satisfy

Frequently = Average

Not at all = Not satisfy

Out of the following questions asked to workers, following were the responses at one site (responses were taken randomly from five workers);

- Satisfy answers of workers only on 15 questions;

hence, out of 100% safety practices only 21.42% results were found to be on satisfactorily side.

- Average answers of workers on 38 questions; hence, out of 100% safety practices 54.28% results were found to be on average side
- Not-Satisfy answers of worker on 17 questions; hence, out of 100% safety practices 24.28% results were found to be on not-satisfactorily side.

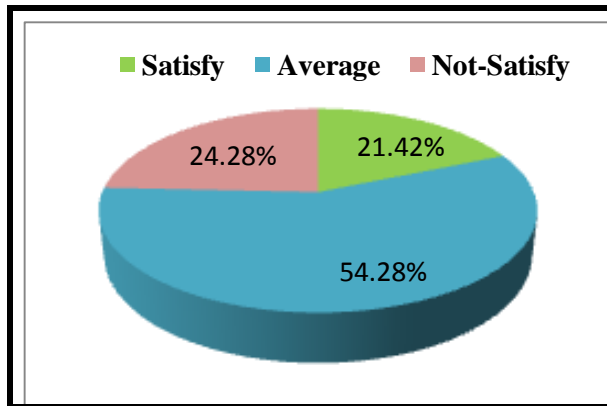


Fig.4.1 Percentages of Safety Practices

Out of the following questions asked to workers, following were the responses at one site (responses were taken randomly from five workers);

- Satisfy answers of workers only on 50 questions; Hence, out of 100% safety practices only 71.43% results were found to be on satisfactorily side.
- Average answers of workers on 20 questions; Hence, out of 100% safety practices 28.57% results were found to be on average side
- Since there were not a single not satisfy answer of workers, it is assumed that 00% results are on not satisfactorily sides.

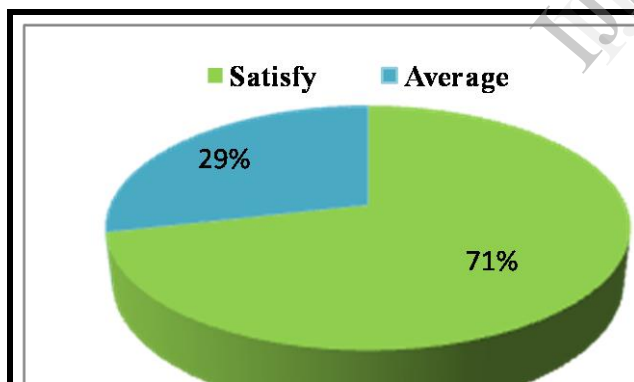


Fig.4.2 Percentages of Safety Practices

5. Suggestion and Recommendation

Following were the suggestion and recommendations given to the workers;

- Appointment of competent authority for the health check-up of the workers. Also to keep record of such work.
- Organising of safety camp, training, mock drills in the premises to the workers.

- Regularly updating and checking of PPE by competent person and also to keep its record.
- Provision of safety emergency such as ambulance at site, first aid facilities, appointment of safety officer, etc.
- Educating workers via training, workshop, seminars, etc
- Provision of safety sign such as safety warning, safety banners, safety boards, safety notices, etc.
- In case of migrant workers there should be provision of regional language notice boards or workplace should be provided with posters, pictures, etc.
- Periodic inspection should be given to the workplace of the workers by the safety officer, management, etc.
- Awards should be given to the workers in the form of memento, cash, certificates, leaves, gifts, etc for good work which includes safety practices during work.
- Expenditure should be done by the company on the workers health, maintaining good workplace, purchasing latest PPE, etc.
- Also compensation should be provided to the workers in case of any incident taking place at the time of work.
- Company, management, safety officer, site supervisor, workers, etc are themselves responsible for carrying out safe work practices.

6. Conclusion

Construction industry is considered as the back bone of the country. Its contribution in the development of the country is very crucial, since it is the second largest sector employing the workers next to the agricultural sector, but in case of accident it is the first sector next to the road accidents. This does not result only in loss of life and property and slow down of the work, but also create a feeling of fearness amongst its operators (management, supervisors, workers, etc).

Safety Management therefore plays a very important role in construction industry.

Managing safety is the duty of its operators. By going through the above project work the following conclusions are drawn;

1. Various causes of accidents that results in losses (property, money, manpower, equipment, etc) are determine according to their occurrences.
2. After determining the causes these are classified on the basis of the activities carried out by the workers in and around the construction site. Also behaviours and work place conditions of the workers are also studied.

3. In order check whether the work place is safe or not investigation is carried out with the help of safety committee. Investigation helps to determine the work place conditions and the attitude of the workers in respect to their work.
 4. Investigation checks the provision of PPE at the job site. Also, it helps in identifying the causes that can results in accidents.
 5. Safety can also be maintained in and around the work place if its operators do not neglect their duties and responsibilities.
 6. Laws which are related to safety plays a very crucial role are also being introduce in order to check whether the construction industry look toward the safety of its employees.
 7. Workers safety and health education helps in motivating themselves. They are provided with the knowledge of safety by means of training, lecture, films, posters, etc. This lead to the safety and results in building confidence.
 8. Awareness programme are also conducted for the newly joined and existing workers in the company premises for their health and safety.
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Therefore, safety management should be implemented in order to study the performances of the organization related to safety. Also awareness programmes, training, education and management committed to safety will also provide a safe working platform to its operators.

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